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# INVESTIGATION
# OF
# DOUBLE FATALITY ACCIDENT
# AT
# NEW WASTE CALCINING FACILITY
# CONSTRUCTION SITE
# NOVEMBER 15, 1977

Idaho National Engineering Laboratory
U.S. Department of Energy

December 1977

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December 8, 1977

# I. PURPOSE AND SCOPE OF INVESTIGATION

On November 15, 1977, an accident resulting in two fatalities occurred at the construction site of the New Waste Calcining Facility (NWCF) located at the Idaho National Engineering Laboratory (INEL). Immediately following the accident, the Manager, Idaho Operations Office, Department of Energy (DOE), appointed a DOE Investigating Committee. The DOE Investigating Committee was charged with the conduct of an investigation and the preparation of a report of the facts and conclusions concerning this accident. The investigation was to be conducted in accordance with DOE Manual Chapter 0502 and was to identify the causal events and the management systems which should have prevented the accident. The letter appointing the Investigating Committee is included as Appendix A. The investigation was begun on November 15, 1977. A Management Oversight and Risk Tree (MORT) analysis was used to assist in the investigation. The Committee developed facts, analyses, and conclusions from the following:

1. Visits to the accident location at the NWCF construction site

2. Review of documentary photographs of the construction site and the pre-accident scene

3. Interviews and written statements (obtained immediately after the accident by DOE-ID Operational Safety Division personnel) from eyewitnesses actually involved in the accident and rescue attempt

4. Photographs taken at the accident scene

5. Interviews (conducted by the Investigating Committee) of personnel involved in the accident and rescue efforts and personnel responsible for various aspects of Jones/BOECON construction activities

6. Review of applicable Jones/BOECON procedures, logs, and other formal documentation concerning NWCF construction activities

7. Review of engineering drawings

8. Review of OSHA standards as identified by contract specifications

9. Review of the DOE-ID Warning Communications Center (WCC) radio log.

A list of the personnel providing information to the Investigating Committee is in Appendix B.

## II. SUMMARY

On November 15, 1977, at approximately 7:10 a.m., an accident occurred at the construction site of the New Waste Calcining Facility (NWCF) located at the Idaho National Engineering Laboratory (INEL), which resulted in the death of two construction laborers, employees of Jones/BOECON. The two employees were participating in third-shift backfill operations in the northwest corner of the NWCF excavation site, in an area designated as stairwell #2, when the north bank of the NWCF excavation adjacent to stairwell #2 collapsed, covering the two employees with 2 to 3 feet of earth.

The laborers were engaged in the backfill operation which had begun November 8, 1977. The method of extending the backfill into the west end of the excavation was informally discussed by the Jones/BOECON General Superintendent, the Civil/Structural Superintendent, and the operating engineer foreman. A decision was made to reach the west end by going around stairwell #2 in the northwest corner. Neither the schedule nor details of how to proceed around the stairwell were discussed.

The operating engineer foreman directed a loader operator to construct an access ramp around the northwest corner on the second shift, November 14, 1977. Construction of an access ramp required cutting back the earth embankment beside the stairwell until the opening was wide enough to allow heavy equipment to pass. This created a vertical bank that varied in height from 6 to 10 feet, and which intersected an interface between undisturbed and compacted soil left from an earlier (1959-60) adjacent excavation.

The laborers working the third shift began hand compacting loose material around the northwest corner about 6:00 a.m., November 15. Two of the laborers were standing near the vertical bank at 7:10 a.m. when a self-propelled vibratory roller approached to within about 20 feet of their position. At that time, the vertical bank collapsed, burying them completely, and causing their deaths by suffocation.

The probable cause of the accident was the failure of management systems to prevent the cutting of a vertical bank through a compacted soil/undisturbed soil interface and to provide adequate controls to prevent personnel from being in the energy path of a potentially hazardous situation.

The more significant findings resulting from the Committee's investigation are:

1. The actual implementation of the Safety Program was not adequate to accomplish the elements described by the Jones/BOECON Safety Program and management directives.

2. There was no Jones/BOECON training program which would provide guidance for supervisors in discharging their responsibilities concerning safety (as described by Jones/BOECON POP-602 and -606).

3. The job safety training provided to Jones/BOECON employees was not adequate to acquaint the craft personnel with job safety requirements or to prevent personnel exposure to hazardous conditions.

4. The decision to cut the north slope of the NWCF excavation to a vertical condition at stairwell #2 was made at an incorrect level of management and without adequate analysis of the safety considerations or consequences of the change. The Events and Causal Factors Sequence Chart which summarizes the accident is shown in Figure 1.

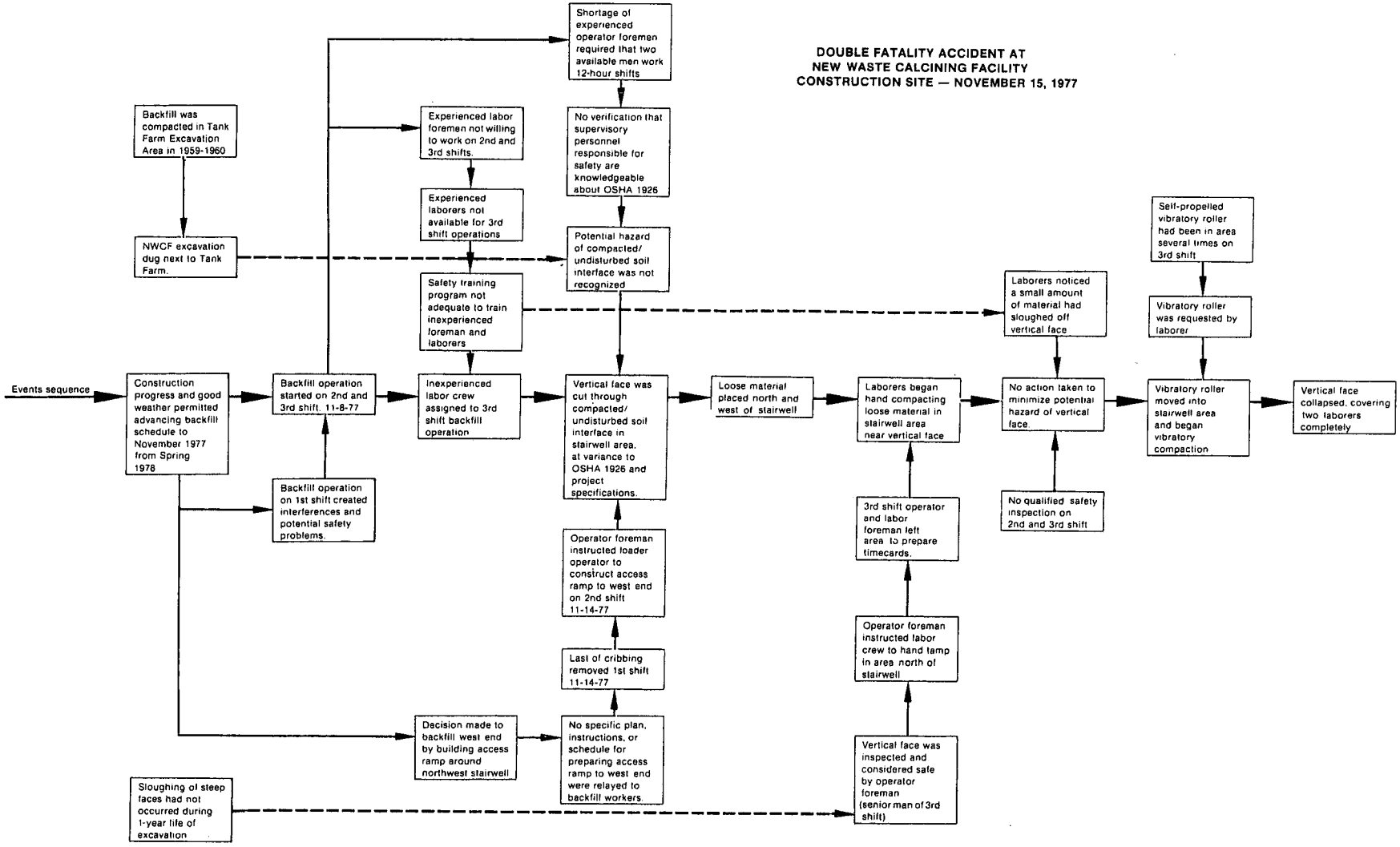



Fig. 1 Events and causal factors sequence chart.

## III. FACTS

### A. BACKGROUND

On October 28, 1976, Jones/BOECON, a joint venture of J. A. Jones Construction Company and BOECON, the Boeing construction subsidiary, entered into Contract No. EY-76-C-07-1565 with the Energy Research and Development Administration (ERDA). This contract provided that Jones/BOECON would construct the New Waste Calcining Facility (NWCF) at the Idaho National Engineering Laboratory (INEL). The NWCF was to be constructed in an area at INEL known as the Idaho Chemical Processing Plant (ICPP). Figures 2 and 3 show the location of the ICPP and the NWCF construction site.

Construction began October 5, 1976, and, at the time of the accident, was 10.5% complete. Jones/BOECON had employed 68 indirect staff personnel and 263 craft personnel. The construction activities in progress on first shift, November 14, 1977, included placement of reinforcing steel, formwork, placement of concrete, mechanical fabrication, and embedment installation. Second shift activities included formwork stripping, general cleanup, and backfill operations; backfill was the only activity on third shift. The second- and third-shift operations had begun on November 8, 1977. All construction activities had been accomplished previously on first shift.

### B. THE ACCIDENT

On the evening of November 14 and the morning of November 15, 1977, Jones/BOECON personnel were engaged in a backfill operation on the north side of the New Waste Calcining Facility (NWCF) construction site. The backfill operation was being conducted on the second (4:30 p.m. to 12:30 a.m.) and third (12:30 p.m. to 8:00 a.m.) shifts due to a Jones/BOECON management decision that it could be conducted in a safer manner, i.e., with less congestion of men and machines, than if it were conducted on the first shift (8:00 a.m. to 4:30 p.m.).

The backfill operation was to proceed around stairwell #2 at the northwest corner of the NWCF building to the west end of the excavation area (Figure 4). The clearance between the building and the excavation slope around the stairwell corner was about 6 feet. An access ramp was made around stairwell #2 by a front-end loader between 7:00 and 8:00 p.m., November 14, to permit access of heavy equipment needed for backfill in the west end. Construction of this ramp created a vertical bank (from 6 to 10 feet high) which was slightly undercut. The vertical bank was cut through a compacted/undisturbed soil interface formed during the Tank Farm construction completed in 1959-60. This vertical condition violated contract specifications and OSHA requirements and was not properly documented.

At various times between 8:00 p.m., November 14 and 6:00 a.m., November 15, a 9-ton self-propelled vibratory roller (Figure 5) and a front-end loader were used to improve the access ramp. Some hand compaction was also accomplished by craft labor during this period. Both operating engineer and labor foremen had inspected the vertical bank adjacent to stairwell #2 and had considered it safe.

# IDAHO NATIONAL ENGINEERING LABORATORY

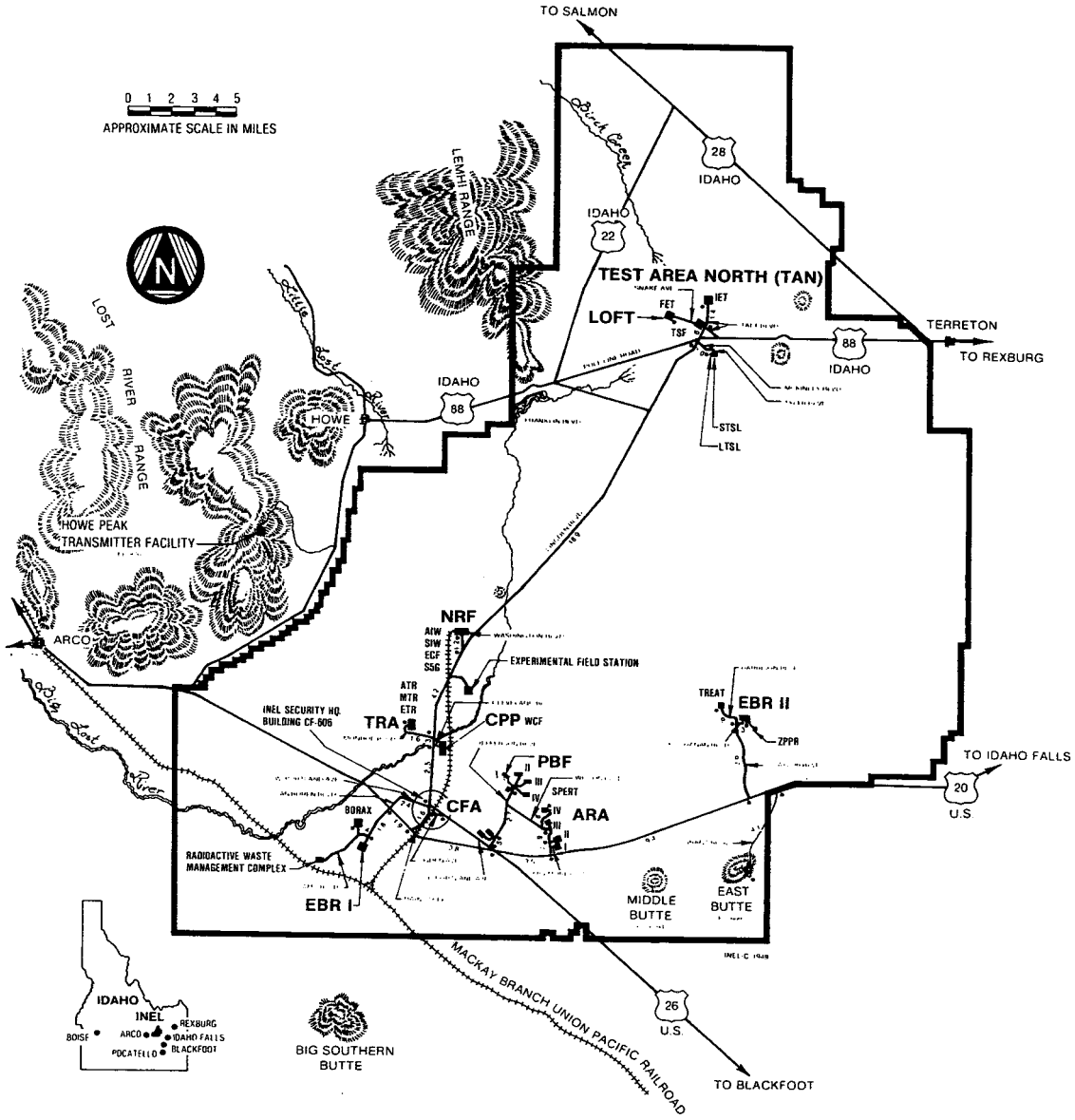
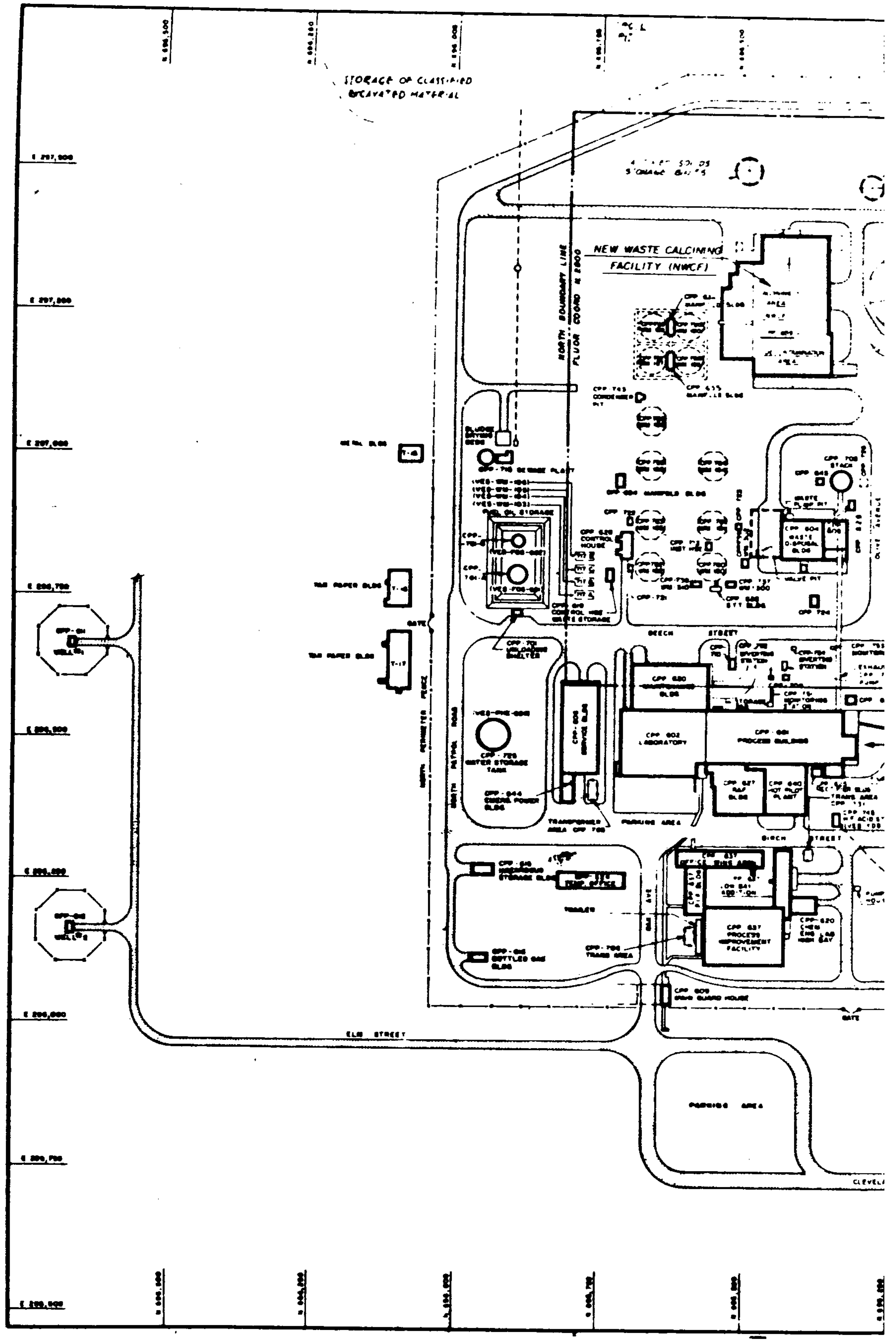



Fig. 2 Map of INEL.


STORAGE OF CLASSIFIED EXCAVATED MATERIAL
NEW WASTE CALCINING FACILITY (NWCF)
NORTH BOUNDARY LINE
FLUOR COORD N 2800
CONDENSER PIT
SLUDGE DRYING BEDS
SEWAGE PLANT
FUEL OIL STORAGE
METAL BLDG
TAR PAPER BLDG
T-16
T-17
GATE
NORTH PERIMETER FENCE
NORTH PATROL ROAD
CONTROL HOUSE
STACK
WASTE DISPOSAL BLDG
VALVE PIT
BEECH STREET
CPP 602 LABORATORY
PROCESS BUILDING
WATER STORAGE TANK
HOT PILOT PLANT
TRANSFORMER AREA
PARKING AREA
BIRCH STREET
CPP 637 PROCESS IMPROVEMENT FACILITY
CPP-620 CHEM ENG LAB HIGH BAY
TRAILER
BOTTLED GAS BLDG
GUARD HOUSE
ELM STREET
PARKING AREA

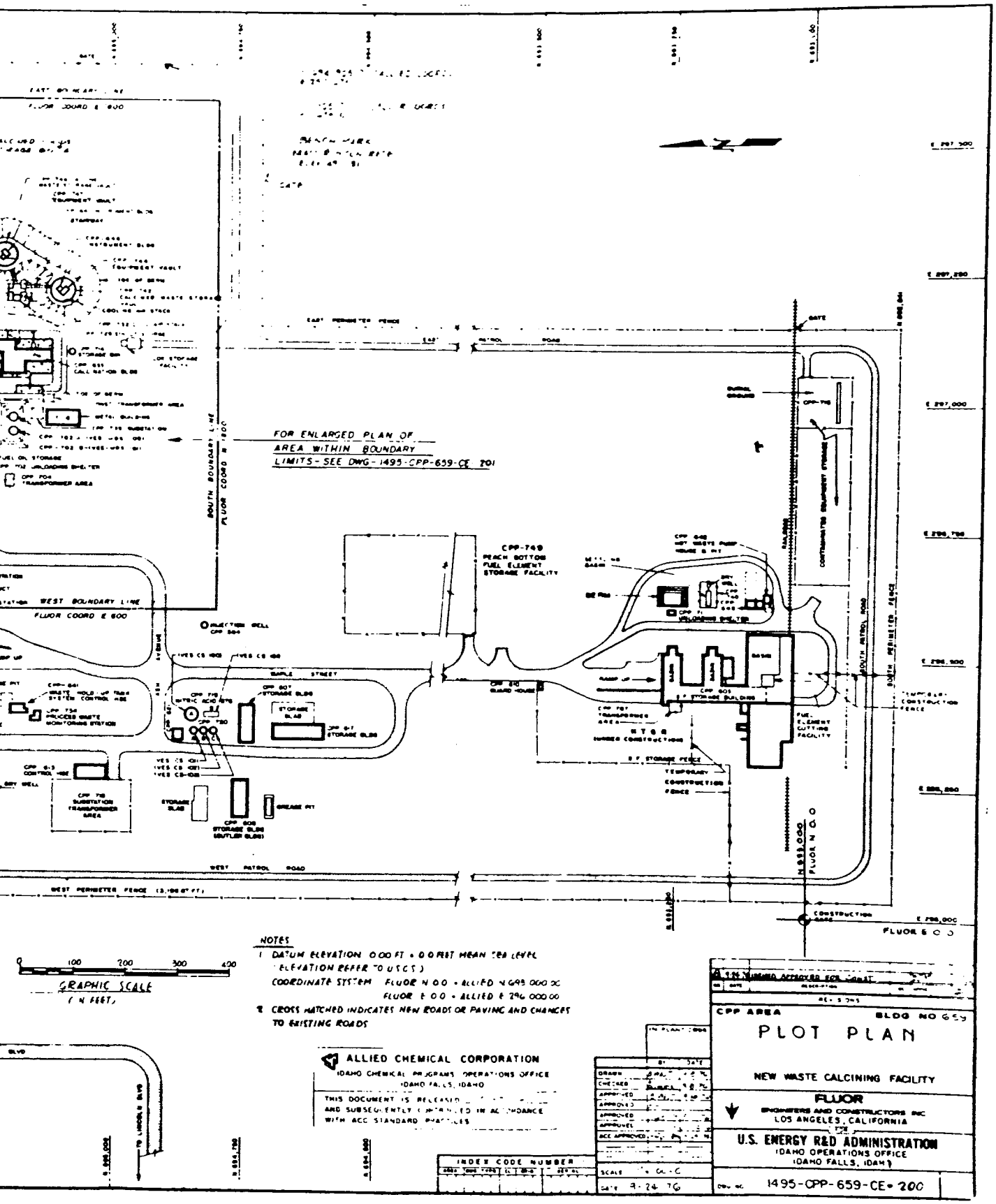



Fig. 3 Overall plan of ICPP showing location of NWCF.

Fig. 4 NWCF construction site -- looking southeast.

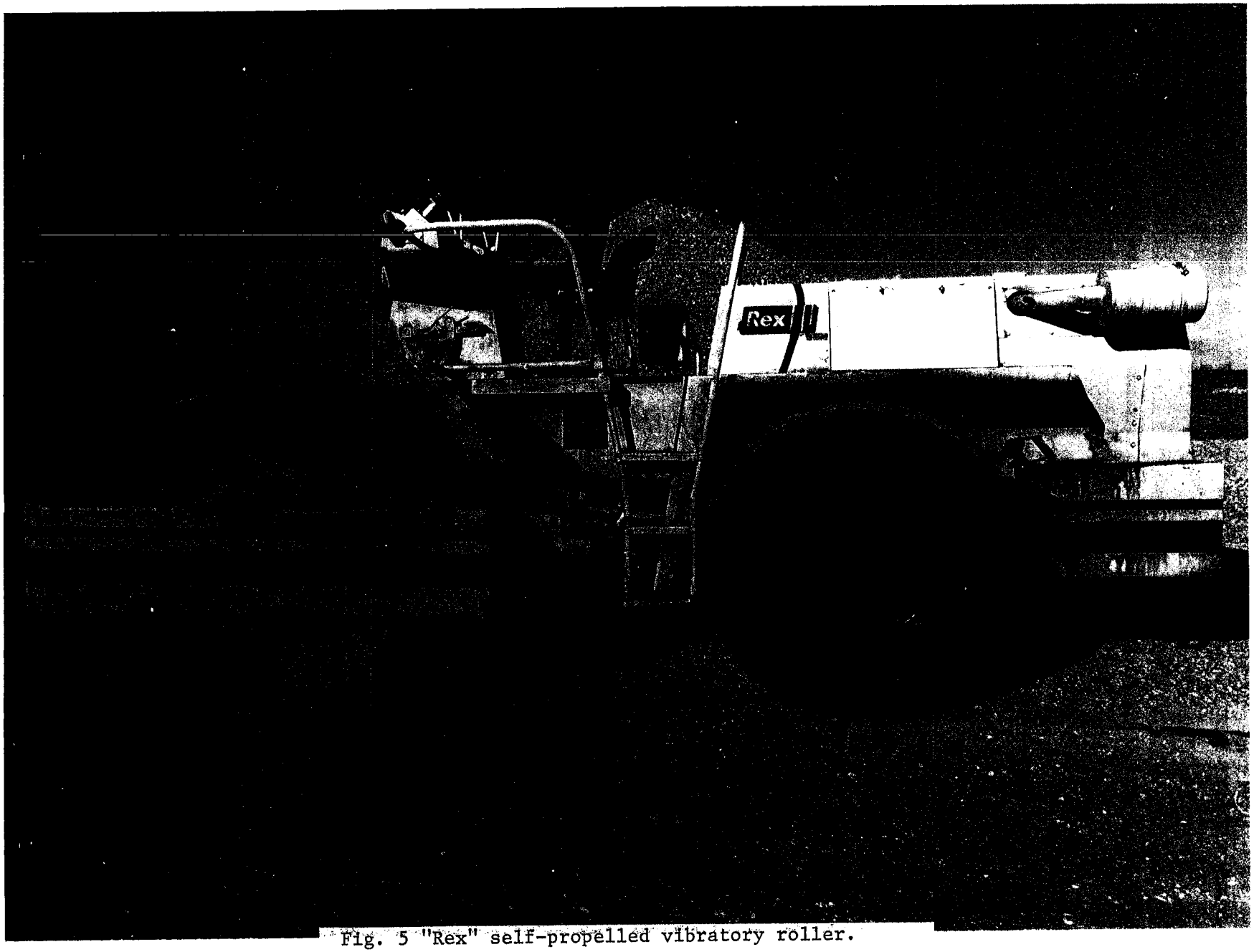



Fig. 5 "Rex" self-propelled vibratory roller.

At approximately 6:00 a.m., November 15, the hand compaction of backfill adjacent to the north side of the NWCF building had progressed to the point that the next step in the backfill operation was hand compaction of loose material on the ramp around stairwell #2. The contract specifications require hand compaction within 5 feet of the building.

Four laborers and a foreman began compaction of loose fill material north and west of stairwell #2 with shovels and motor-powered hand compactors (Figure 6). This compaction effort placed the laborers next to the vertical bank created by construction of the access ramp to the west of the NWCF building.

At approximately 6:55 a.m., the labor foreman left the building site to fill out timecards, leaving the four laborers to continue hand compaction in the area north and west of stairwell #2. The area was well lit by temporary lighting. At approximately 7:05 a.m., the roller operator drove the self-propelled vibratory roller to the northeast corner of stairwell #2. The roller had been requested by the loader operator, who was relaying a request of the laborers for the roller. Two laborers moved east out of the area as the roller approached stairwell #2, and the other two laborers stood below and west of the roller on the ramp with their backs to the vertical bank. The roller operator engaged the vibrating mechanism on the roller and started down the access road. At this time, approximately 7:10 a.m., a section of the vertical bank broke loose and toppled like a tree onto the two laborers standing adjacent to the bank, covering them completely.

The two other laborers and a loader operator saw the bank collapse and immediately began to extricate the buried laborers. The roller operator also saw the collapse and immediately went for help. A security guard who was on a routine patrol of the construction site observed the commotion, intercepted the roller operator, and learned of the accident. At approximately 7:11 a.m., the guard used his radio to notify Post 300, Security Patrol Headquarters at Central Facilities Area (CFA) of the accident and the need for the ambulance and trained emergency response personnel. Additional help from the NWCF area began arriving at the accident scene within 3 to 5 minutes after the accident occurred.

The Department of Energy (DOE) Fire Station #1 was notified by Post 300 that two Jones/BOECON workers were buried at the NWCF construction site. The Fire Department responded at 7:13 a.m. with six firemen and one nurse transported in Foam Unit #1, Engine #1, Truck #1, and an ambulance. They arrived at the NWCF construction site, a distance of 4 miles from Fire Station #1 (CFA) at 7:19 a.m. Upon arrival, it was noted that one laborer was partially uncovered and the men were still searching for the other laborer. The Assistant Fire Chief arrived in the Chief's car at 7:32 a.m., at which time the second laborer had been located and was being uncovered. Foam Unit #2 from Fire Station #3, Test Area North (TAN) arrived with two firemen at 7:32 a.m., and a rescue unit from Fire Station #2 (EBR-II) arrived with two firemen at 7:38 a.m. Resuscitation efforts were begun on the first laborer by Jones/BOECON construction personnel trained in mouth-to-mouth resuscitation and cardiopulmonary resuscitation. No vital signs were apparent in the first laborer when he was uncovered. Upon arrival, the

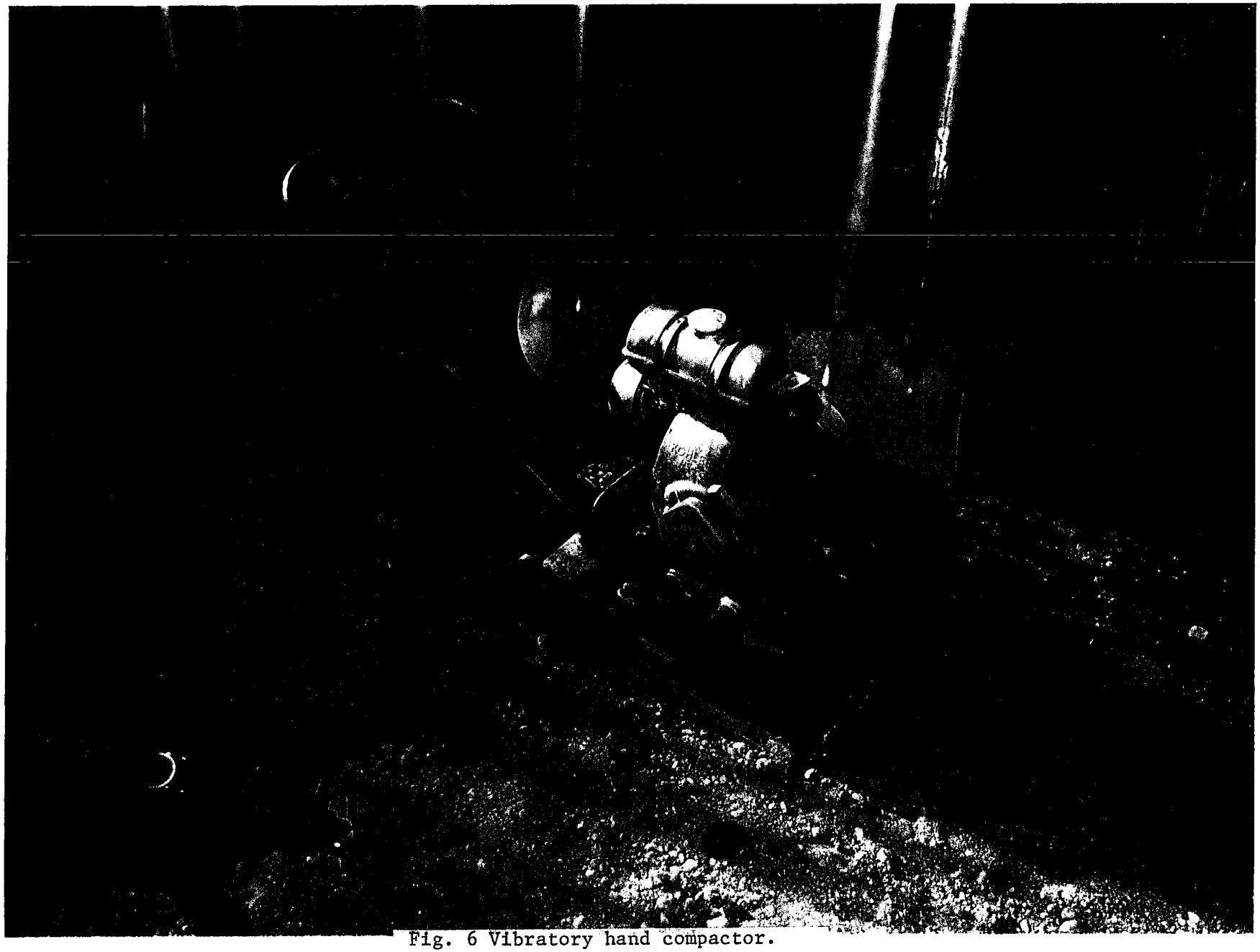


Fig. 6 Vibratory hand compactor.

Fire Department personnel and the nurse aided the resuscitation efforts and assisted in the location of the second laborer. Although no vital signs were apparent when the second laborer was uncovered, resuscitation efforts were begun immediately. The resuscitation efforts on both individuals were continued while they were loaded into the ambulance and transported to the CFA Dispensary where they were pronounced dead by the DOE physician. The two laborers were 23 and 25 years old, and had begun working for Jones/BOECON on November 11, 1977. As far as the Committee could determine, the two victims had no previous heavy construction experience.

## C. EMERGENCY RESPONSE ASPECTS

The time of the accident of 7:10 a.m. was established by a DOE Operational Safety Division (ID-OSD) interviewer during a post-accident interview with an eyewitness who was looking up from his watch when he saw the bank collapse. The security guard at the scene called Post 300 at 7:10:52 a.m. The Security Officer at Post 300 called the Fire Department and requested the ambulance and emergency response personnel. At 7:13:11, the Fire Department radio operator notified the Warning Communications Center that the emergency personnel and vehicles were responding, i.e., had just left the fire station. Following normal practice, the ambulance went by the CFA Dispensary to pick up the nurse and proceeded to the accident scene. The emergency equipment from CFA arrived at the scene at 7:19 a.m., the unit from Fire Station #3 arrived at 7:32 a.m., and the rescue unit from Fire Station #2 arrived at 7:38 a.m.

The distance to the NWCF construction site from CFA is 3.7 miles; from TAN, 24.7 miles; and from EBR-II, 23.6 miles. Most of the road from EBR-II to CFA is public highway. Refer to Figure 2 for the location of these facilities.

## D. POST-ACCIDENT EVENTS

Following the removal of the victims from the accident scene, Jones/BOECON management initiated action to secure the scene based on instructions provided by ID-OSD.

ID-OSD personnel reported to the NWCF construction site, inspected the accident scene, and had documentary photographs taken of the accident scene and surrounding area topographical plot drawn (Figures 7-12). The ID-OSD personnel began interviews of eyewitnesses and obtained preliminary written statements from individuals who were directly and indirectly involved immediately before the accident and during the rescue activities following the accident.

Immediately after his return from the accident scene, the DOE Idaho Operations Office Manager issued a letter (Appendix A) which appointed a DOE Investigating Committee to conduct an investigation and prepare a report in accordance with DOEM 0502. The Committee officially began its investigation on the afternoon of November 15, 1977, by reviewing available information and having discussions with ID-OSD personnel who had returned from the accident scene.

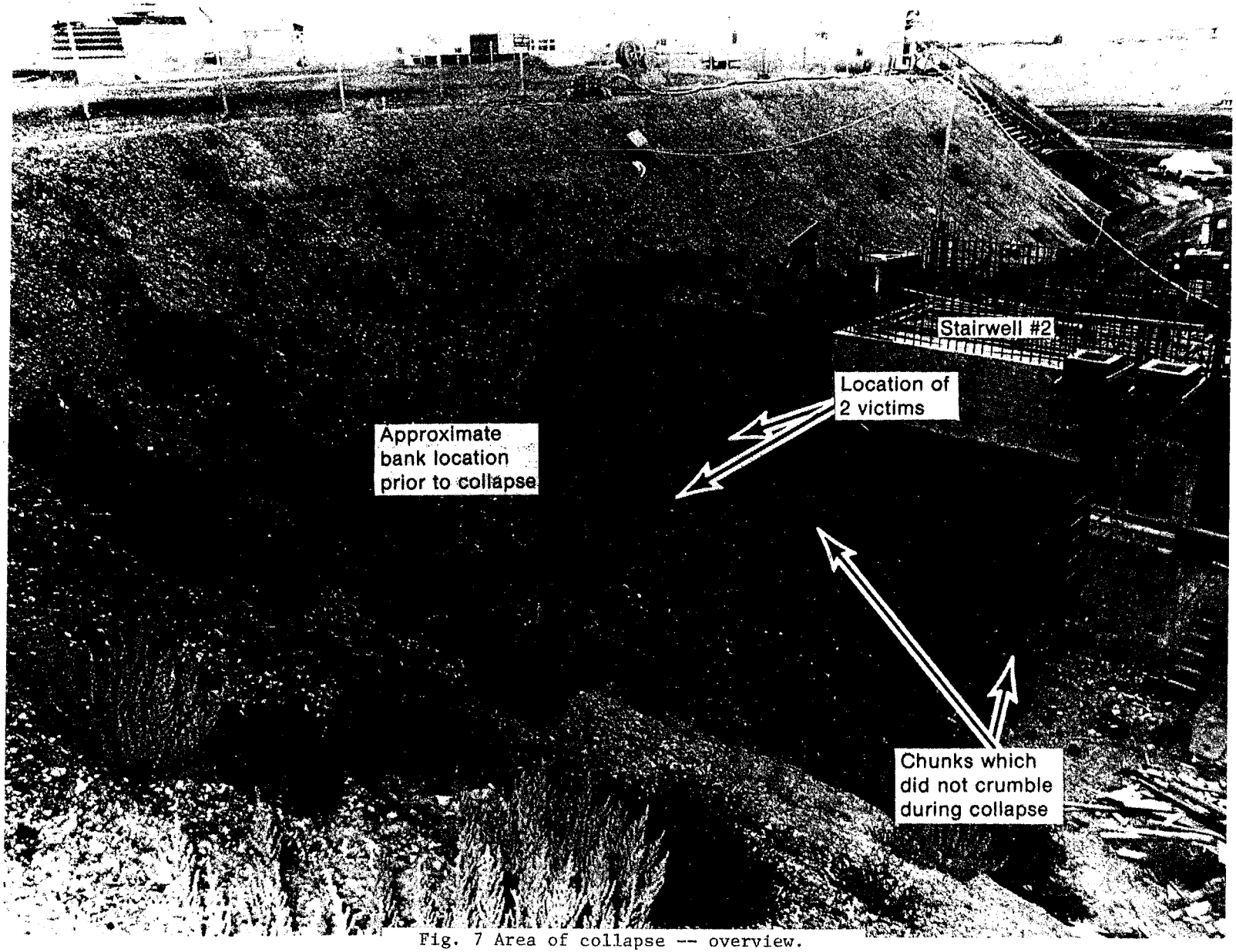



Fig. 7 Area of collapse -- overview.

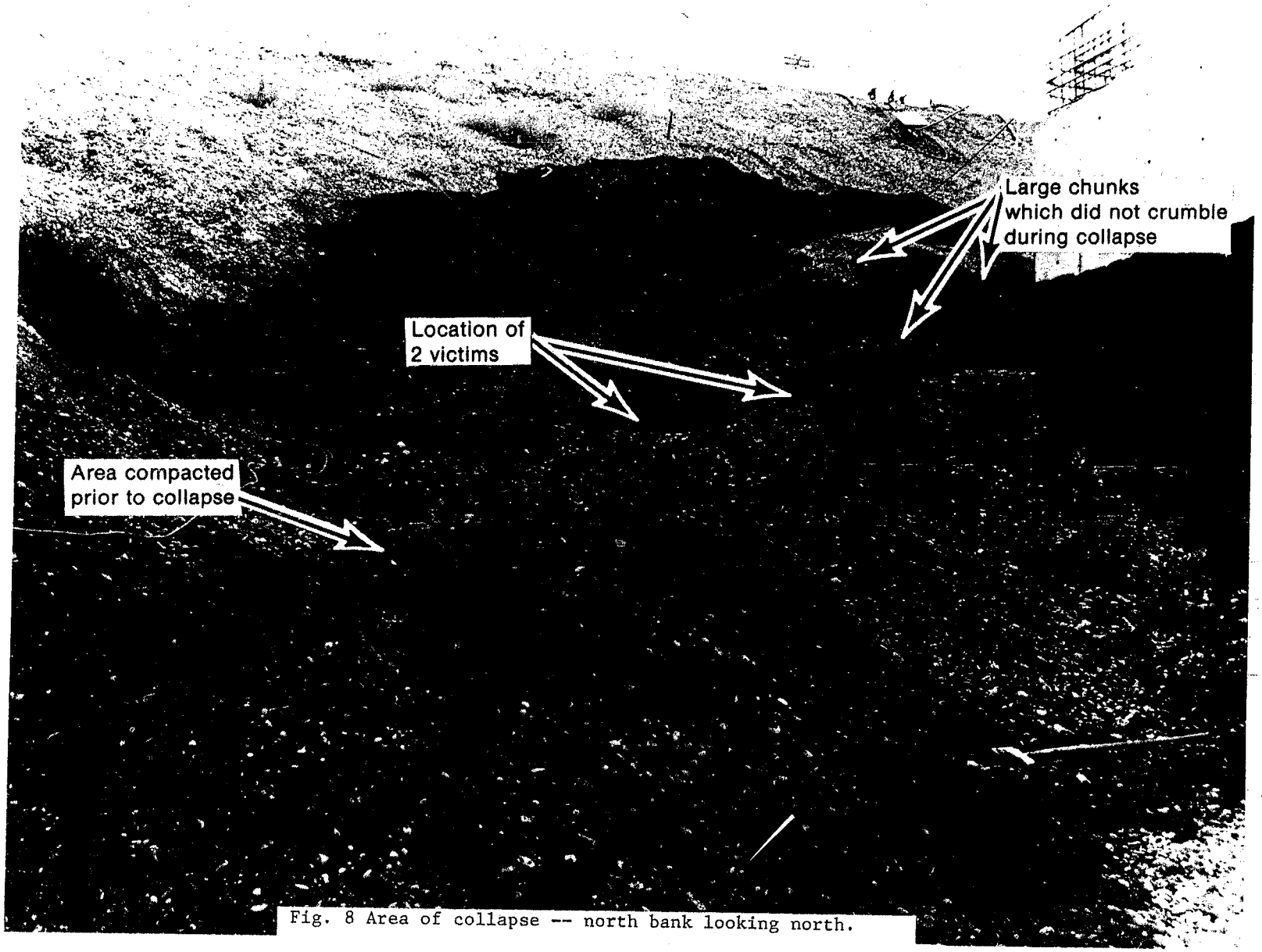



Fig. 8 Area of collapse -- north bank looking north.

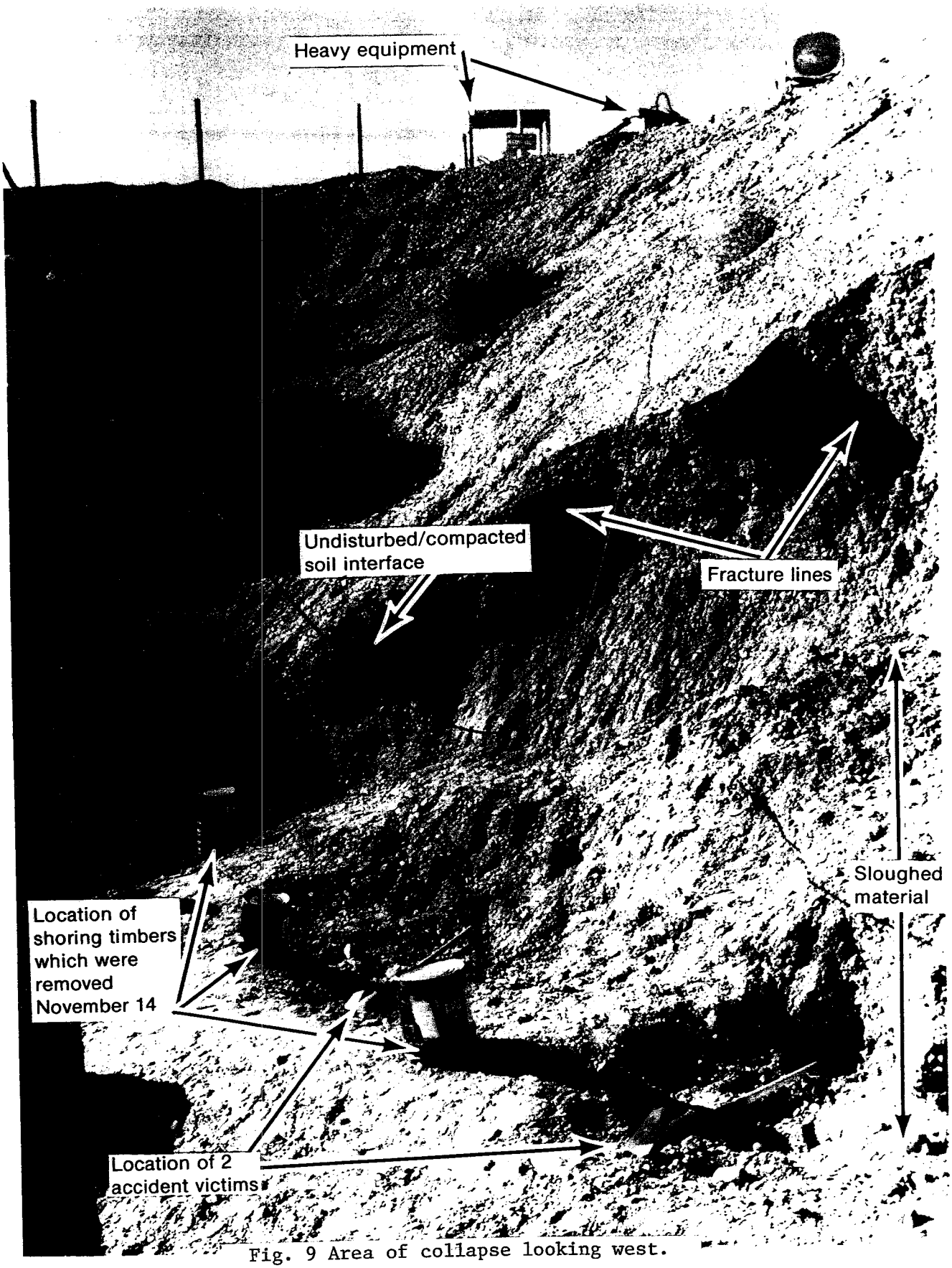



Fig. 9 Area of collapse looking west.

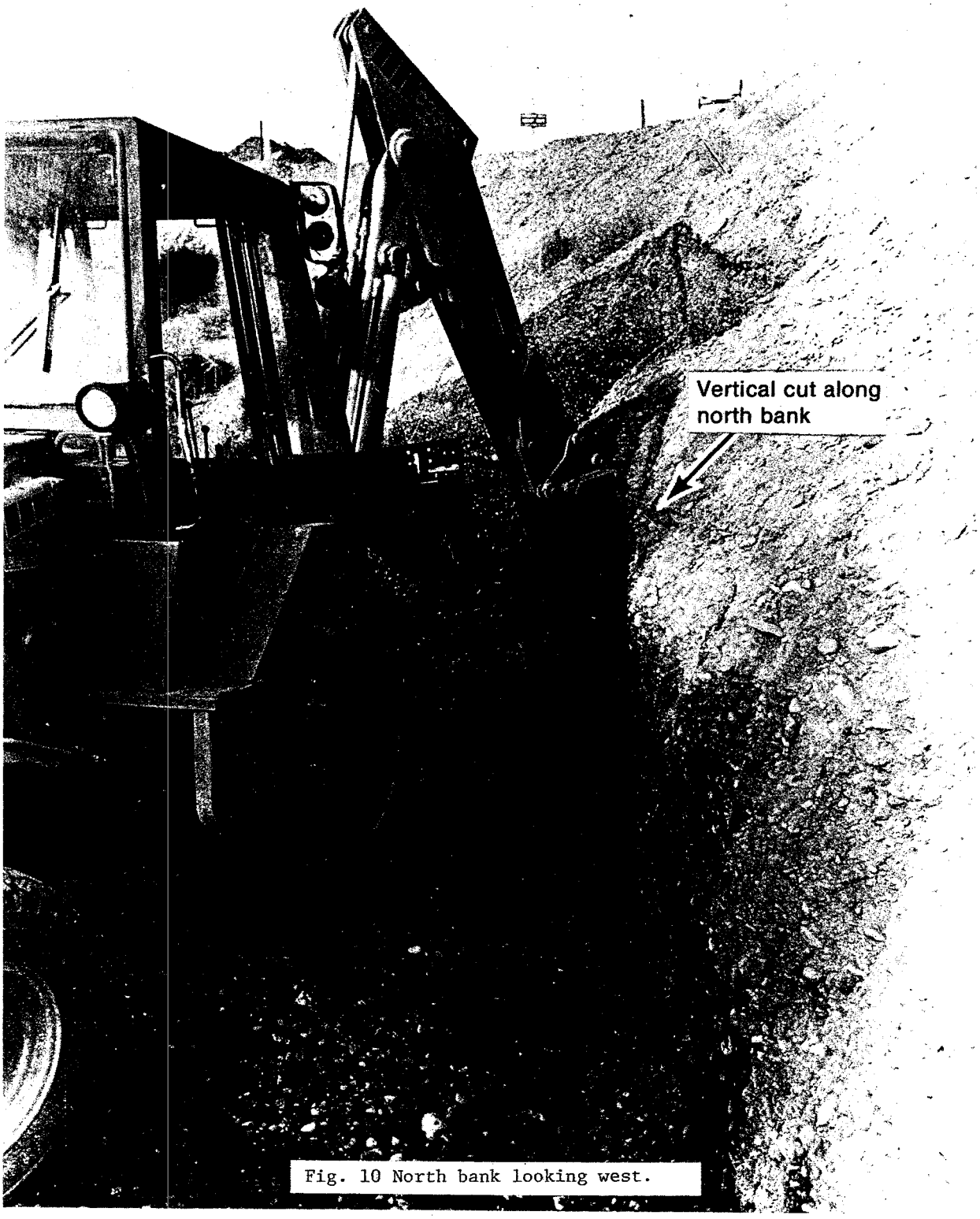



Fig. 10 North bank looking west.

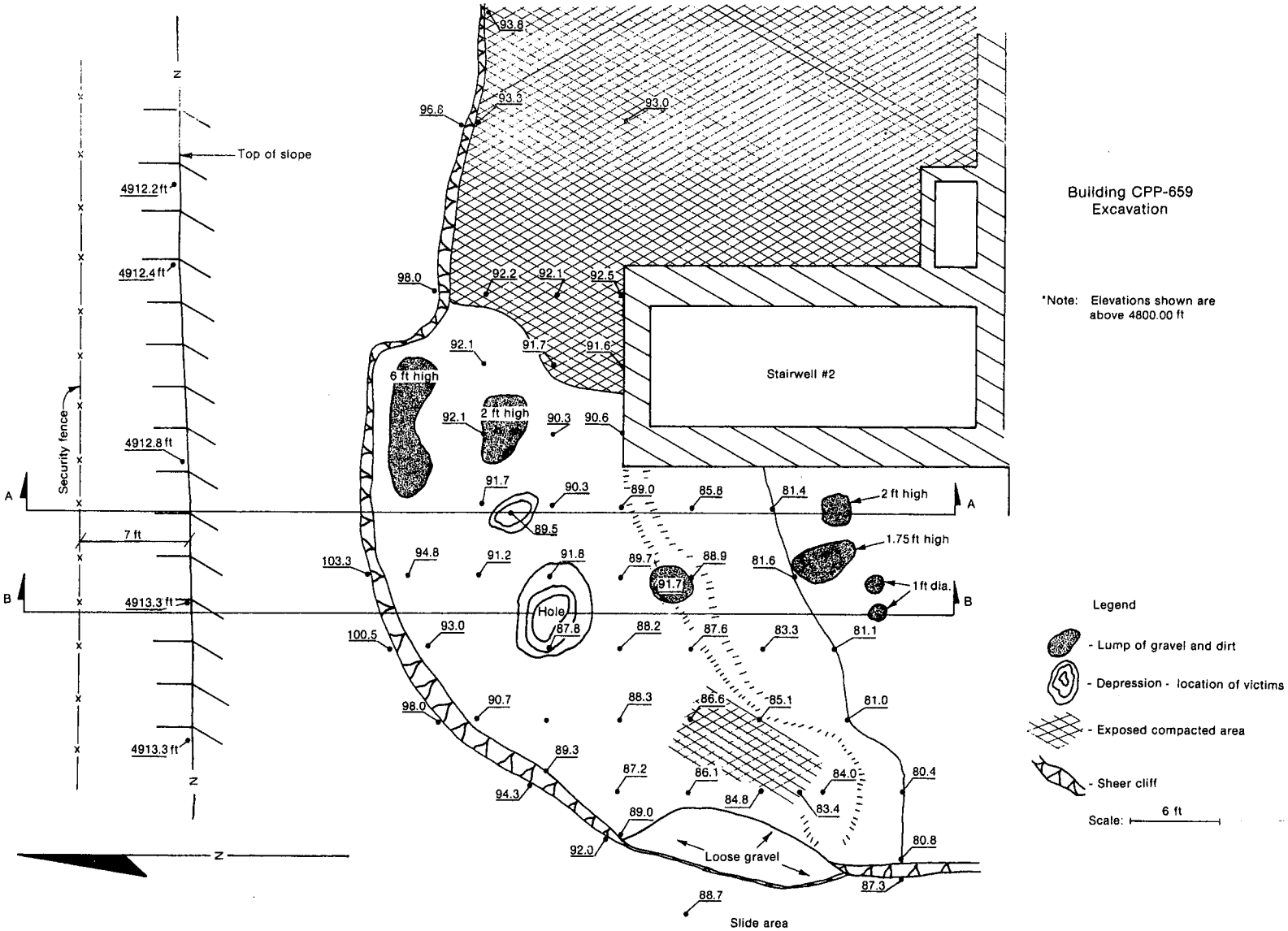



Fig. 11 Topographical plot of accident area.

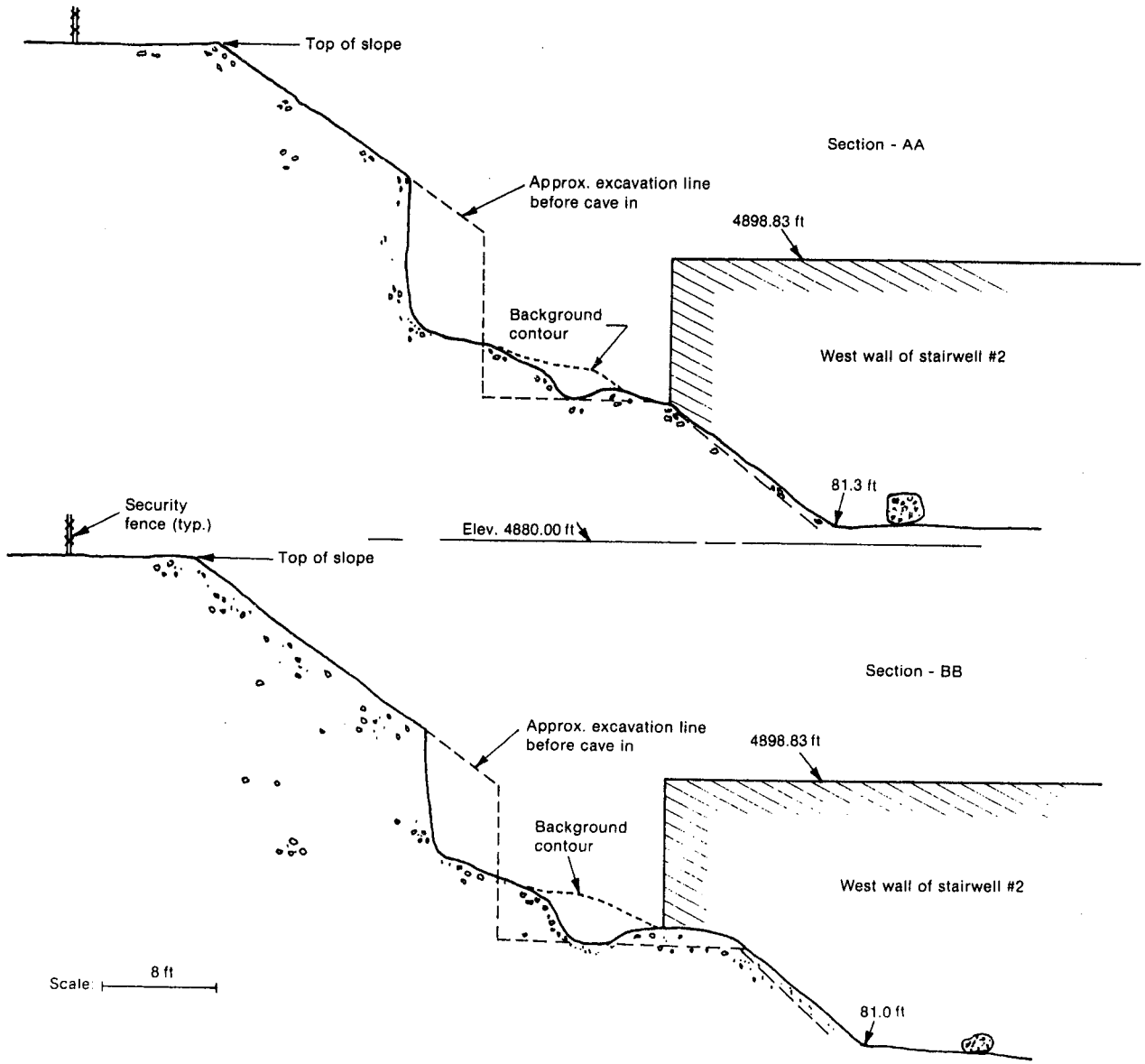



Fig. 12 Cross sections through accident area.

Notification of next of kin of the two victims was handled by Jones/ BOECON as rapidly as possible.

Notification to the press and news media was controlled by DOE and handled by the DOE Office of Information.

A local television station was allowed to film the accident area, and that film was shown on local television stations on November 15, 1977, along with the prepared DOE release identifying the victims and the circumstances of the accident event. The local news media coverage of the accident was low key with only routine followup inquiries by the local newspaper.

During the Committee's site inspection on November 17, heavy equipment was observed operating in the Tank Farm on the north side of the NWCF excavation. The heavy equipment was operating directly above the area of the bank collapse adjacent to the Tank Farm south perimeter fence. The Investigating Committee requested of the Director, ID Engineering and Construction Management Division that work in the Tank Farm area above the collapsed bank be suspended. This was done. This work was resumed after Jones/BOECON stabilized the area of the collapse.

The accident area was released by the DOE Investigating Committee on November 18, 1977, on the condition that the area be stabilized by Jones/ BOECON in accordance with a plan concurred in by ID-OSD.

A chain link mat was secured from existing fence posts at the top of the excavation slope and was draped down the slope to the compacted soil level to control any further collapse of the bank. This was accomplished on November 19, 1977, and backfill operations resumed. The backfill surrounding the building was brought to a level such that the slopes intersected the compacted soil at the design slope angle, i.e., no more vertical slopes.

## E. ENVIRONMENTAL CONSIDERATIONS

Information regarding the environmental conditions at the time of and preceding the accident were obtained and considered in order to investigate the possibility of alternate causal mechanisms.

1. The weather conditions at 7:00 a.m., November 15, were recorded by the Air Resources Laboratory Field Research Office, NOAA station at the INEL as follows: temperature was 31°F; surface winds were 10 mph from 240° (WSW); sunrise occurred at 7:28 a.m. MST.

2. The microseismograph network maintained around the INEL indicated no seismic activity in the INEL region preceding the accident or at the time of the accident.

3. The moisture content of the soil at the accident scene was judged by a USGS representative to be typical or normal for that type of soil. Preconstruction soil samples taken in the area about 2 years prior to the accident indicated a moisture content of 3-5%.

4. The temperature of subsurface soil is not maintained at the INEL; however, the 4-inch soil depth temperature is recorded in Idaho Falls. These soil temperatures and the maximum and minimum air temperatures for Idaho Falls and the INEL are listed in Table I.

5. The NWCF construction site -- in particular, the accident scene -- is adjacent to the ICPP Tank Farm. The northwest corner of the NWCF excavation was located in a backfilled excavation created by the construction of the underground storage tanks completed in 1959-1960. During the inspection of the accident scene, the interface between the compacted soil and undisturbed soil was observed (see Figure 13). The interface is also visible in Figure 9. A USGS employee observed the interface and confirmed that it appeared to be compacted backfill/undisturbed soil interface. Compacted backfill in the soil at the accident scene tended to be "cemented" as can be seen from the large clumps shown in Figures 7 and 8.

Interviews with the operating engineer foremen on the second and third shifts and the loader operator on the second shift disclosed that they thought they were working in previously backfilled material. The operating engineer foremen indicated that the backfilled material was easier to work than undisturbed soil but did not indicate that they were working in an interface of compacted/undisturbed soil when making the access ramp. The operating engineer foremen indicated that the cut made in that location several months previously was very stable and had not sloughed behind the support cribbing placed nearby.

TABLE I

AIR AND SOIL TEMPERATURES NOVEMBER 8-15, 1977

| | Air Temperature (°F) | | | | Minimum 4-in. Depth Soil Temperature (°F) |
|---|---|---|---|---|---|
| | INEL | | Idaho Falls | | Idaho Falls |
| Date | Max. | Min. | Max. | Min. | |
| November 8 | 37 | 6 | 37 | 14 | 35 |
| November 9 | 40 | 0 | 40 | 12 | 29 |
| November 10 | 46 | 5 | 50 | 19 | 31 |
| November 11 | 51 | 11 | 60 | 21 | 31 |
| November 12 | 55 | 15 | 57 | 27 | 33 |
| November 13 | 51 | 14 | 56 | 23 | 32 |
| November 14 | 46 | 20 | 48 | 30 | 35 |
| November 15 | 54 | 31 | 55 | 30 | 40 |

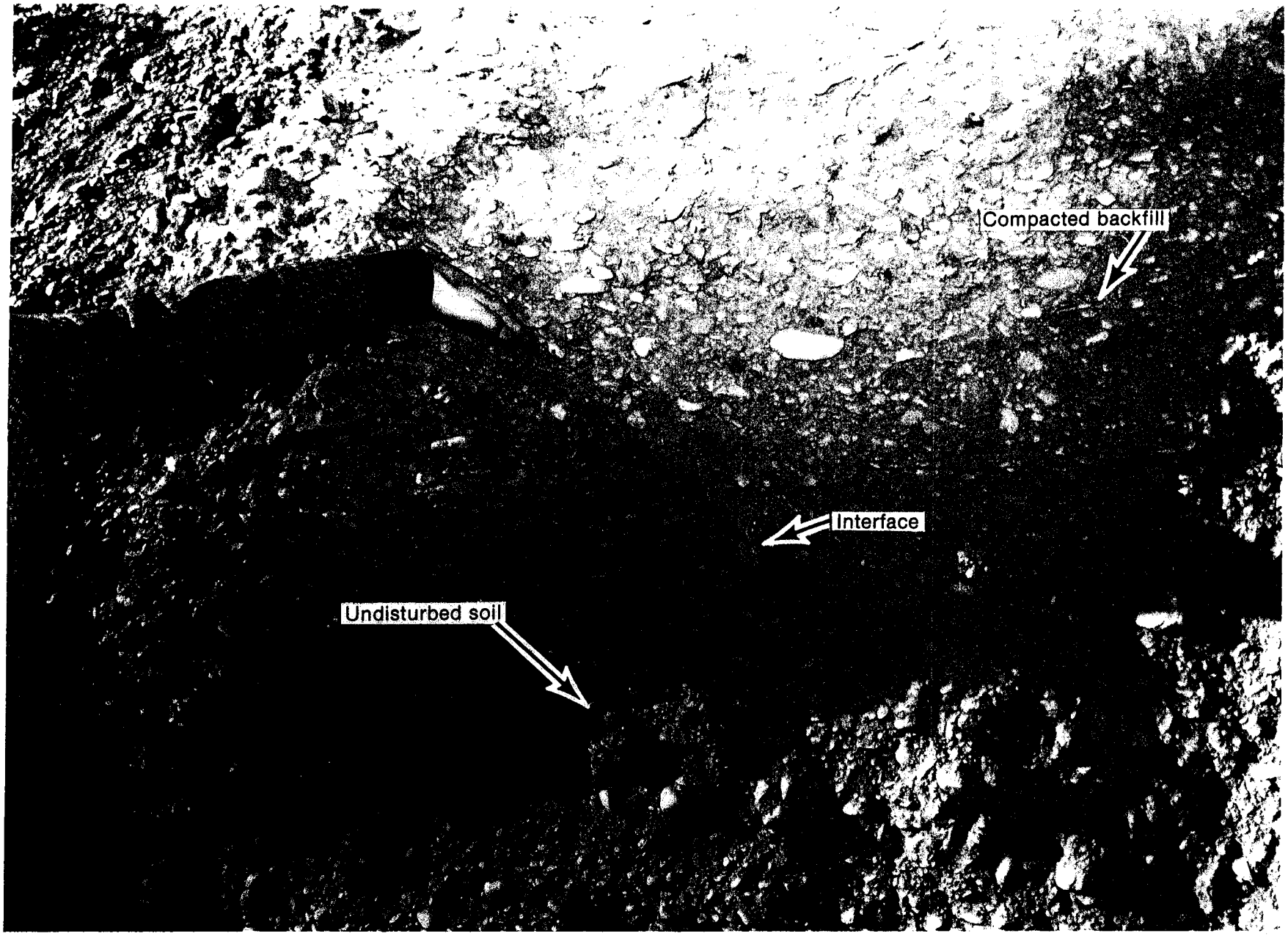



Fig. 13 Undisturbed soil/compacted backfill interface.

## F. CAUSAL FACTORS

### 1. Indoctrination and Training

The Jones/BOECON Project Operating Procedure, POP-606, "Indoctrination and Training" (Appendix D), provides for a three-phase indoctrination. The first phase, or primary indoctrination, provides for formal indoctrination of all employees on a number of points, including safety rules and requirements, the safety program, and requirements for personal protective safety equipment. The second phase, or specific indoctrination, includes instructions to craft employees by the immediate supervisor on safety requirements. The third phase, or the informal indoctrination session, is to be conducted by supervisors within 1 month of employment and consists of a brief review of safety rules including solicitation of questions from employees. Further, there is a requirement for weekly "toolbox" safety meetings conducted by each crew's immediate foreman. Supervisory safety meetings are also required on a monthly basis.

In implementing the first phase, Jones/BOECON developed a 15-minute video tape with the Project Manager describing the NWCF project and the Jones/BOECON operation. About 4 minutes of this tape were devoted to a management statement supporting safety and urging all employees to take an active role in job-site safety. Included in the 4 minutes is information pertaining to the emergency evacuation procedure and general fire protection. Each employee also receives a copy of the Jones/BOECON Employee Manual, 1977, Appendix C. Until approximately 2 months ago, all employees also viewed the EG&G Safety Indoctrination as a part of the first phase of the program. At that time, Jones/BOECON discontinued the supplemental use of an EG&G Safety Indoctrination for craft personnel in favor of creation of their own indoctrination program. Salaried personnel still view the EG&G Safety Indoctrination. The Manager of Industrial Relations stated that the Jones/BOECON replacement for the EG&G Safety Indoctrination for craft personnel had not been completed at the time of the accident.

The Committee was not able to find evidence that the second phase was implemented in any structured manner. The labor general foreman on the first shift recognized an obligation to warn new employees of hazards, and in some cases he had done this. The labor crew foremen on the second and third shifts were not advised of the second phase requirement and had taken no specific action to implement the second phase.

The Committee found little evidence of how the third phase was handled by Jones/BOECON.

Additional safety training for craft personnel was to be provided by weekly "toolbox" safety sessions at the beginning of each shift the first day of each workweek. The Committee reviewed minutes of the "toolbox" safety sessions which were conducted with some degree of regularity on the first shift. Some "toolbox" meetings were conducted on the second shift, but none had been conducted on the third shift.

Jones/BOECON Project Operating Procedure, POP-602 "Safety and Health" (Appendix E) requires that each foreman and general foreman assure that personnel are working in accordance with the standards referenced in POP-602, 4.0, which includes OSHA standards, and ID-12028, Safety and

Health Requirements. The Committee requested that Jones/BOECON provide evidence of the training given these supervisors to enable them to comply with this requirement. Jones/BOECON management said there was no training program. The Committee interviewed the second- and third-shift operating engineer foremen, first-shift general labor foreman, second- and third-shift labor foremen, the General Superintendent, and the Civil/Structural Superintendent, who all confirmed that there had been no positive effort by Jones/BOECON to provide a structured training program in OSHA and ID safety requirements.

2. Safety

According to Jones/BOECON POP-602, "Safety and Health", the Project Manager is ultimately responsible for all aspects of NWCF safety. The responsibilities of various other employees of Jones/BOECON are set out in detail in POP-602 which is attached as Appendix E.

Even though POP-602 does not place site safety inspection responsibility on the Quality Assurance Manager, the Project Manager issued interoffice correspondence dated July 11, 1977, entitled "Safety Coverage," wherein Quality Assurance was directed to provide safety inspections as a part of their routine activities, the results of which were to be recorded in a daily log and reported as appropriate. Jones/BOECON's Quality Assurance Manager stated that the daily log was maintained during the first week after the directive, but subsequent compliance had been informal.

Interviews with the Quality Verification Technician on the third shift disclosed that he had observed the cut bank on the morning of November 15 prior to the accident. He said the bank did not look safe and that he was aware of his safety responsibilities; however, he did not report his concern because no one was working in the area at that time.

Under POP-602, the Safety Supervisor is responsible to the Industrial Relations Manager for job-site inspections and provides staff support to all supervision. The Safety Supervisor was hired on October 2, 1977, to fill a Safety Engineer position which had been vacant approximately 3 weeks. The Safety Supervisor stated that the amount of time allotted to job-site inspections had been limited to an average of 1-1/2 hours per day due to miscellaneous duties -- including the hiring of craft personnel, setting up the orientation film, processing security forms, and other Industrial Relations matters. The Project Manager's interoffice correspondence of July 11, 1977, mentioned above, stated that the Safety Supervisor should attempt to spend 3 or 4 hours a day in direct contact with the construction activity.

POP-100, "Organization and Responsibilities,"(Appendix F) paragraph 6.1.3, states that the Project Manager and his staff are fully supported by the Jones/ BOECON Management Committee which will make both scheduled and unscheduled reviews of project activities by "Corporate Industrial Relations." The NWCF Project Manager stated that "Corporate Industrial Relations" had not made any such reviews.

3. Supervision

The Project Manager is responsible for all activities at the NWCF. (Jones/BOECON organization chart is shown in Figure 14.) Control and supervision of backfill activities were provided by the General Superintendent, Civil/Structural Superintendent, general foremen, operating engineer foremen, and labor foremen. Safety support functions for these activities were provided by the Industrial Relations and Quality Assurance Divisions.

Instructions to first- and second-shift foremen were relayed directly from the General and Civil/Structural Superintendents. At the beginning of backshift activities, the Assistant Mechanical Superintendent was assigned to supervise the second shift. The Assistant Mechanical Superintendent functioned in an administrative capacity relative to backfill operations and was not responsible for providing craft foremen detailed work instructions for this activity. The third-shift foremen received work instructions as passed on by the second-shift foremen.

Superintendent-level coverage was not provided for the third shift. Day shift superintendents frequently provided spot coverage on backshifts and weekends. However, superintendents were not onsite during the shift in which the accident occurred. Supervision on the third shift was provided by an operating engineer foreman.

4. Planning, Scheduling, and Communication

NWCF construction tasks are planned and scheduled in biweekly, weekly, and daily meetings. Meeting minutes are documented for the biweekly and weekly meetings. The daily planning meetings consist of informal discussions among superintendents, general foremen, and foremen wherein ongoing and near-term activities are discussed.

Formal communication within Jones/BOECON was provided by written directives from the Project Manager and other written correspondence from line management concerning construction activities. Communication down through the management chain was conducted in an informal manner typical of normal construction practices. Two-week schedules and eight-week schedules were prepared and distributed down to the general foreman level. Backfill operations originally had been scheduled to start in Spring 1978. Due to favorable weather conditions and progress of construction, backfill was rescheduled and commenced on November 8, 1977. Second and third shifts were established to perform backfill tasks. Although no formal plan was developed for accomplishment of backfill activity, the general need for accomplishing the work was discussed in the weekly Construction Coordination meeting on November 10 and in the daily planning meetings held on November 11 and November 14. At the November 10 meeting, the Safety Supervisor was charged with instigating second- and third-shift safety by November 17, 1977, and the Industrial Relations Manager was charged with evaluating the need for a third-shift superintendent by November 17, 1977.

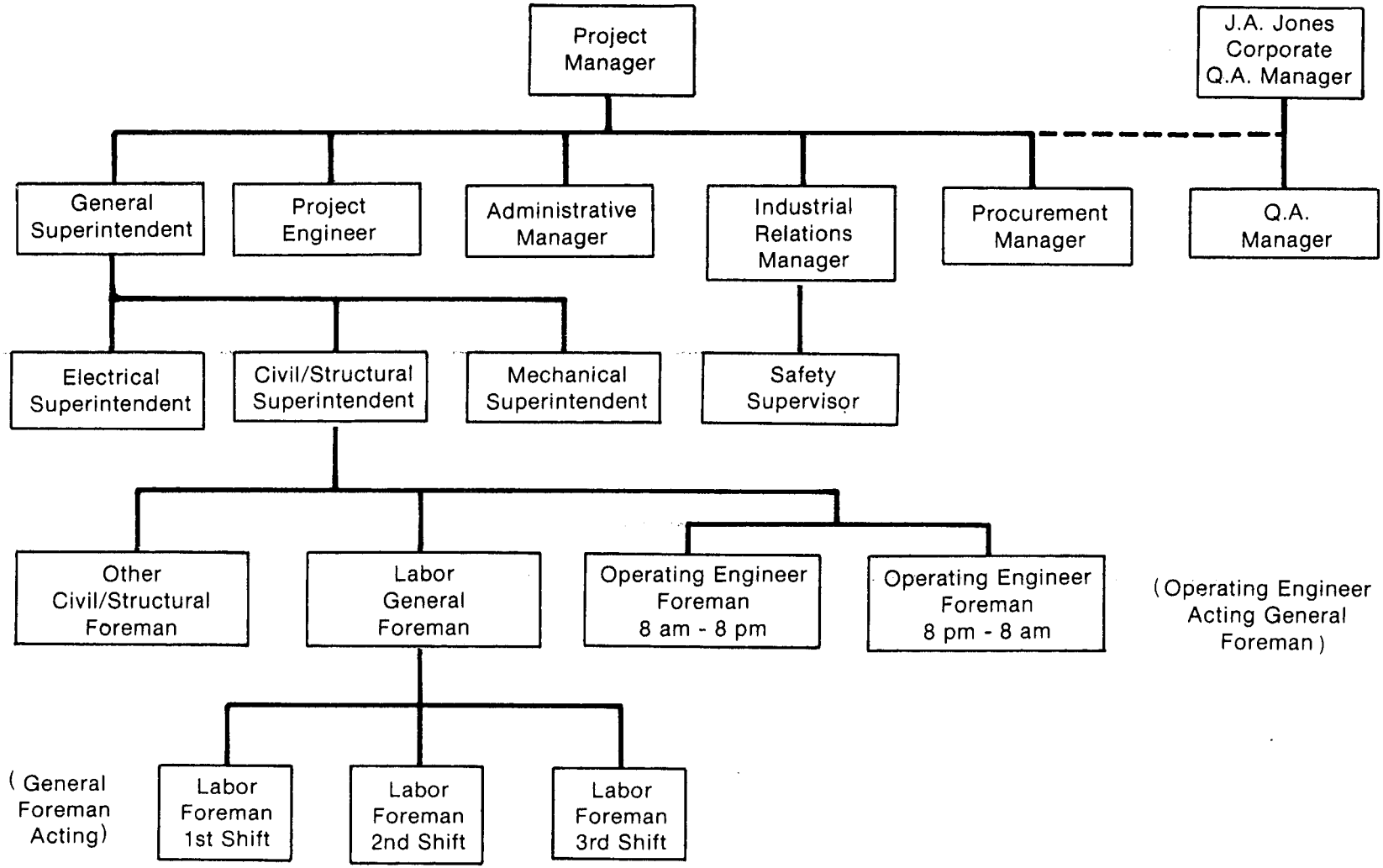



Fig. 14 Jones/BOECON organization chart.

Backfill of the west end and the need for access to the west end around stairwell #2 were discussed in the planning meeting on November 11. These activities were again discussed on November 14. The General Superintendent envisioned that backfill of the west end would start on the second shift, November 16. However, management did not provide a written plan or schedule for access to the west end. Subsequent to the accident, management stated that access to the west end was to have been accomplished by hand backfill between the #2 stairwell and the north slope until sufficient clearance was obtained to permit equipment access -- with only minor cutting required on the north slope.

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Any evidence that this is true

## G. CONTRACTOR/DEPARTMENT OF ENERGY RELATIONSHIPS

### 1. Contractor Responsibility

Contract No. EY-76-C-07-1565 between Jones/BOECON and DOE contains the standard "Safety and Health" clause used by DOE in its cost-type prime construction contracts. The clause places primary responsibility for safety on construction contractors and reads as follows:

> "ARTICLE XLI - SAFETY AND HEALTH
>
> The Contractor shall take all reasonable precautions in the performance of the work under this contract to protect the safety and health of employees and of members of the public and shall comply with all applicable safety and health regulations and requirements (including reporting requirements) of ERDA. In the event that the Contractor fails to comply with said regulations or requirements of ERDA, the Contracting Officer may, without prejudice to any other legal or contractual rights of ERDA, issue an order stopping all or any part of the work; thereafter a start order for resumption of the work may be issued at the discretion of the Contracting Officer. The Contractor shall make no claim for an extension of time or for compensation or damages by reason of or in connection with such work stoppage."

A primary source of DOE requirements is ERDA Manual Chapter 0505[a], "Construction Safety Program," which establishes the policy that "contractors and subcontractors [are required] to provide safe and healthful working conditions for their employees and to maintain injury, property damage or loss, and environmental risk levels as low as practicable in construction activities." It is under this policy that Jones/BOECON submits its proposed construction safety program to DOE for review.

### 2. DOE Responsibility

In pertinent part, ERDA Manual Chapter 0505 assigned the following responsibilities to the Managers of Field Offices:

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[a] ERDA Manual Chapter 0505, "Construction Safety Program," was cancelled by ERDA TN 0500-25, dated 9-30-77. DOE Interim Management Directive 5001, dated September 29, 1977, indicates that the ERDAM 0505 may be used for guidance.

a. Establish a program to conduct inspections of construction activities in accordance with ERDA requirements and objectives as contained in ERDAM 0506

b. Assure that successful bidders and/or contractors are informed of their contractual responsibilities for complying with ERDA Safety Requirements

c. Assure that each prime construction contractor has an approved safety program appropriate to the size of the project and associated hazards

d. Assure that the prime construction contractor follows the approved safety program.

In fulfilling these responsibilities, the ID Manager has delegated certain responsibilities to the ID Engineering and Construction Management Division (ID-E&CM) and the ID Operational Safety Division (ID-OSD).

The ID-E&CM Division has an NWCF Branch consisting of a Branch Chief and two Project Engineers, one of which is a vacant position. The available Project Engineer is assigned to the NWCF construction site to monitor the construction activities on a full-time basis. He provides liaison between ID and Jones/BOECON. Part of his duties involve assuring that followup is completed on safety surveillance inspections of the NWCF site conducted by DOE and Allied Chemical Corporation (ACC) inspectors. He makes inspections of his own on a daily basis. He has had contact with the Jones/BOECON Safety Supervisor several times per week to discuss safety matters. The Project Engineer participates in management level meetings such as the weekly Construction Coordination meetings, but does not participate in daily construction planning meetings.

The ID-OSD has an Industrial Safety Branch consisting of an Industrial Safety Engineer, an Industrial Hygiene Engineer, and a Fire Protection Engineer. The ID-OSD Director serves as the Acting Branch Chief. The Industrial Safety Branch makes safety surveillance inspections of the NWCF site once or twice per month. These inspections are made as a result of the ID-OSD policy that each division member will make field surveillance visits to monitor his areas of responsibility. Significant observations made during these visits are discussed with responsible personnel at the area. The observations are documented also in a surveillance report which is typically distributed to the ID-OSD Director, ID-E&CM NWCF Project Branch, ID NWCF Project Engineer, and the Jones/BOECON Safety Supervisor.

Contract No. EY-76-C-07-1565 also provides that the contractor is to be paid a fee for performing the work which, in part, is adjusted according to evaluations of performance under a method known as Cost Plus Award Fee (CPAF). CPAF evaluations are made on a monthly basis and award of fee is made for an evaluation period established by the contract. The criteria which are being used for the current CPAF evaluation period, i.e., September 1, 1977 to February 28, 1978, are as follows: Compliance with ERDA Safety

Requirements; Management Involvement and Support of Safety; Preplanning; Equipment Reliability; Safety Performance. There were five specific priorities identified for this period:

"1. Adherence to agreed-upon scheduled milestones

2. Preplanning to include safety in upcoming work

3. Compliance with personnel policies and approval requirements of [contract] Appendix A

4. Control of subcontractors with regard to compliance with ERDA safety requirements

5. Management involvement and measure of success in meeting goals identified in the Affirmative Action Plan."

ID-OSD has generally rated the J/B safety program as better than average for construction contracts, with Jones/BOECON management being very responsive to safety matters.

3. Allied Chemical Corporation Involvement

ID has directed Allied Chemical Corporation (ACC) to make safety audits of construction sites proximal to the geographical area for which ACC is responsible. The NWCF construction site is located within the Idaho Chemical Processing Plant (ICPP) area for which ACC is responsible. These visits were made by the ACC Fire Protection Engineer at least once per week during the several months prior to the accident. The visits are generally made with the J/B Safety Supervisor. Any deficiencies are discussed with the J/B Safety Supervisor prior to leaving the site. A report is prepared to document observations, with distribution made to the DOE resident Project Engineer, the ACC NWCF Project Manager, and the ACC Field Engineer who sends a copy to the J/B Safety Supervisor.

The ACC safety inspector stated that the attitude of the J/B craft personnel was better than average for construction activities. The ACC safety inspector also observed that the number of deficiencies he noted increased substantially during the period when J/B was without a safety supervisor on the site. He brought this to the attention of ID-OSD, but an improvement was not noted until J/B was able to recruit and hire the replacement Safety Supervisor.

## H. RELATED NONCAUSAL EVENTS

The committee noted two areas which appeared to warrant special attention but which were not causally related to this accident. During inspection of the accident site, the Committee observed that the base of the west slope of the excavation had been cut nearly vertically to a height of approximately 6 to 10 feet. Shoring, barriers, or other protective measures had not been provided. The excavation drawing specified a slope of 1-1/2 to 1. Jones/BOECON management stated that the slope was cut back to provide room for equipment and a material storage laydown area. Management

also stated that this change was not documented but, in retrospect, should have been documented in an engineering change request. Committee review of an historical construction (Figure 15) photo indicated that other slopes of the NWCF excavation had been altered in violation of contract requirements. These slope alterations had not been documented or analyzed as required by POP-300, "Control of Engineering Documents" (Appendix G) or POP-703, "Nonconformance and Corrective Action Report."

As described in the post-accident events section of this report, heavy equipment had been operating near and above the north slope of the NWCF excavation, creating a potentially hazardous situation. This points out a potential problem created by multiple contractors working in the same general area and the need for improved interface communication among those contractors.

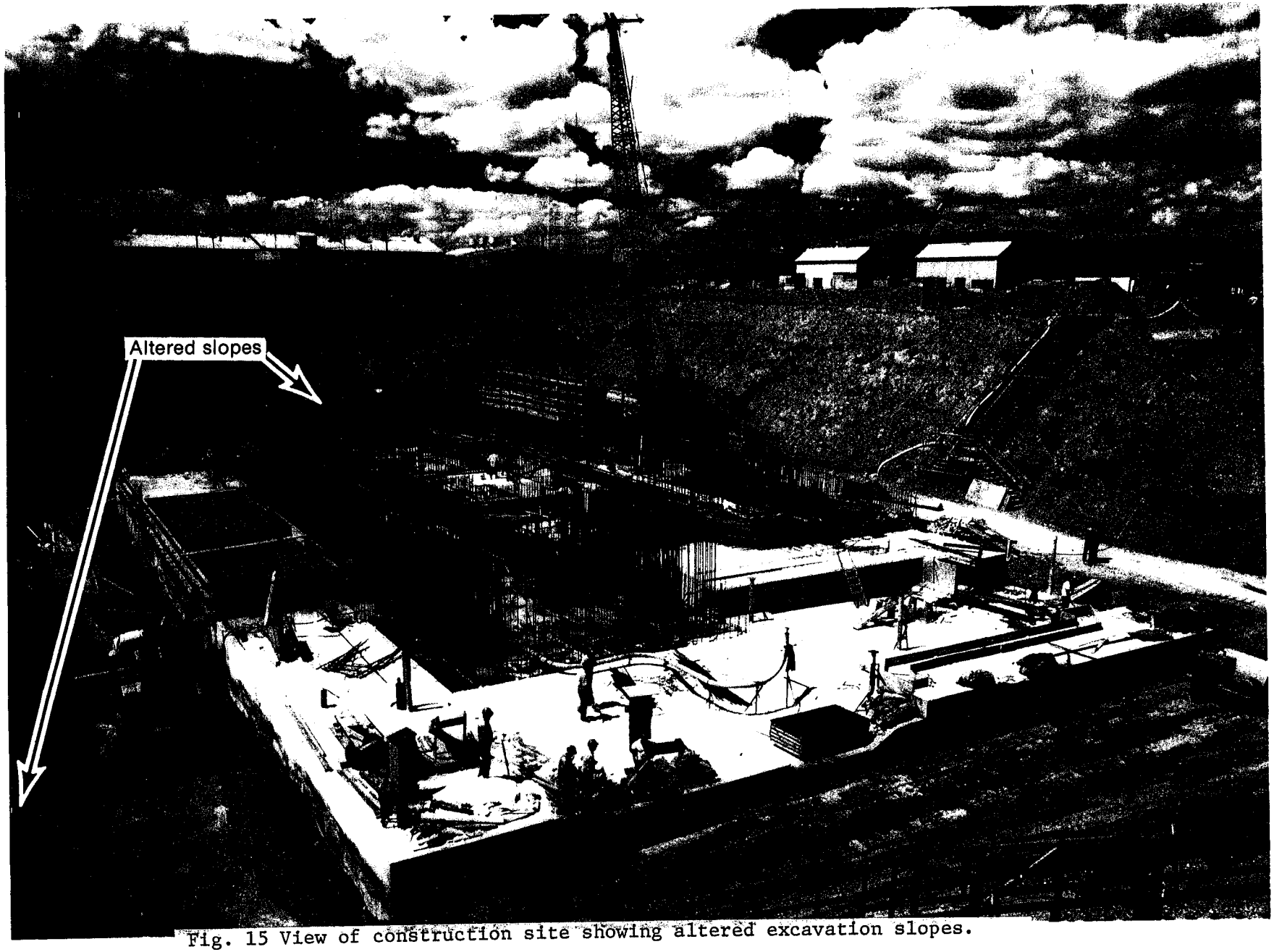


Fig. 15 View of construction site showing altered excavation slopes.

## IV. ANALYSIS

### A. BACKGROUND

As set out in the FACTS, the backfill operation, originally scheduled for the spring of 1978, was accelerated in order to take advantage of good construction progress and the good weather conditions. Jones/BOECON management decided to start second- and third-shift backfill operations on November 8, 1977. The specific reason for extra shifts was to conduct the backfill during a period when there would be fewer people at the construction site; thus the backfill could be conducted with less interference and in a safer manner. It appeared to the Committee that the decision to conduct backfill operations in the fall was made hastily and with less than adequate consideration of such things as supervision, labor availability, and construction sequence planning. Jones/BOECON had only a craft operating engineer foreman on duty as a supervisor during the third shift, and the laborers who were available had very little or no heavy construction experience. The second shift had a salaried supervisor, but he had little civil/structural experience; the operating engineer foreman during this shift made major decisions concerning backfill operations. The General Superintendent and/or the Civil/Structural Superintendent passed inadequate information to the operating engineer foremen on the second and third shifts regarding the sequencing and details of creating the access ramp to the west end of the building. The effect was to create a job condition during the second and third shifts entirely different and more hazardous than envisioned by management. The Committee concluded that these circumstances illustrate inadequate overall planning for the backfill operation on the second and third shifts.

### B. ACCIDENT

One of the circumstances which caused the accident was the creation of a vertical cut in the sloped excavation near the northwest corner of the NWCF building. The prospect of backfill on the west end of the NWCF building had been considered by the General Superintendent and discussed with others in the supervisory chain. It appears that all were agreed that the best way to accomplish this would be to provide access to the west end around the northwest corner of the building by stairwell #2. The precise manner of providing access was not discussed with the supervisor or foremen for the second and third shifts. When the second shift operating engineer foreman decided to use the front-end loader to make the cut around stairwell #2, he apparently thought the timing was right and that he was accomplishing the next logical step in the backfill operation. The resulting cut in the bank presented no particular hazard to the men operating the front-end loader or the self-propelled vibratory roller. The Committee concluded that the condition of the vertical bank in the north slope was a deviation from control specifications and OSHA safety requirements and an Engineering Change Request should have been processed to provide adequate management review and approval of the condition.

The uncompacted fill precluded use of self-propelled compaction on the access ramp, and it was decided that hand compactors should be brought into the area by laborers. This decision was apparently made by one or both of the operating engineer foremen who were intent on improving the access ramp. The operating engineer foremen both looked at the cut adjacent to the access ramp and considered it safe. The labor foremen on the second and third shifts stated that they had been concerned about the condition of the vertical bank and had cautioned their crews about the vertical bank; but neither took any other action to ameliorate the potential hazard.

The Investigating Committee concluded that it was normal on the second and third shifts for significant decisions regarding the means/method of accomplishing the work to be made at the operating engineer foreman level. Since this level of supervision may have limited overview and since this level of supervision may not be aware of the safety considerations applicable to all crafts, the committee concluded that this decision was made at too low a level in the Jones/BOECON management chain.

Another cause contributing to the accident was the placement of laborers in proximity to the vertical bank adjacent to the access ramp. Interviews with Jones/BOECON employees on all three shifts indicated a concern for safety and an awareness of their personal responsibility for safe work conditions. A number of employees on the second and third shifts had noted the existence of the 6- to 10-foot vertical bank, and some indicated concern about the safety of this condition. However, none of the employees took ameliorative action which would have prevented the accident. Apparently, the laborers on the third shift were not cognizant of the hazard potential of the vertical bank and had little concern about the bank collapsing onto them. This lack of concern appeared to have been the result of insufficient experience in heavy construction work and inadequate safety training. The Committee concluded that the general safety attitude of workers at the Jones/BOECON construction site was one of looking out for themselves with no concern for overall job-site safety; those workers who, due to lack of experience or adequate training are not capable of looking out for themselves, work at an increased risk level.

The Committee also evaluated the events which caused the bank to collapse at the time it did. Prior to the day of the accident, a backhoe and a pavement breaker (an 8- to 10-foot pointed steel pipe filled with concrete) were used to test the stability of the area after shoring from an earlier, lesser cut was removed. A front-end loader had been on the access ramp a few hours before the accident and reportedly bumped the vertical bank. The self-propelled vibratory roller had also been on the access ramp a number of times with the vibrating mechanism engaged. There was no record of any earthquake activity, and no other heavy machinery was being used in the area at the time the accident occurred. Thus, it was postulated that either the front-end loader, the pavement breaker, or the backhoe, may have created a fracture in the vertical bank, and the continued use of vibratory machinery in the vicinity loosened the vertical bank. The laborers in the area indicated that some minor sloughing had occurred just prior to the accident, but none were sure of the source of the material. The Investigating Committee concluded that the final action which caused the vertical bank to topple was the movement of the self-propelled vibratory roller down the access ramp at about 7:10 a.m.

During the Committee's examination and evaluation of the scene of the accident, it appeared that there was an area of interface between previously undisturbed soil and compacted backfill at the west end of the collapse area. USGS personnel stationed at the INEL were contacted, and a representative of that office viewed the location and confirmed this observation. The Committee attempted to establish the precise location of the interface between these soil conditions vis-a-vis the collapse and the cut made in the bank for the access ramp to the west end of the NWCF building. The Committee postulated that the interface roughly intersected the lower level of the vertical bank. However, the Committee was not able to reach a conclusion as to whether this coincidence was a primary factor in either creating or aggravating the accident situation.

It was ascertained that the operators working on the access ramp thought they were working in an area of previously compacted backfill. The interviewed workers stated that they had not seen any sloughing of bank material in a lesser cut made in the area several months previously. It appeared to the Committee that the new and larger cut may have crossed from undisturbed soil to previously compacted backfill and thus created a more hazardous condition[b]. Also, witnesses indicated that the bank "toppled like a tree" rather than sloughing down and out from the bottom.

One worker stated that he thought the soil in this area was "frozen." It was concluded from investigation of soil and weather conditions that it was unlikely that the ground was frozen, or that there was a freeze-thaw cycle in the soil during the period preceding the accident. The Investigating Committee concluded that compaction of backfill material caused it to consolidate and adhere to itself in a manner much like frozen soil.

## C. EMERGENCY RESPONSE

The Committee has reviewed the DOE radio net transcripts and the tape recording of the Warning Communications Center (WCC) from the time of notification to the Security Officer at Post 300, at 7:10:52 a.m., by the security guard on the scene, until rescue efforts were terminated.

The time frames established from the WCC tape and the distances over which the DOE emergency equipment had to travel to reach the accident scene indicate that satisfactory DOE emergency response occurred. The Committee concluded that the emergency response time of the DOE personnel did not have any overall effect on the eventual condition of the two victims who had been covered about 5 minutes and 20 minutes, respectively. The emergency actions of the DOE Fire Department, Security, and Health Services personnel at the accident scene were also considered to be satisfactory.

The emergency actions of the Jones/BOECON personnel at the accident scene have been reviewed by the Committee, and it is the evaluation of the Committee that all possible emergency action had been satisfactorily

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[b] OSHA 1926.651(m) states that "special precautions" such as shoring or sloping should be taken when such conditions are encountered.

undertaken by the Jones/BOECON personnel. It is the opinion of the Committee that the presence of emergency response personnel at the ICPP would not have had any substantive effect on the outcome of the accident.

## D. CAUSAL FACTORS

### 1. Indoctrination and Training

Safety training at the Jones/BOECON NWCF construction site was evaluated by the Committee from the standpoint of the program outlined in their procedures and the program as actually implemented on the job site. As detailed in the FACTS above, Jones/BOECON POP-606 provides for a three-phase indoctrination.

In actual practice, it appears that implementation of the program varied from shift to shift. In the first phase, all employees viewed the video-tape presentation by the Project Manager, although the employees on the third shift worked one full shift before seeing the presentation. The second phase apparently was given more consistently on the first shift than on the second and third shifts. The laborers working with those involved in the accident had not received specific indoctrination from their immediate supervisor. The Committee was uncertain regarding third-phase implementation. Since the second and third shifts had not been in operation for a month, it was not possible to evaluate this phase of the indoctrination on those shifts. Weekly "toolbox" meetings were not conducted on the third shift.

Interviews with two laborers who were working with the victims indicated that all were hired a few days before the accident and, as they recalled, safety training consisted of receiving an Employee Manual and a video-tape presentation at the end of the first shift they worked. Review of the video tape by the Committee disclosed that safety was not the primary topic of the presentation. Review of the Employee Manual (Appendix C) disclosed that it does not contain warnings regarding work around excavations. Neither laborer recalled any safety indoctrination by his foreman, and the foreman did not recall receiving any training in how to fulfill his safety duties. These employees were furnished by the union and were considered very short on job and safety experience by the third shift operating engineer foreman.

Jones/BOECON had discontinued use of the EG&G Safety Indoctrination for craft personnel. The reasoning for that decision was that it was more oriented to radiation safety than to construction safety. The Committee viewed the EG&G presentation and felt that it would have done little to acquaint a worker with hazards associated with construction. The proposed Jones/BOECON Construction Safety Indoctrination had not been completed at the time of this investigation, so it could not be evaluated by the Committee.

In view of the above, the Committee concluded that safety training for the employees who were involved in the accident was less than adequate. The primary area of inadequacy was the failure of the safety program to provide any substantive information to an inexperienced employee regarding construction hazards he might encounter on the job. Also, the Committee concluded that the safety content of the video-tape presentation and foreman indoctrination should be expanded to provide more basic construction hazard information to the inexperienced worker.

Jones/BOECON POP-602 requires Jones/BOECON to assure that personnel are working in accordance with OSHA safety requirements. The Committee established that Jones/BOECON had taken no steps to determine the knowledge of supervisory personnel with regard to OSHA safety requirements or to provide necessary OSHA safety training. Since Jones/BOECON management had the responsibility to assure compliance, and since they took no action, the Committee concluded that the training received by the two operating engineer foremen on second and third shifts with respect to the safety requirements of OSHA 1926 was not adequate to enable them to recognize the hazardous nature of a vertical, unshored bank.

2. Safety

As set out in the FACTS, POP-602 indicates that safety is a line management function. The Committee's review of formal management responsibility as well as discussions with individuals in management positions indicated that heavy reliance was being placed on foremen for implementation of the Jones/BOECON Safety Program. The Committee was able to find little evidence of an active accident prevention program.

While there was a provision for the Project Manager to gain corporate support for his safety program through Industrial Relations, the lack of any contacts or demonstrated support indicates a less than active implementation of the Safety Program outlined in the Project Operating Procedures.

The General Superintendent, the Industrial Relations Manager, and the Safety Supervisor all have responsibility for implementing and enforcing an effective safety program under POP-602. The Quality Assurance Manager was also given safety inspection responsibility by interoffice correspondence dated July 11, 1977, from the Project Manager. The Committee found no program explaining these responsibilities or assuring that they were being carried out. The Committee concluded that, except for the three-phase indoctrination and training sessions discussed in the Indoctrination and Training section above, the Safety Program consisted of "toolbox" meetings, display of safety posters, safety inspections by the Safety Supervisor, and informal safety inspections by the Quality Assurance personnel. Discussions with the Project Manager confirmed this conclusion.

The Committee discussed the general Safety Program with the Industrial Relations Manager, who is the immediate supervisor of the Safety Supervisor and who is also responsible for continual audits of all aspects of the Safety Program. He stated that he had not reviewed the Safety Supervisor's log during the 6-week period preceding the accident and that he had made at least one safety inspection with the Safety Supervisor during that period. The Committee concluded that the involvement of the Jones/BOECON Industrial Relations Manager with respect to safety was not adequate to assure effective implementation of the Safety Program.

The Committee also discussed the general question of safety attitude with several of the Jones/BOECON employees. It was the general consensus of those interviewed that the safety attitude of workers on the NWCF construction site was better than that of workers on the average construction site. This attitude was usually verbalized in terms of looking out for conditions which

would injure them personally or which might injure someone else, e.g., with machinery they were operating. The facts of the accident disclosed that there were many people who were apprehensive over the vertical bank, including the second- and third-shift labor foremen, the third-shift Quality Verification Technician, and the acting second-shift Civil/Structural Supervisor, although none of them took effective ameliorative action. The Committee concluded that none of these individuals were sufficiently aware of their responsibility for preventive safety to take effective action.

The overall conclusion reached by the Committee was that the safety program at the NWCF construction project was well structured and delineated in the Project Operating Procedures, but that there was inadequate action taken by management personnel to assure that the Safety Program was in fact being implemented.

3. Supervision

A comparison of the supervision staffing on the first, second, and third shifts shows that the first shift had the normal construction chain of command, i.e., general superintendent, superintendents, general foremen, foremen, and workers. The second shift had an acting superintendent, an operating engineer foreman, labor foreman, and workers. The third shift had an acting general foreman (dual function as operating engineer foreman), a labor foreman, and workers.

The limited amount of experience that the acting superintendent on second shift possessed with respect to civil/structural backfill operations (he is a mechanical engineer) caused Jones/BOECON management to assign the basic responsibility for routine decisions concerning the backfill activities to the operating engineer foreman. The assignment of supervisors on the second and third shifts was made by Jones/BOECON management. (Additional review of the supervisor assignment on third shift had been requested by Jones/BOECON management on November 10, 1977, but had not yet been accomplished.) The Committee concluded that this assignment put the decision-making function at a management level too low to provide the necessary review for engineering and safety considerations. This same conclusion applies to the acting general foreman (hourly) having overall job-site supervision and decision-making authority on third shift.

4. Planning, Scheduling, and Communication

The Committee evaluated the formal and informal communication practices within Jones/BOECON and concluded that they were adequate to provide information for scheduling work functions at the construction site but may not have been adequate to communicate the methods/means management had envisioned to accomplish those scheduled construction activities.

As noted in the FACTS, F-4., the actual backfill operation differed from what Jones/BOECON management had envisioned. The informal transfer of methods/means, instructions, and information from first-shift supervision to second-shift supervision and subsequent transfer to third shift regarding backfill operations, provides no assurance that the plan was understood or ever communicated. Additionally, the original instructions and information

could be altered or changed subject to the individual supervisor's understanding or interpretation of what he was told. The Committee concluded that had written instructions been provided, the chance for misinterpretation of the intent of management's instructions could have been sigificantly reduced, and that the Jones/BOECON method/means plan envisioned by management for backfill was not documented or adequately communicated to backshift foremen.

Another area that was reviewed concerns communications among the various union personnel working at the NWCF construction site. It appears that there is a definite heirarchy among the unions, with the laborers' union having the least influence. The laborer foreman on third shift made the statement that his immediate supervisor was the laborer general foreman on first shift, not the operating engineer foreman who had been charged with overall job-site supervision responsibility on third shift by Jones/BOECON management. The Committee concluded that this heirarchy problem of what union gives which union direction and who can talk to whom, may have influenced the laborers on second and third shifts not to communicate their concerns about the vertical bank to the operating engineer foreman. It is the Committee's conclusion that although this inter-union communication problem is typical industry-wide, it was a factor in the continued existence of the vertical bank even though several of the laborers, including foremen, were concerned over the relative safety of the vertical bank.

## E. CONTRACTOR/DOE RELATIONSHIPS

The framework for the safe conduct of construction activities at NWCF had been established through standard safety requirements and responsibilities imposed by DOE-ID on Jones/BOECON through the NWCF construction contract. The DOE-ID monitoring function is not considered causal to this accident because the function is an audit activity intended to determine whether or not the contractor is fulfilling the contractual responsibility for conducting work in a safe manner.

true

Personnel from ID-OSD, ID-E&CM, and ACC, who carry out DOE-ID's safety monitoring functions appear to be adequate in number, as is the frequency of their inspections, to fulfill the audit function, although the monitoring technique may have been less formal than desirable -- i.e., past inspections have been more a matter of general observations as opposed to inspection against criteria. Further, Jones/BOECON has not been subject to a formal annual safety audit or OSHA inspections. The Committee did not find specific criteria requiring these types of inspections.

Weaknesses in contractor management systems necessary to implement the Safety Program were identified by the Committee during this investigation; these weaknesses are set out in the ANALYSIS, Causal Factors, Section IV-D. The Committee noted that DOE-ID monitoring methods did not identify these weaknesses. The Committee concluded that the use of specific criteria and checklists could have detected contractor management system weaknesses where general observations did not. Such specific criteria and checklists could be a part of the Cost Plus Award Fee (CPAF) evaluation criteria, and the weight factor assigned to safety could be adjusted, as required, to emphasize the need for the contractor to correct such weaknesses.

The Committee evaluated ERDA Manual Chapter 0505 to determine the basis for present ID monitoring techniques. The following observations were made:

1. An annual safety appraisal is not required of a construction contractor who is not a resident, permanent construction contractor.

2. A construction contractor is required to have an approved safety program consisting of:

   a. Adequate provision for emergency aid including medical and fire protection

   b. A program for certifying the safe operating condition and for assuring proper maintenance of earthmoving equipment, cranes, vehicles, pressure vessels, protective devices for portable electrical tools, etc. (The manual chapter provides no guidance concerning the minimum requirements for approval of this safety program.)

3. There is no requirement for a safety engineer/supervisor for construction contractors. [ID has imposed a requirement for a full-time safety engineer if more than 400 people are employed by the contractor.]

4. There is no definition of what constitutes an adequate on-the-job safety training program.

The Committee concluded that review of contractor safety programs was left to the discretion of the reviewing officials. ID-OSD stated that this flexibility allows adjustment for specific job-connected problems, and the application of specific requirements and checklists could result in a restriction of this flexibility.

## V. CONCLUSIONS

### A. FINDINGS

1. The actual implementation of the Jones/BOECON Safety Program was not adequate to accomplish the elements described by the Safety Program and management directives.

2. Jones/BOECON management verification of the effectiveness and implementation of the Jones/BOECON Safety Program, as described in POP-602, and -606, was less than adequate.

3. There was no formal method whereby Jones/BOECON management could determine the qualifications of craft supervisors to accomplish/fulfill their responsibilities (as described by Jones/BOECON POP-602 and -606) concerning safety.

4. There was no Jones/BOECON training program which would provide guidance for line supervisors in discharging their responsibilities concerning safety (as described by Jones/BOECON POP-602 and -606).

5. The job safety training provided to Jones/BOECON employees was not adequate to acquaint the craft personnel with job safety requirements or to prevent personnel exposure to construction hazards.

6. The informal method by which Jones/BOECON line management provided work instructions to second- and third-shift supervisors was not adequate to cause the crafts to accomplish the backfill operations in the manner envisioned by line management.

7. The decision to cut the north slope of the NWCF excavation to a vertical condition at stairwell #2 was made at an incorrect level of management and without adequate analysis of the safety considerations or consequences of the change.

8. Implementation of the Jones/BOECON change control procedure was not adequate to assure that proposed changes received the required management overview.

9. There was no qualified safety inspection for construction activities on the second and third shifts.

### B. PROBABLE CAUSE

The probable cause of the accident was the failure of management systems to prevent the cutting of a vertical bank through a compacted soil/undisturbed soil interface and to provide adequate controls to prevent personnel from being in the energy path of a potentially hazardous situation.

### C. JUDGMENT OF NEEDS

1. Jones/BOECON should assure a more effective implementation of the Jones/BOECON Safety Program and assure compliance with the safety requirements identified by contract and specifications.

2. A structured job safety training program should be developed which would acquaint all construction contractor personnel with job safety requirements.

3. Jones/BOECON should develop and implement a training program for craft supervisors, which would familiarize them with DOE, OSHA, and J/B job safety requirements.

4. Jones/BOECON should develop a system for the preparation of construction work plans and a formalized means of communication to assure that all supervisory personnel directing construction activities are knowledgeable about the planned work activities.

5. Jones/BOECON should assure the effective implementation of a change control procedure to preclude changes being made to drawings and specifications without proper management review and authorization.

6. Jones/BOECON should provide qualified safety inspection for all shifts during which construction activity is in progress.

No reco

## VI. SIGNATURES

R. A. SCHWARZ, Chairman
Director, Butte Project Office
ID-DOE

P. E. RUHTER, Member
Chief, Radiological Safety Branch
ID-DOE

B. H. LITTLE, Member
Reactor Operations & Programs Division
ID-DOE

G. S. ROKKAN, Member
Construction Division
RL-DOE

S. D. BRUMLEY, Legal Advisor
Office of Chief Counsel
ID-DOE

# APPENDIX A

## AUTHORIZING LETTER

UNITED STATES
**DEPARTMENT OF ENERGY**
IDAHO OPERATIONS OFFICE
550 Second St
Idaho Falls, Idaho 83401

NOV 15 1977

R. A. Schwarz, Director
Butte Project Office
MHD/CDIF

INVESTIGATION OF FATALITIES AT NWCF CONSTRUCTION SITE

Early November 15, 1977, two employees of Jones/Boecon at the New Waste Calcining Facility construction site were fatally injured in an earth cave-in at the construction site. You are hereby appointed as Chairman of the investigating committee. The members of the committee are as follows:

G. S. Rokkan, Construction Division, RL-DOE
B. H. Little, Reactor Operations and Programs Division, ID-DOE
P. E. Ruhter, Operational Safety Division, ID-DOE

In addition, S. D. Brumley is designated as Legal Advisor and J. H. Spickard is designated as Medical Advisor.

You are also authorized to draw on any other DOE or DOE contractor resources or expertise you feel necessary to assure a thorough and complete investigation. The investigation and reporting are to be conducted in accordance with DOEM 0502, insofar as circumstances associated with this subject permit. The report should fully cover and explain the causal sequence of the occurrence. The report should also describe the management systems which should have or could have prevented the occurrence. Appropriate recommendations for improvement of the management systems will be required.

The draft of your report should be ready by December 9, 1977. Your preliminary findings concerning the accident should be presented to me by November 23. Please contact R. J. Beers for any assistance you may need.

Charles E. Williams
Manager

cc: Investigation Committee Members
R. E. Tiller
R. E. Wood

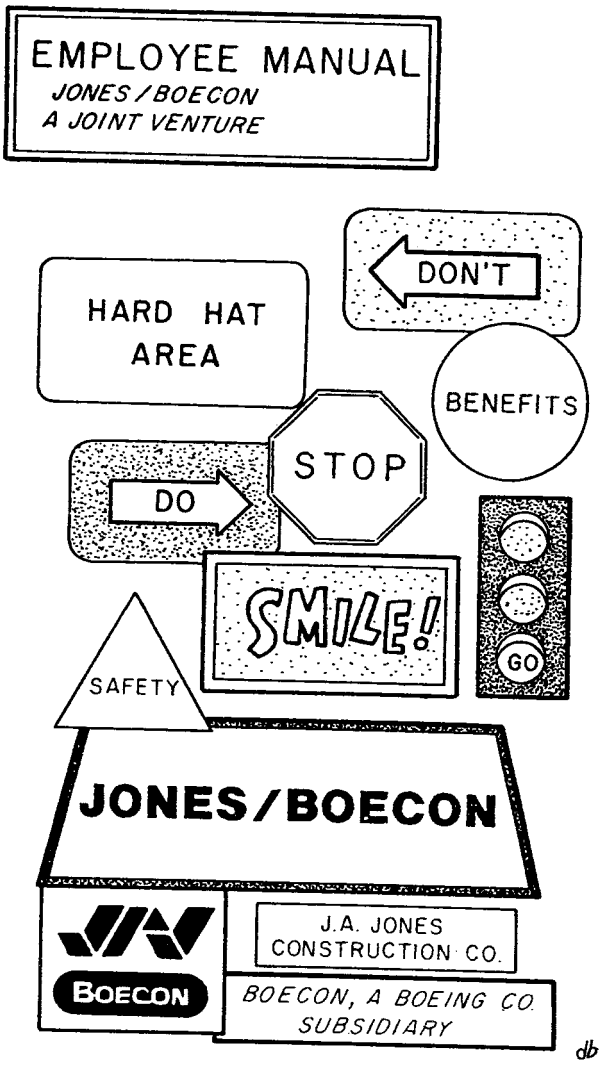
# APPENDIX B

## LIST OF PEOPLE SUPPLYING INFORMATION TO COMMITTEE

APPENDIX B

Personnel Providing Information

| Name | Contractor | Job Title | Interviewed | Statement |
|---|---|---|---|---|
| M. Marlin | Jones/BOECON | Project Manager | X | |
| W. Mizell* | Jones/BOECON | General Superintendent | X | |
| K. Goeres | Jones/BOECON | Civil/Structural Superintendent | X | |
| J. Mountain | Jones/BOECON | Asst. Mechanical Superintendent | X | |
| E. Jennings* | Jones/BOECON | Acting Gen. Foreman Operating Engineer Foreman | X | X |
| J. Fuhriman* | Jones/BOECON | Labor Foreman | X | X |
| C. Davis | Jones/BOECON | Operating Engineer Foreman | X | |
| L. Broadie* | Jones/BOECON | Labor General Foreman | X | |
| D. Semerad | Jones/BOECON | Industrial Relations Manager | X | X |
| R. Ohman | Jones/BOECON | Safety Supervisor | X | |
| R. Keller* | Jones/BOECON | Operating Engineer | X | X |
| R. Martinson* | Jones/BOECON | Operating Engineer | X | X |
| L. Livermore* | Jones/BOECON | Laborer | X | X |
| A. Hollenbeck* | Jones/BOECON | Laborer | X | X |
| E. Mouser | Jones/BOECON | Senior Civil Inspector | X | |
| E. Weighall | Jones/BOECON | Operating Engineer | X | |
| F. Calder | Jones/BOECON | Labor Foreman | X | |
| D. Bowne | Jones/BOECON | Teamster | | X |
| R. Atwood | Jones/BOECON | Teamster (Oiler) | | X |
| A. Hanson | Jones/BOECON | Operating Engineer | | X |
| R. Collier | Jones/BOECON | Operating Engineer | | X |
| D. Haney* | Jones/BOECON | Labor Foreman, Day Shift | | |
| C. Gertz | D.O.E. | Project Engineer, NWCF | X | |
| R. Beers | D.O.E. | Asst. Mgr., Envir., Safety & Health | X | |
| D. Dierks | D.O.E. | Industrial Safety Engineer | X | |


EMPLOYEE MANUAL
JONES / BOECON
A JOINT VENTURE
HARD HAT AREA
DON'T
BENEFITS
STOP
DO
SMILE!
GO
SAFETY
JONES/BOECON
J.A. JONES CONSTRUCTION CO.
BOECON
BOECON, A BOEING CO. SUBSIDIARY
db

# PART I

Welcome to the job. We are pleased to have you on our team and sincerely hope that your stay with us is both pleasant and profitable.

JONES/BOECON is a joint venture between the J. A. Jones Construction Company from Charlotte, North Carolina and BOECON, the Boeing Company Construction Subsidiary. Our primary purpose here is to build the New Waste Calcining Facility for the Energy Research and Development Administration. The construction consists of all civil, structural, mechanical, electrical and instrumentation work including all associated component testing. Construction is scheduled to be complete by December of 19[illegible].79 After completion of this $65 million project, the NWCF will be turned over to Allied Chemical Corporation to process liquid radioactive waste into a solid material that is easily stored.

This is our employee manual. Please read it carefully. Part I contains important information on Industrial Relations and Project Rules. Parts II-IV contain important security and safety information. Please contact your foreman or supervisor if you have any questions regarding any material contained in the manual.

Very briefly, we would like to summarize some of the more important aspects of our work here at the Idaho National Engineering Laboratory.

## EQUAL EMPLOYMENT OPPORTUNITY

It's a fundamental policy of JONES/BOECON to provide an equal employment opportunity for all employees or job applicants. The written Equal Employment Opportunity Policy of JONES/BOECON is as follows:

"It is the policy of JONES/BOECON to take affirmative action in affording Equal Employment Opportunity to all qualified persons without regard to race, creed,



color, religion, national origin, sex, or age. This shall apply to all personnel policies, including but not limited to, hiring, training, promotion, transfer, or termination and shall cover all salaried and hourly paid jobs within the respective construction trades.

Furthermore, it is the policy of this company to comply to the fullest extent with the applicable regulations of the Civil Rights Act of 1965 and Executive Order No. 11246 as amended by the Executive Order No. 11375. It is intended that all officials and employees of this company be informed of this statement of policy and that this policy shall be applied to every phase of employee recruitment, including advertising, relationships with referral organizations, employment agencies and labor organizations."

Dave Semerad, our Industrial Relations Manager, has been assigned the responsibility of administering our Equal Employment Opportunity and Affirmative Action Programs for JONES/BOECON. An important part of the JONES/BOECON Affirmative Action Plan is the placement of minority individuals who can both contribute and benefit from employment with JONES/BOECON. Please contact Mr. Semerad through your foreman if you know of any such minority individuals.

## HUMAN AFFAIRS COMMITTEE

As an employee of JONES/BOECON, you have the right to notify our Human Affairs Committee through the Industrial Relations Department if you feel that you have been discriminated against in any way because of your race, creed, color, religion, national origin, sex or age. This applies to all personnel policies including but not limited to hiring, training, promotion, transfer, or termination and shall cover all salaried employees and hourly-paid employees within the respective construction trades. The human affairs committee is designed to accommodate any human relations problem, not only those associated with discrimination. Contact the Industrial Relations Department

for details.

It is also the policy of JONES/BOECON to take affirmative action to employ qualified disabled veterans, veterans of the Vietnam Era, and qualified handicapped individuals. We believe that these are worthwhile programs and fully expect your support in their implementation.

## FOR YOUR SAFETY

We expect all employees to comply fully with all safety, health, security, and radiation rules and procedures of both JONES/BOECON and ERDA. These programs are outlined in Parts II-IV of your employee manual and are an important part of our overall operations. We want to personally assure you that JONES/BOECON is genuinely interested in your health and welfare, and we are totally committed to our safety program. We expect you to share our commitment. This will require a positive effort on your part. **All craftsmen are required to attend and participate in weekly tool box safety meetings held by your foreman each Monday morning.** These meetings will enable you to discuss specific work hazards and how to avoid and eliminate them. These meetings are for your benefit, and your participation is necessary to make them meaningful.

Sometime during the job you will undoubtedly notice hazardous conditions that could cause injury to you or a fellow worker. **It is your responsibility to bring this hazard to the immediate attention of your foreman.** If you are a foreman, it is your responsibility to correct any hazardous condition at once. All employees have the right to report an unsafe condition to ERDA's safety department if a solution cannot be obtained through your foreman or the JONES/BOECON Safety Engineer. If ERDA does not act on your complaint, you may complete a written form available through our Industrial Relations Department and submit it to ERDA's headquarters in Washington, D.C. You can be assured, though, that a complaint will be taken care of long before it reaches that point.

**If you are injured on the job, report the injury immediately to your foreman or supervisor. All injuries, regardless of how serious, MUST be reported.** Failure to do so may be a cause for dismissal. A first-aid kit is available at the Industrial Relations Office in case of emergency. Most injuries will be treated in the ERDA Medical Dispensary at the Central Facilities area where there is a nurse on duty 24 hours a day. If emergency equipment is needed, contact Industrial Relations at once. All emergency equipment is available within several minutes.

Personal protective equipment such as hard hats, safety belts and respirators will be furnished by the company. If you wish to buy safety shoes or prescription safety glasses, check with your foreman. Safety shoes are available through the EG&G warehouse at a reduced price, and prescription safety glasses are available at a reduced price through Royal Optical in Idaho Falls. Again, check with your foreman or the Industrial Relations Department for details.

Good housekeeping is the rule on this project. All areas must be maintained in a clean and sanitary manner at all times. Each employee is responsible for maintaining his work area and picking up at the day's end.

Above all, remember that 90% of all accidents are caused by people and therefore, 90% of all accidents can be **prevented** by people. Your positive attitude toward safety is the best insurance we can have towards a safe job. Be **careful. If you are unsure of any operation, stop and ask. Don't take chances.** You may jeopardize your own life or the lives of your fellow workers.

Emergency preparedness is another important function in our safety program. Know the exact location of fire extinguishers in your area. In the event you hear an evacuation signal, which is an alternating siren, follow emergency shutdown procedures for your equipment, report immediately to your lunchroom for a head count, and wait for instructions from your supervisor or foreman. If you hear the alert signal, which is a steady siren, follow emergency shutdown procedures for your equipment and find shelter under a supporting structure.

## SECURITY

Security at the INEL is goverened and enforced by the Energy Research and Development Administration. The ERDA Security Rules are outlined in Part II of your manual but here are some of the more important points.

**Each employee or visitor must stop at security headquarters located in Building 606 at the Central Facilities Area and obtain a Security Pass.** Check to see that you are wearing your pass right now. Before terminating from JONES/BOECON, all employees must turn in their security passes and any personal protective equipment that has been issued to them.

Also, there are certain items that are contraband and must not be brought on the INEL work site. These items are covered in Part II of this manual. Periodically, vehicle inspections are made by ERDA Security and any contraband items found in your car will be confiscated and you will be obligated to pick them up on your own time.

## GENERAL INFORMATION

Here is some general project information that will be of interest to you. **Contact the JONES/BOECON Industrial Relations office at 522-4400, extension 3672 any time you will be absent from work.** Be sure to give us your name, reason for absence, and foreman. JONES/BOECON will not tolerate excessive absenteeism. We need you on the job.

The JONES/BOECON work day is from 8:00 a.m. to 4:30 p.m. with a half-hour break for lunch at noon. **There are no organized coffee breaks on this project, although you may drink coffee at your work station if it does not disrupt the harmony of your work.** This is up to your foreman or supervisor. Clean-up time is at 11:54 am and 4:20 pm.

Also, driving of government vehicles without a valid Government Driver's Permit is prohibited. If your work is such that you must drive a Government vehicle, your foreman will make sure that you obtain a Government Driver's License.

There is a set of Project Operating Procedures (POP's) in effect on this project. These were carefully prepared by each department and provide the framework for our operation.

As you will see, we are on a tight construction schedule and your cooperation will be expected in every phase of our work.

We mentioned some of the more important things, you, as a new employee should know. The New Waste Calcining Facility is a complex project, and its successful completion is going to depend heavily on a strong team effort, and you're an important member of that team. If you see a better way to do things, if you see unsafe practices, or if you can see a way to improve your work environment, please let us know. We welcome your comments and ideas. We're glad to have you aboard. Have a safe stay.



# PART II

## SECURITY REGULATIONS

JONES/BOECON adheres strictly to all security requirements of the Energy Research and Development Administration. Work performed by JONES/BOECON at the Idaho National Engineering Laboratory (INEL) may require access to security areas and occasional use of classified documents and information. It is the responsibility of each employee to protect and safeguard all classified information which he might receive and to comply with the security regulations established for this purpose.

(a) Personnel who have been cleared for access to certain classified information must notify ERDA of any contemplated foreign travel to certain countries (presently those countries considered as Soviet Bloc "behind the Iron Curtain") prior to departure for

such travel.

(b) Under the Atomic Energy Act of 1954, as amended, and the U.S. Code, Title 18, "Crimes and Criminal Procedures," certain penalties are prescribed for disclosure to unauthorized personnel of any **RESTRICTED DATA** or **CLASSIFIED INFORMATION,** even though such disclosure is from carelessness rather than intentional. In addition to criminal proceedings, an employee's disclosure of such information could result in his discharge from this project and limitations placed on his ability to again find employment in the ERDA Program.

(c) PROHIBITED ARTICLES INCLUDE: FIREARMS, ALCOHOLIC BEVERAGES, NARCOTICS, EXPLOSIVES, AND LIVESTOCK. PERIODIC VEHICLE CHECKS WILL BE MADE BY ERDA SECURITY AND SHOULD ANY OF THESE ITEMS BE FOUND IN YOUR VEHICLE, THEY WILL BE CONFISCATED AND YOU WILL BE REQUIRED TO PICK THEM UP ON YOUR OWN TIME.

(d) Cameras are prohibited unless accompanied by a camera pass. Persons using unauthorized cameras will surrender their camera to a member of the ERDA Patrol Force. The film will be confiscated and processed. Exposures of other than ID Operations will be returned.

(e) Electronic transmitting and receiving devices (shortwave, radio telephone, amateur systems, citizens band units, etc.) which are currently licensed by the FCC and those citizen band units under 100 Milliwatts are exempt from the prohibited designation. All other devices not licensed are prohibited.

(f) Hunting and fishing are prohibited in the INEL Area.

(g) Badges will be worn in plain view at all times.

(h) All badges must be returned to the JONES/BOECON Industrial Relations office immediately upon termination.



# PART III

## EMERGENCY PREPAREDNESS PROGRAM

It is the policy of JONES/BOECON to cooperate fully with the Energy Research and Development Administration in the implementation of an emergency evacuation plan. This plan is formally called the JONES/BOECON Emergency Preparedness Program.

ERDA periodically conducts tests to monitor the effectiveness of the plan. Unless otherwise notified in advance, JONES/BOECON will participate in each of these drills:

1. **Evacuation Signal**
   a. The evacuation signal is an oscillating (varying intensity) siren, at approximately five to ten seconds on and five to ten seconds off, for at least a three-minute duration.
   b. Upon hearing the evacuation signal, all personnel shall:
      i. Follow emergency shut-down procedures for equipment under their control.
      ii. Proceed at a rapid walk to their lunchroom, changehouses, or other designated meeting places.
      iii. At the designated meeting place, the General Foreman, Foreman, etc., will conduct a head count of their personnel. They will report any missing personnel to their Department Manager or Superintendent who in turn will report to the Project Manager.
      iv. After the head count has been made, employees will go directly to their cars and follow the lead car out.
2. Alert Signal
   a. The alert signal is a continuous (non-varying intensity) siren tone for at least a three-minute duration.
   b. Upon hearing the alert signal, all personnel shall:
      i. Follow emergency shut-down procedures for equipment under their control.

ii. Find shelter under a supporting structure.
iii. Stand by for instructions from the Foreman, Superintendent or other authorized individual.

**Under no circumstances will individuals decide for themselves if a signal is real or practice.** Unless specifically told otherwise by an authorized individual, they shall follow the procedures outlined in 1 or 2.

## PART IV

### SAFETY

It is the policy of the JONES/BOECON Company to perform work in the safest manner possible. We will comply with applicable local, state, and Federal regulations pertaining to safety, health, radiation, and fire protection. It will be the responsibility of each employee to maintain and comply with this policy.

1. General Safety Rules
   a. All injuries, accidents, incidents, and fires will be reported at once to your immediate supervisor.
   b. No machines, tools, etc., will be operated until guards are in place.
   c. Defective machines, tools, etc., will be reported and taken out of service at once.
   d. Unless specifically authorized, gloves must **not** be worn while operating machines with revolving spindles.
   e. When in doubt, insist upon being instructed as to your duties and how to perform them safely.
   f. Know the location, type, and how to use all fire extinguishers in your job location. Know the location and how to use the nearest means of reporting a fire.
   g. Only one person is to operate a double wheel grinder at one time.
   h. All protruding nails or screws will be bent down or removed immediately.



   i. Loose material and/or tools will not be left lying overhead where they might fall.
   j. Equipment will not be left unattended while in operation or motion.
   k. Portable electric equipment will be unplugged when not in use.
   l. Airtools shall have air shut off when not in use. Air hoses shall not be crimped or kinked for the purpose of changing tools or equipment.
   m. Loose or torn clothing will not be worn around moving equipment.
   n. Do not use hands for holding work while drilling.
   o. Running or horseplay will not be tolerated.
   p. Toolbox Safety Meetings will be held once a week. Craftsmen are required to attend the meeting held by your immediate Foreman.
   q. Report all hazardous conditions to your immediate supervisor at once.
   r. Crane operators shall take signals from only one individual. If the operator is in doubt of a signal, he will not continue the operation until the signal is clear.
   s. Gasoline shall not be used for hand washing.
2. Personal Protective Equipment
   a. Eye protection must be worn when there is danger of eye injury from flying particles, welding, etc.
   b. Prescription glasses may be purchased through the Company. Check with Industrial Relations for details.
   c. Nonprescription glasses will be furnished by the Company.
   d. Hardhats must be worn in all areas (except lunchrooms and offices) at all times.
   e. Foot protection must be worn when there is a danger of injury to the feet. Safety shoes may be purchased at the EG&G warehouse on Tuesday and Thursday.
   f. A good shoe or boot of solid leather construction must be worn by all field construction people. Ten-

nis shoes, sandals, etc., are prohibited.

g. Hearing protection must be worn in high noise-level areas.

3. Clothing
   a. Proper clothing and serviceable shoes must be worn at all times.
   b. Employees reporting to work improperly clothed or without serviceable shoes will be sent home and will be considered absent for the day.
   c. Torn or loose clothing will not be permitted around equipment with rotating or moving parts.
   d. T-shirts will be permitted if they afford over-the-shoulder protection. Tank tops and no shirts will not be permitted.
   e. Long hair and beards will not be permitted around machinery with rotating or moving parts.
4. Ladders
   a. All ladders shall be inspected upon arrival at the site. Defective ladders shall not be put into service.
   b. Ladders should be stored where they will not be exposed to the weather and where the ventilation is adequate.
   c. Ladders found to be defective in any way will immediately be removed from service and returned to the warehouse.
   d. Ladders shall never be painted; paint hides defects which may appear.
   e. Straight ladders shall be so placed that the base of the ladder from the wall against which the ladder rests is ¼ the length of the ladder.
   f. Only one man on a ladder at a time.
   g. All straight ladders shall be equipped with safety feet and a tie-off line.
   h. Step ladders shall be placed with all four feet on a solid, level base. Spreaders will be fully opened and locked during use.
   i. Metal ladders shall not be used for electrical work or where they may come into contact with electrical conductors.



   j. Ladders shall not be placed in passageways, doorways, drives, or any location where they may be displaced by activities being conducted or any other work unless protected by barricades or guards.
   k. All ladders shall extend 36" above their landing.
5. Scaffolds
   a. Make sure scaffold feet are placed on a level, solid surface at all times.
   b. Make sure all scaffolds are plumb and level.
   c. Tie scaffolds into walls at least every 25 feet of height and 28 feet of length.
   d. A safety railing shall be used regardless of height. A standard railing of top-rail, midrail, and toe-board shall be used on any scaffold 6 feet high or higher. Top-rail shall be 42 inches high.
   e. All scaffolds shall be equipped with a ladder and employees shall never climb on cross-braces.
   f. All free-standing towers must be guyed every 30 feet.
   g. Make sure all scaffolds are fully planked on all working levels and plank is of sound quality and at least 2 inch scaffold-grade lumber or equal.
   h. Scaffold planks resting on bearers will be cleated, toe-nailed or tied in such a manner that slipping is not possible.
   i. Scaffold planks shall extend over the last bearer at least 6 inches but not more than 12 inches.
   j. Men shall not be allowed to work on scaffolds that are covered with ice or snow. Clinging ice shall be removed from guardrails and uprights and the planks turned over or sanded to prevent slipping.
   k. It shall be the responsibility of the foreman to see that any scaffold damaged is immediately repaired and men will not be allowed to work on the scaffolds until repairs have been made.
6. Housekeeping
   a. Metal waste cans with lids will be furnished for oily and paint-saturated waste materials. These wastes will be disposed of daily.

b. All fire lanes, aisles, stairways, passageways, etc., will be kept clean and free from loose materials and debris. No such space shall be used for storage of any kind.

c. Tools shall not be strewn about or left where they may cause tripping or other hazards, and shall, at the end of each shift, be collected and stored in a safe location.

d. Materials in storage shall be stored in an orderly manner to prevent toppling or being otherwise displaced.

e. Lumber and other materials, if no longer needed, and waste materials of all kinds, whether combustible or not, shall be immediately removed from the construction area.

f. All nails will be removed or bent over from all boards, planks, or timbers. Under no condition will nails be left to form a hazard to workmen.

g. Where quantities of sawdust, shavings, or other similar combustible materials are produced, a suitable method of removal of each material will be provided.

h. Spillage of any liquids of any kind on floors will be immediately cleaned up to avoid slipping, falling, or possible fire.

7. Welding

a. Where welding or cutting must be done near combustible materials, special precautions are necessary to prevent sparks or hot slag from reaching such materials.

i. If possible, move the materials to a safe distance from the operation.

ii. If material cannot be moved, it should be completely covered with fireproof blankets or other fire resistant material.

b. When welding is to be done over wood floors, it is advisable to:

i. Sweep floors clean.

ii. Take precautions to prevent sparks from falling



through cracks.

c. When welding in an area where there are open holes, cracks, etc., over pits, over floors below, or any other sources of possible fire, suitable means will be used to protect workers below.

d. In locations where unusual existing conditions, wood walls, floor openings and/or cracks, combustible materials, etc., cannot be protected by coverings, a fire watch will be stationed with fire extinguishers for ready use. This watch person shall stay at the location for at least 30 minutes after the job is completed to make sure there are no smoldering fires.

e. Welding or cutting operations will not be permitted in or near rooms containing flammable vapors, liquids, or dusts or inside tanks or other containers which have held flammable liquids, until all fire and explosion hazards have been eliminated.

8. Handling of Compressed Gas Cylinders

a. All cylinders shall be secured in an upright position at all times except for brief periods when in actual transportation.

b. Always consider cylinders full and handle carefully.

c. Do not expose fittings or cylinders to grease or oil, especially oxygen.

d. When in actual transportation, regulators shall be removed and the valve caps in place.

e. Use an approved cradle or holder when hoisting cylinders. Never use a magnet or a choker.

f. Gas cylinders should never be used as rollers for moving equipment.

g. Never attempt to mix gases in a cylinder.

h. No alterations or repairs shall be made to cylinders or valves.

i. Cylinder valves should be opened slowly. Cylinders must be provided with hand wheels or shall have a spindle key or valve wrench in place while the tank is in use.

j. Before connecting the regulator to the tank, open the valve slightly for an instant to clear the valve of dirt, except if the tank is of highly toxic gas.
k. After cylinder is empty, disconnect regulator, replace protective cap, and return to empty cylinder rack.
l. Oxygen cylinders in storage shall be separated from fuel gas mixtures and/or other combustibles, such as oil and grease, by a distance of twenty (20) feet or by a noncombustible barrier at least 5 feet high having a fire resistance rating of at least one-half (½) hour.
m. Oxygen or other compressed gases shall not be used to clean or dust off clothing.
n. All oxygen / acetylene cutting torches shall be equipped with back-flow check valves.



## EMERGENCY SIGNALS

### SITE AREAS

| | |
|---|---|
| SIGNAL | STEADY SIREN |
| INDICATION | ALERT |
| ACTION REQUIRED | TAKE COVER - USE SHELTER AREA (IF AVAILABLE) PREPARE TO EVACUATE. |

| | |
|---|---|
| SIGNAL | ALTERNATING SIREN |
| INDICATION | EVACUATE |
| ACTION REQUIRED | PROCEED IMEDIATELY TO OUTSIDE ASSEMBLY AREA IN ACCORDANCE WITH EVACUATION PLANS |

# APPENDIX D

## POP-606

## INDOCTRINATION AND TRAINING

JONES/BOECON



| PROJECT OPERATING PROCEDURE | PROCEDURE NO. POP — 606 |
|---|---|
| TITLE OF PROCEDURE: INDOCTRINATION AND TRAINING | Issue Date: March 11, 1977 |
| PROJECT TITLE: New Waste Calcining Facility (NWCF) Energy Research and Development Administration (INEL) | Rev. No. & Date: 0 3/11/77 |
| PREPARED BY: D. C. Semerad DATE | APPROVED BY: PROJ. MGR. DATE: 3-11-77 QA MGR. 3/11/77 |

1.0 Purpose

1.1 This procedure specifies the requirements for the indoctrination and training of all personnel.

2.0 Scope

2.1 This procedure applies to the Indoctrination and Training of all JONES/BOECON personnel.

3.0 Definitions

3.1 None

4.0 References

4.1 POP-100, "Organization and Responsibilities."

4.2 POP-602, "Safety and Health."

4.3 POP-603, "Security."

4.4 POP-604, "Personnel."

4.5 POP-605, "First Aid."

4.6 POP-607, "Accident Investigation and Reporting."

4.7 POP-608, "Emergency Preparedness Program."

4.8 POP-609, "Apprenticeship Program."

4.9 JONES/BOECON Equal Employment Opportunity and Affirmative Action Plan.

4.10 POP-700, "Quality Assurance Program and Organization."

4.11 IAD 0504-33, Part E, Instructions for Employees (Employee Rights and Responsibilities).

5.0 General

5.1 All personnel employed by JONES/BOECON shall receive basic

indoctrination in the general Safety Requirements and procedures, Quality Assurance Requirements, project housekeeping and fire protection policies, and emergency procedures in effect at the site. This indoctrination is in addition to the Safety Orientation given by EG&G referenced in 4.4.

5.2 All non-craft personnel shall receive basic indoctrination in JONES/BOECON policies and procedures, company benefits and programs, and special project information or requirements in addition to 5.1.

5.3 Industrial Relations shall coordinate and develop specific training programs that are required to develop the technical capabilities of personnel.

5.4 All personnel shall be informed of their rights and responsibilities as outlined in 4.11.

6.0 Procedure

6.1 Industrial Relations will coordinate the frequency and time of indoctrination meetings. All formal indoctrination meetings will be documented with Attachment 606-A. The three phases of indoctrination will be designed, and revised as required to acquaint new employees with the employer, the project, the work, and applicable rules and regulations. The indoctrination process will be scheduled to assure prompt and orderly processing of new employees.

6.1.1 Primary indoctrination will fall into these categories:

a. Salaried-exempt personnel will receive an informal indoctrination from the Industrial Relations Department to include:

i. Policies and Procedures.

ii. Company benefits and programs.

iii. Special or project information and requirements.

b. Non-exempt, non-bargaining unit personnel will receive an informal indoctrination from the Industrial Relations Department to include:

i. Policies and Procedures.

ii. Company benefits and programs.

iii. Special or project information and requirements.

c. All employees shall receive formal indoctrination from the Industrial Relations Department which shall include:

i. Project rules and brief introduction to the project.

ii. Safety rules and requirements, the safety program, and fire protection procedures.

iii. Emergency procedures and plans.

iv. Requirements for personal protective safety equipment such as hard hats, eye protection, ear protection, and other protective devices.

v. ERDA security requirements.

vi. Equal Employment Opportunity Policy.

6.1.2 Specific indoctrination will fall into these categories:

a. Salaried-exempt personnel, immediately after processing, will have their particular duties explained by their department head who will also indoctrinate them concerning specific Quality Assurance, security, safety, or other requirements of the area or department.

b. Non-exempt, non-bargaining unit personnel, immediately after processing, will receive indoctrination as to duties, specific Quality Assurance, security, and safety responsibilities from their section supervisor.

c. Craft employees will receive specific instruction as to duties, Quality Assurance, security, and safety requirements immediately upon arriving at their assigned work area by their immediate supervisor.

6.1.3 Follow-up informal indoctrination sessions will be conducted by those supervisors set forth in paragraph 6.1.2 above and will consist of a brief review of safety and security rules, Quality Assurance requirements and other items mentioned initially. At this session, questions

are to be solicited relative to any areas of uncertainty the employee may have. This session is to take place during the first month of employment.

6.2 Industrial Relations may assist in conducting any indoctrination session. Special indoctrinations may be developed and implemented if necessitated by local conditions.

6.3 General Training

6.3.1 Industrial Relations shall take the action necessary to support bargaining-unit apprenticeship training programs as referenced in 4.8.

6.3.2 In the event apprenticeship training programs are not functioning as planned, Industrial Relations shall seek semi-skilled individuals to place in local labor unions with the consent of the appropriate union.

6.3.3 Key Management personnel shall constantly evaluate subordinate employees for inherent potential and will develop, for employees with potential, on-the-job, formal and informal training programs to increase their capacity for assumption of increasingly responsible positions. All formal training programs shall be coordinated through Industrial Relations.

6.3.4 All department managers shall assure that their employees are trained in, and familiar with those duties assigned.

6.4 Safety Training

6.4.1 The Industrial Relations Department will conduct training sessions for each foreman in how to conduct weekly "Toolbox" meetings.

6.4.2 Craft employees are required to attend weekly "Toolbox" safety meetings conducted by the crew's immediate foreman.

6.4.3 Pertinent subjects shall be discussed each week. Each foreman is responsible for stimulating participation from his crew and for limiting the length of each meeting

to fifteen (15) minutes. These meetings will take place at the start of shift the first day of each work week.

6.4.4 Each foreman is responsible for documenting the subject matter and other details of each meeting in the "Foreman's Toolbox Meeting Record Book." (Attachment 606-B)

6.4.5 The white copy of these reports should be turned in to the Industrial Relations Department no later than end of shift the day of the meeting.

6.4.6 All members of field supervision are required to attend a meeting conducted by a different foreman each week.

6.4.7 Supervisory safety meetings will be conducted each month. The Industrial Relations Manager or his representative shall be the chairman of each meeting and will be responsible for the meeting agenda which shall include accident report review, hazard discussions, and delegation of specific corrective action measures. The Industrial Relations department will be responsible for the organization and documentation of each meeting. The following individuals are required to attend:

a. Project Manager
b. General Superintendent
c. Line Superintendents
d. Engineering Representative
e. Quality Assurance Representative
f. Procurement Representative
g. All Foreman
h. Industrial Relations Manager
i. Safety Engineer
j. All department heads not listed are invited to attend.

7.0 Quality Assurance

7.1 No audit responsibilities.

| PROJECT OPERATING PROCEDURE | PROCEDURE NO. POP — 606 |
|---|---|
| TITLE OF PROCEDURE: INDOCTRINATION AND TRAINING | March 11, 1977 |
| PROJECT TITLE: New Waste Calcining Facility (NWCF) Energy Research and Development Administration (INEL) | Rev. No. & Date: 0 3/11/77 |

8.0 Records and Reports

8.1 Attachment 606-A, "Meeting Register."

8.2 Attachment 606-B, "Foreman's Toolbox Meeting Record."

8.3 Minutes of Supervisory Safety Meetings.

# APPENDIX E

## POP-602

## SAFETY AND HEALTH

JONES/BOECON



| PROJECT OPERATING PROCEDURE | PROCEDURE NO. POP — 602 |
|---|---|
| TITLE OF PROCEDURE: SAFETY AND HEALTH | Issue Date: March 11, 1977 |
| PROJECT TITLE: New Waste Calcining Facility (NWCF) Energy Research and Development Administration (INEL) | Rev. No. & Date: 0 3/11/77 |

| PREPARED BY: | DATE | APPROVED BY: | DATE: |
|---|---|---|---|
| D. C. Semerad | 2/28/77 | Mark Martin PROJ. MGR. / J. Cambell QA MGR. | 3.11.77 / 3/11/77 |

1.0 Purpose

1.1 The purpose of this procedure is to define organizational responsibilities and establish procedures for the Safety and Health of all employees and subcontractors of JONES/BOECON.

2.0 Scope

2.1 This policy is applicable to every employee of the JONES/BOECON Joint Venture and subcontractors.

3.0 Definitions

3.1 None

4.0 References

4.1 Idaho Operations Safety and Health Requirements, ID-12028.

4.2 JONES/BOECON Employee Manual, 1977.

4.3 OSHA - Williams-Steiger Occupational Safety and Health Act, 1970.

4.4 National Fire Protection Association, Life Safety Code 101, 1973.

4.5 National Electric Code, 1975 Edition.

4.6 ID-12044, Health and Safety Design Criteria Manual.

4.7 POP-606, "Indoctrination and Training."

4.8 POP-607, "Accident Investigation and Reporting."

4.9 POP-608, "Emergency Preparedness Program.

4.10 Project Management Memorandum #4.

5.0 General

5.1 PROJECT MANAGER - Ultimately responsible for all aspects of NWCF safety. Attends safety meetings as required conducts periodic job-site inspections, informs Industrial Relations Manager of deficiencies. Reviews and approves all accident reports, makes recommendations to Safety Engineer.

5.2 GENERAL SUPERINTENDENT - Responsible for all aspects of Field Safety and Fire Protection. Receives recommendations from Field Staff. Puts appropriate recommendations into effect and insures compliance with recommendations. Makes frequent job site inspection formally or informally, with or without Safety Engineer. Implements corrective action. Attends Safety meetings as required. Assists Line Superintendents in hazard recognition. Reviews and approves all accident reports.

5.3 INDUSTRIAL RELATIONS MANAGER - Immediate supervisor of Safety Engineer. Informs Project Manager of safety program deficiencies and any proposed changes. Continually audits all aspects of safety program. Provides support to Safety Engineer when needed. Conducts periodic job-site inspections. Attends safety meetings as required. Reviews and approves all accident reports.

5.4 SAFETY ENGINEER - Reports to Industrial Relations Manager. Writes safety procedures, develops reporting system, conducts investigations and reports accidents as required. Maintains OSHA, ERDA, and company logs. Conducts job-site inspections at unscheduled intervals and compiles a written detailed report of each inspection. (Attachment 602-A) Provides staff support to all supervision in matters pertaining to safety and health. Coordinates incentive and training programs. Has direct and frequent interface with Operations Safety personnel. Attends, audits, and records safety meetings. Conducts and maintains log of new employee orientation. Develops and maintains record-keeping system. Conducts related training programs. Arranges transportation to first aid as required.

5.5 LINE SUPERINTENDENTS - Receives direction from General Superintendent. Receives comments and recommendations from General Superintendent and Safety Engineer. Assists foremen in weekly safety meeting responsibilities. Assures that employees are working according to prescribed safety practices. Assures equipment safety through continuous inspections. Makes continuous job-site inspections and recommendations to General Superintendent. Attends safety meetings as required. Assures that all NWCF accidents are reported as required. Assures good housekeeping and fire protection throughout the project. Assists General Foreman and Foreman in training employees in new or hazardous assignments and use of Personal Protective Equipment.

| PROJECT OPERATING PROCEDURE | PROCEDURE NO. POP — 602 |
|---|---|
| TITLE OF PROCEDURE: SAFETY AND HEALTH | March 11, 1977 |
| PROJECT TITLE: New Waste Calcining Facility (NWCF) Energy Research and Development Administration (INEL) | Rev. No. & Date: 0 3/11/77 |

5.6 GENERAL FOREMAN - Receives direction from Line Superintendent. Assures that men are working according to standards as referenced in 4.0. Assures that material and tools are in good repair and all structures built according to 4.0. Assures that all men have and utilize adequate protective equipment; assures that all accidents are reported as required. Attends Safety meetings as required. Makes periodic inspections. Makes recommendations to Line Superintendents and Safety Engineer. Implements corrective action on Project deficiencies. Assists Foreman in training employees in new or hazardous assignments and use of Personal Protective Equipment.

5.7 FOREMAN - Receives direction from General Foreman. Assures that men are working in accordance with prescribed practices outlined in 4.0; that all equipment is safe and in good repair and that protective equipment is provided and used. Conducts and records weekly "Tool Box" meetings. Reports all accidents as referenced in 4.8. Continuously inspects his area for workplace hazards and housekeeping infractions. Makes recommendations to General Foreman. Takes corrective action as required. Assures that injured employees receive required First-Aid. Provides Safety Engineer with pertinent information. Assures employees are trained in new or hazardous assignments and Personal Protective Equipment.

5.8 WORKER - Attends and participates in orientation functions. Receives direction from immediate foreman. Attends and participates in weekly "Tool Box" Safety meetings. Abides by supervisory directives and prescribed practices. Immediately reports all unsafe situations to foreman and maintains a clean and orderly work location. Immediately reports all accidents to his foreman.

5.9 PROJECT ENGINEER - Assures that JONES/BOECON engineering standards comply with standards referenced in 4.0. Makes periodic job-site inspections. Maintains close liaison with Safety Engineer regarding potential problem areas.

5.10 PROCUREMENT MANAGER - Maintains quality safety standards on all purchases. Restricts purchases only to equipment meeting approved standards referenced in 4.0.

5.11 QUALITY ASSURANCE MANAGER - Assures quality of equipment purchased; reports defects to Procurement Manager and Safety Engineer. Assures quality of work being performed with regards to safety. Verifies integrity of permanent items damaged by accidents.

5.12 ADMINISTRATION MANAGER - Assures that a log of hours worked is maintained and furnished to Safety Engineer for monthly and quarterly reports.

5.13 SUBCONTRACT ADMINISTRATOR - Assures that subcontractors are able to meet JONES/BOECON and ERDA Safety standards. Informs bidders that final approval of all bids will be contingent on the ability to comply with standards referenced in 4.0.

5.14 JONES/BOECON will adhere to all radiation procedures established by ERDA, EG&G, and Allied.

6.0 Procedures

6.1 The procedures contained in the JONES/BOECON Employee Manual shall be utilized. This manual is issued to each JONES/BOECON employee at new employee orientation as referenced in 4.7.

6.2 Safety Meetings

6.2.1 Requirements

a. Each craft foreman has the responsibility of conducting weekly safety meetings with his immediate crew as defined in 4.7.

b. Supervisory safety meetings shall be held monthly as defined in 4.7.

6.3 Absence from Work

6.3.1 Any employee who has been absent from work due to a work-related injury shall obtain a written statement from a physician authorizing a return to work.

6.4 Safe Work Permits

6.4.1 When work is performed inside the secured CPP area or where work might interfere with Allied Chemical Corp. activities, a Safe Work Permit must be completed and submitted to Allied for approval. (Attachment 602-B)

6.4.2 JONES/BOECON SWP's will be submitted according to Attachment 602-C.

6.4.3 JONES/BOECON subcontractor SWP's will be submitted according to Attachment 602-D.

6.5 Safety Inspections

6.5.1 In addition to JONES/BOECON safety inspections ERDA and Allied Safety, Fire Protection or Industral Hygiene Personnel shall periodically inspect the NWCF. These inspectors may be accompanied by the JONES/BOECON Safety Engineer, Industrial Relations Manager, or other authorized personnel.

6.5.2 A written report of these inspections will be made with a copy sent to JONES/BOECON Industrial Relations. These copies will be routed internally for necessary corrective action and then filed for the duration of the project.

7.0 Quality Assurance

7.1 Reference 5.11.

8.0 Records and Reports

8.1 Referenced in POP-607, "Accident Investigation and Reporting."

8.2 Attachment 602-A.

8.3 Attachment 602-B.

8.4 Attachment 602-C

8.4 Attachment 602-D

# APPENDIX F

## POP-100

## ORGANIZATION AND RESPONSIBILITIES

JONES/BOECON



| PROJECT OPERATING PROCEDURE | PROCEDURE NO. POP — 100 |
|---|---|
| TITLE OF PROCEDURE: ORGANIZATION AND RESPONSIBILITIES | Issue Date: March 11, 1977 |
| PROJECT TITLE: New Waste Calcining Facility (NWCF) Energy Research and Development Administration (INEL) | Rev. No. & Date: 0 3/11/77 |

| PREPARED BY: | DATE | APPROVED BY: | DATE: |
|---|---|---|---|
| Mark Marlin | 2/25/77 | Mark Marlin PROJ. MGR. | 3.11.77 |
| | | J A Cambell QA MGR. | 3/11/77 |

1.0 Purpose:

1.1 To define and depict the organization and responsibilities of the key personnel assigned to the NWCF.

2.0 Scope:

2.1 The responsibilities defined herein apply to the total scope of work assigned to JONES/BOECON under a Construction Contract.

3.0 Definitions:

3.1 JONES/BOECON: A joint venture construction company.

3.2 ERDA: The Client organization who, through contract, has appointed JONES/BOECON as a constructor for the facility. (Energy Research and Development Administration)

3.3 Site: The NWCF and surroundings.

3.4 Project: That portion of the facility construction assigned to JONES/BOECON and its subcontractors.

3.5 Contract: A written agreement between JONES/BOECON and ERDA delineating the responsibilities of each party.

4.0 References:

4.1 JONES/BOECON Joint Venture Agreement dated April 14, 1976.

4.2 Contract No. EY-76-C-07-1565, also called E(10-1)-1565.

4.3 Organization Charts.

5.0 General:

5.1 JONES/BOECON shall perform all activities assigned by the contract.

5.2 JONES/BOECON is to carry out the construction work in accordance with approved drawings and specifications furnished by ERDA.

5.3 These procedures have been developed to govern the conduct of the work in accordance with the Contract.

6.0 Procedure - Project Responsibilities:

6.1 Corporate:

6.1.1 The General Manager, JONES/BOECON, has the Corporate responsibility to ERDA for the execution of the project.

6.1.2 The line responsibility and the corresponding authority for execution of the project have been delegated to the JONES/BOECON Project Manager who is resident at the site.

6.1.3 The Project Manager and his staff are fully supported and controlled by the JONES/BOECON Management Committee as listed below:

* Initial planning and project development;
* Assignment of key personnel;
* Continuous surveillance of project activities;
* Scheduled and unscheduled reviews of project activities by Corporate Purchasing, Accounting, Estimating, Industrial Relations, and Quality Assurance;
* Enforcement of Corporate policies and procedures;
* On-call assistance from Corporate Purchasing, Accounting, Estimating, Planning Scheduling, Engineering, Industrial Relations, Equipment and Quality Assurance Staff.

6.2 Project Manager:

6.2.1 The JONES/BOECON Project Manager is the senior JONES/BOECON representative on site and is the official contact with ERDA.

6.2.2 The Project Manager is responsible to the General Manager, JONES/BOECON, for all project activities, including those listed below:

* Representing the Company in all matters related to the project;
* Developing and maintaining the necessary staff and labor force to competently and efficiently complete the work; including the development of personnel for more responsible assignments on this and other projects.

* Providing functional guidance to his staff in the performance of their duties;
* Developing plans, procedures and schedules for the successful completion of the project;
* Developing and maintaining complete and accurate estimates of the cost of the project;
* Completing the work within the approved schedule and estimate;
* Assuring that the work is completed in accordance with the plans and specifications provided by ERDA;
* Enforcement of and adherence to the policies and procedures outlined in this manual;
* Assuring that all changes to the work are approved by ERDA before they are carried out;
* Assuring that ERDA receives maximum value for all expenditures;
* Maintaining complete and accurate records of project activities;
* Organizing active Accident Prevention, Training, and Equal Employment Opportunity Programs;
* Assuring that ERDA, JONES/BOECON management and the project staff are fully informed on project activities in a timely manner;
* Development, Maintenance, and Control of Project Operations Procedure Manual.

6.3 Project Engineer:

6.3.1 The Project Engineer will act for the Project Manager in his absence.

6.3.2 The Project Engineer is the senior JONES/BOECON technical representative on site.

6.3.3 The Project Engineer is responsible to the Project Manager for all technical aspects of the project, including the following:

* Representing the project in all technical matters;
* Developing and maintaining the necessary technical staff to competently and efficiently carry out the responsibilities of his department;
* Providing functional guidance to his staff in the performance of their duties;

* Obtaining or developing all required construction and procurement information and providing interpretation of all technical information provided by ERDA, the Architect-Engineer and suppliers;
* Performing all field engineering;
* Performing all technical liaison with ERDA's Architect-Engineer;
* Resolving interferences in design and installation;
* Providing field engineering support to the construction staff;
* Providing field work procedures;
* Coordinating Field Work procedures and instructions with Quality Assurance;
* Maintaining control of all technical documents;
* Providing cost estimates and field measurements;
* Coordinating project plans and schedules;
* Approving all Purchase Requisitions and initiating Subcontracts in accordance with the requirements of the contract and all applicable codes, standards, and regulations;
* Maintaining technical surveillance of vendors and suppliers and field construction activities;
* Maintaining the status information on procured materials and equipment;
* Measuring and reporting the progress and performance of field construction forces;
* Subcontract coordination;
* Keeping the Project Manager fully informed of the status of his activities at all times;
* Project permanent records and document files;
* Issuing reports as specified in the Project Operating Procedures.

6.4 General Superintendent:

6.4.1 The General Superintendent is the senior JONES/BOECON Construction representative on site.

6.4.2 The General Superintendent is responsible to the Project Manager for all field construction activities including the following:

* Representing the project on all construction matters;
* Developing and maintaining the necessary construction staff to competently and efficiently complete the construction activities;

* Providing functional guidance to his staff in the performance of their duties;
* Maintaining the necessary craft labor force to efficiently carry out the construction in an effective manner;
* Assuring that all construction activities are completed within the approved schedule and estimate;
* Assuring that all construction and installation work is in complete accordance with the applicable drawings, specifications, codes, standards and approved work procedures;
* Advising Construction Engineering of any errors or problems arising from the drawings, specifications, instructions, procedures and assuring their resolution;
* Maintaining a high standard of quality and giving full cooperation to the Quality Assurance staff;
* Maintaining, protecting, and accounting for all materials and equipment issued for construction or installation;
* Maintaining a high standard of housekeeping and fire protection in all areas of the construction site;
* Implementation and enforcement of an effective safety program in accordance with Occupational Safety and Health Act, JONES/BOECON and ERDA requirements;
* Assisting the Project Manager as required in labor relations matters;
* Supervision of subcontractors' field activity;
* Keeping the Project Manager fully informed of the status of construction activities at all times; and
* Issuing reports and records as specified in the Project Operating Procedures.

6.5 Administration:

6.5.1 The Administration Manager is the senior JONES/BOECON financial and administrative representative on site.

6.5.2 The Administration Manager is responsible to the Project Manager for all finance, accounting, and general administration activities, including the following:

* Representing the project on all finance, accounting, and administrative matters;
* Developing and maintaining the necessary office staff to competently and efficiently carry out the duties of his department;

* Providing functional guidance to his staff in the performance of their duties;
* Providing general accounting for the project;
* Providing cost accounting for the project;
* Coordinating and handling the craft timekeeping and payroll;
* Coordinating and handling the non-manual payroll including keeping the home office advised of vacation, sick leave, and absences;
* Operation of the computer terminal and reproduction facilities;
* Maintenance of the general project filing system;
* Performance of general field office administration;
* Keeping the Project Manager fully informed of the status of the activities of his department at all times;
* Issuing the reports specified by the Project Operating Procedures.

6.6 Procurement Manager:

6.6.1 The Procurement Manager is the senior JONES/BOECON procurement representative on site.

6.6.2 The Procurement Manager is responsible to the Project Manager for all procurement activities, including the following:

* Representing the project on all procurement matters;
* Developing and maintaining the necessary procurement staff to competently and efficiently perform the duties of his department;
* Providing functional guidance to his staff in the performance of their duties;
* Placing orders for services, materials and equipment with approved vendors and suppliers in accordance with specified requirements;
* Coordination of all contract changes and vendor or subcontractor claims or backcharges;
* Assuring deliveries of all materials and equipment including engineered items, as required to support the construction schedule with expediting where required;
* Assuring all materials and equipment received comply with the purchase specifications and are accompanied by the specified technical, administrative and Quality Assurance documentation;

* Receiving procured items and initiating the necessary action in cases of overages, shortages or damage;
* Developing a thorough knowledge of vendor and suppliers' capabilities, material and equipment availability and delivery times and market conditions;
* Receiving and storage of all materials and equipment in accordance with vendor requirements and field work procedures and instructions;
* Controlling the issue or release for construction of all materials, tools, and equipment;
* Maintaining up-to-date inventories and issuing appropriate material status information;
* Keeping the Project Manager fully informed of the procurement status at all times; and
* Issuing the reports specified by the Project Operating Procedures.

6.7 Industrial Relations Manager:

6.7.1 The Industrial Relations Manager is the senior JONES/BOECON safety, security, and labor representative on site.

6.7.2 The Industrial Relations Manager is responsible to the Project Manager for all industrial relations activities, including the following:

* Representing the project on all industrial relations matters;
* Developing and maintaining the necessary staff to competently and efficiently carry out the duties of his department;
* Developing and maintaining the necessary staff to competently and efficiently perform first aid;
* Providing guidance to his staff in the performance of their duties;
* Assuring internal site security;
* Developing and assuring that an effective safety program is carried out for all site activities in accordance with Occupational Safety and Health Act, JONES/BOECON and ERDA requirements;
* Handling day-to-day industrial relations matters and assisting the Project Manager where required;
* Assuring that the project employment activities are in accordance with the applicable Equal Employment Opportunity rules and regulations;

* Administration of all project and corporate personnel policies with assistance from the Project Manager and the home office as required;
* Coordinating and acting as the central employment office for the recruitment and hiring of all manual and non-manual employees;
* Maintaining personnel records;
* Assuring participation in the appropriate craft apprenticeship programs;
* Developing training programs to supplement the craft apprenticeship programs where required;
* Assuring that an effective fire protection program is implemented on site;
* Keeping the Project Manager fully informed of the status of activities in this area at all times;
* Coordinating all formal conferences where there is joint labor-management participation;
* Representing the company in all matters pertaining to labor relations; and
* Issuing the reports specified by the Project Operating Procedures.

6.8 Quality Assurance Manager:

6.8.1 The Quality Assurance Manager is the senior JONES/BOECON Quality Assurance representative on site.

6.8.2 The Quality Assurance Manager is administratively responsible to the Project Manager but is functionally independent and responsible to the Corporate Quality Assurance Manager for the project Quality Assurance Program activities, including the following:

* Representing the project in all Quality Assurance matters;
* Developing and maintaining the necessary staff to competently and efficiently perform the duties of his department;
* Providing functional guidance to his staff in the performance of their duties;
* Maintaining site, subcontractor and supplier, Quality Assurance Auditing Program;
* Maintaining the Nonconformance and Corrective Action System and Procedures;

* Quality Assurance personnel indoctrination, training, qualification and certification program;
* Site measurement and test equipment calibration system;
* Establishing materials and items identification methods;
* Receiving, fabrication, installation, erection, inspection and test program;
* Quality Assurance monitoring and surveillance program of suppliers and subcontractors;
* Quality Assurance coordination with ERDA and Architect-Engineer Quality Assurance Representatives;
* Develop and maintain Quality Assurance procedures and instructions;
* Issue Quality Assurance Program Progress Reports;
* Establish and maintain site Quality Assurance Department's documents and records files;
* Keeping the Project Manager fully informed of the status of activities in this area at all times; and
* Issuing the reports specified by the project operating procedures.

7.0 Quality Assurance:

7.1 See Paragraph 6.8 above.

8.0 Records and Reports:

8.1 Those required specifically in the following Project Operating Procedures.

# APPENDIX G

## POP-300

## CONTROL OF ENGINEERING DOCUMENTS

JONES/EDECON



| PROJECT OPERATING PROCEDURE | PROCEDURE NO. POP — 300 |
|---|---|
| TITLE OF PROCEDURE: CONTROL OF ENGINEERING DOCUMENTS | Issue Date: March 11, 1977 |
| PROJECT TITLE: New Waste Calcining Facility (NWCF) Energy Research and Development Administration (INEL) | Rev. No. & Date: 1 10-11-77 |

| PREPARED BY: | DATE | APPROVED BY: | | DATE: |
|---|---|---|---|---|
| R.D. Stanley | 9-26-77 | | PROJ. MGR. | 9/29/77 |
| | | | QA MGR. | 9/29/77 |

1.0 Purpose

1.1 This procedure specifies the method utilized to control the receipt, release,distribution and storage of Engineering documents.

2.0 Scope

2.1 This procedure applies to all Engineering documents associated with the fabrication, installation, erection, maintenance, and repair of components, systems, and structures for the NWCF.

3.0 Definitions

3.1 Engineering Document: Drawings, isometrics, specifications, test procedures, special procedures, operating manuals, and changes or revisions thereto.

3.2 Types of documents:

"For review and comment" - Preliminary submittal, for review and comments only. Not to be used for fabrication or erection.

"Reference Only" - Not to be used for fabrication or erection. Shall be used for information only.

"For Approval"-Document issued for obtaining final approval. Not to be used for fabrication and erection unless receiving ERDA's direction, which will require the documents to be controlled.

"Approved for construction" - (AFC) - Approved by ERDA/ACC for construction on the NWCF Project.

3.3 Controlled Engineering Document: All Engineering documents that must be placed under control to assure that reproducibles, masters and reproduction thereof are not used on the NWCF Project for unauthorized purposes. Types of controlled documents are "AFC", approved vendor data, special process procedures, project operating procedures, and welding procedures.

3.4 Library: The Document Control Master File of all current and superseded Engineering documents issued on a project.

3.5 "Document Clarification Request and/or Change Notice: A document generated in the field by JONES/BOECON or ERDA/ACC requesting clarification when the Engineering document is unclear or incomplete or when minor changes are required. (see 6.9)

3.6 "Engineering Change Request" A document generated to initiate and control changes to A-E generated Engineering documents.

4.0 References

4.1 "Organization and Responsibilities", POP-100.

4.2 "Project Operating Procedure Control," POP-102.

4.3 "Construction Engineering," POP-301.

4.4 "Preparation of Special Process, Test, and Work Procedures," POP-307.

4.5 "Project Records," POP-709.

4.6 "Procurement Data Submittals," POP-407.

4.7 "Subcontract Data Submittals," POP-453.

5.0 General

5.1 ERDA obtains documents from the A-E and other organizations with whom JONES/BOECON does not have contractual relationship. ERDA assures required approvals, and transmits to JONES/BOECON Document Control with distribution list.

5.2 All Engineering documents received shall be routed directly to Document Control. One copy of each document received shall be maintained in the Document Control office.

5.3 Engineering documents generated by JONES/BOECON shall be routed to Document Control after approvals are obtained. An approved signature list for all JONES/BOECON originated documents shall be maintained in Document Control.

5.4 Document Control shall be the only organization authorized

to copy approved Engineering documents.

5.5 Access to the JONES/BOECON Document Control files will be restricted to authorized personnel. An authorization list originated by Document Control supervision shall be maintained in Document Control.

5.6 All reproduction shall be requested using a "Document Request Form." See Attachment 300-D.

5.7 Priority for reproduction services will be determined by Document Control Supervision.

6.0 Procedure

6.1 Control of Engineering Document Masters and Reproducibles

6.1.1 Original issues & revisions of NWCF Architect-Engineer (A-E) Engineering document reproducibles, to include "For Reference Only," "For Approval", "Information Only", and "Approved for Construction" copies, shall be transmitted to and maintained in JONES/BOECON Document Control.

6.1.2 All Engineering document masters and reproducibles originated by JONES/BOECON, JONES/BOECON vendors and subcontract documents, shall be forwarded to and maintained in JONES/BOECON Document Control.

6.1.3 Upon receipt of masters and reproducibles Document Control shall:

Log in all documents received, noting date, title, revision number and document control number.

Make one (1) sepia of all JONES/BOECON originated drawings and maintain in files.

Superseded documents shall be removed from the current document files. The superseded NWCF (A-E) reproducibles, JONES/BOECON sepias, and vendor reproducibles shall be hand delivered to ACC Document Control.

Receipt for the transfer of the document(s) shall be obtained and filed in Document Control. (Ref. attachment 300-B). One copy of all other documents including specifications, work procedures, etc., shall be stamped "Obsolete" and filed for permanent record.

No document master or reproducible shall leave the Document Control area without authorization from Document Control supervision. A release record of each master and/or reproducible removed shall be obtained and filed in Document Control records. (See attachment 300-S.)

6.2 Distribution of "Controlled" Engineering Documents

6.2.1 Upon receipt of "controlled" Engineering documents, Document Control shall:

Immediately check all documents against the transmittal sheet and date stamp the transmittal. Sign the transmittal and return a copy to the sender, if requested. ACC will furnish their quantity requirements for all AFC documents. The transmittal sheet shall be filed in the sender's file folder.

Pull the Engineering Document Distribution Log from the file. An Engineering Document Log shall be required for each engineering document. (See.attachment 300-A.)

Send photocopy of the Engineering Document Distribution Log for each document received, and associated documents to the Project Engineer. The Project Engineer or his designee will check that required signatures are on all documents to be issued. He shall assign distribution for individuals under JONES/BOECON supervision and return the distribution list to Document Control.

Transfer distribution requirements from JONES/BOECON distribution copy and from ACC distribution list to the Engineering Document Distribution Log.

Print sufficient copies to cover distribution requirements with one additional copy for Document Control files. (See attachment 300-C.)

File the reproducible master of the Engineering document in the JONES/BOECON master files.

All "AFC", approved vendor data, special process procedures, POP's and welding procedures documents to be distributed shall be stamped "J/B Document Control."

Fill out document transmittal form, one for each recipient. (See attachment 300-B.)

Refile the Engineering Document Distribution Log.

6.2.2 Off-site distribution of controlled documents shall be transmitted with a document transmittal form by site mail or U.S. mail. The recipient shall sign the document transmittal and return the copy to JONES/BOECON Document Control. These signatures shall be maintained in Document Control files. The recipient of the revised Engineering document will either destroy the superseded document or mark it obsolete. A suspense file shall be maintained by Document Control, until the signed transmittal is received from the recipient.

6.2.3 On-site distribution of Approved For Construction documents shall be hand delivered to each individual on distribution. Document Control shall update the individual's plan files, if required, and stamp superseded document "obsolete." The recipient may retain the obsolete document for reference only.

Document Control shall obtain a signature from the recipient verifying that he has received the document(s). These signatures shall be maintained in Document Control files. Lost documents shall be noted on the document transmittal, under remarks, as lost, and initialed by the recipient.

6.2.4 One copy of all superseded Engineering documents shall be stamped "obsolete" and maintained in Document Control for permanent records.

6.2.5 Remove the superseded reproducible master from the master files. Log out on a document transmittal, attachment

300-B, and hand carry to ACC Document Control. Receipt for the transfer of the document shall be obtained and filed.

6.3 Engineering Documents for "Review and Comments" and "For Approval"

6.3.1 Upon receipt Document Control shall: (See attachment 300-E)

Immediately check all documents against the transmittal sheet and date stamp the transmittal. Sign the transmittal and return a copy to the sender, if required. ACC will furnish their quantity requirements for all drawings. The transmittal sheet shall be filed in the sender's file folder.

Pull the Engineering Document Distribution Log from the file. An Engineering Document Log shall be required for each engineering document. (See attachment 300-A.)

Print sufficient copies to cover distribution requirements from ACC plus three (3) additional copies; two copies for JONES/BOECON Project Engineer for internal distribution, per Project Operating Procedure POP-301, and maintain one copy in Document Control files.

6.3.2 After the JONES/BOECON internal review cycle, the Project Engineer shall send a photocopy of the "Constructibility Review Comments" to Document Control to be filed for permanent record.

6.4 "NWCF Engineering Document Status" Master/Log Index:

6.4.1 Document Control shall issue weekly a NWCF Engineering Document Status Index stating the latest revisions of all Engineering drawings and procedures released for construction. All outstanding and reference ECR's and DCR's shall be noted in the appropriate column next to the Engineering Documents they affect. (See attachment 300-R.)

6.5 "Piping Isometrics" Engineering Documents.

6.5.1 One copy of all piping isometrics generated by JONES/BOECON that require fabrication will be stamped "Permanent Record, Do Not Destroy" by Document Control. The original vellum piping isometric shall be maintained per para. 6.1.2.

The Permanent Record copy shall be used to record approved field changes and the following data for a permanent record:

* Material Purchase Order (P.O.) No.'s;
* Material Heat Numbers;
* Welding Record; and
* Inspection Record.

6.5.2 Document Control shall maintain a separate log on all Permanent Record isometrics to include isometric number, revision, area issued to, and date.

6.5.3 When the document is on site and a revision is made to a permanent record isometric, Document Control shall hand deliver to the recipient. Attach latest revision to top of superseded revision. Stamp the outdated revision "Superseded." Obtain receipt for the transfer of the document and file.

6.5.4 If the document is off-site and a revision is made to a permanent record isometric, Document Control shall make up a transmittal and mail to recipient. The recipient shall attach latest revision to the top of superseded revision and stamp or mark outdated revision "Superseded."

6.5.5 Upon the completion of each document copy, the General Superintendent or his designee will send the Permanent Record copy to Document Control.

6.5.6 Document Control shall log in and send the permanent record copy to Quality Assurance.

6.5.7 Quality Assurance shall send the Permanent Record isometric back to Document Control after QA review.

6.5.8 Document Control shall log and file the permanent record isometric and transmit to ERDA upon completion of the NWCF or when deemed necessary.

6.6 Approved Special Process Procedures or their revisions.

6.6.1 Upon receipt Document Control shall process same as 6.2 and maintain two (2) updated copies of all Special Process

procedures in files to facilitate any additional distribution.

6.7 Approved vendor and/or subcontract data:

6.7.1 Upon receipt Document Control shall process as per paragraph 6.2.1 through 6.2.5 and maintain a cross reference index by vendor or subcontractor, document number, and equipment number. Data shall be filed in vendor's or subcontractor's files.

6.8 Pre-bid and post-award vendor or subcontract data:

6.8.1 All pre-bid and post-award or subcontract data received shall be sent to Document Control. (See attachment 300-H.)

6.8.2 Upon receipt Document Control shall:

Immediately check all documents against the transmittal sheet and date stamp the transmittal.

Log documents received on an Engineering Document Distribution Log.

Hold reproducibles and copies, send one copy of document(s) to JONES/BOECON Procurement.

6.8.3 Procurement checks for completeness of data submitted, with input from Project Engineer. The Project Engineer shall also define distribution requirements and return the document(s) to Document Control.

6.8.4 Document Control shall make distribution of Document(s) as defined by Project Engineer.

6.8.5 JONES/BOECON Internal Distribution:

Document Control Routes one (1) copy of the document(s) to the Project Engineer.

The Project Engineer or his designee shall review the document(s) and route to Quality Assurance and Procurement, if required. He shall consolidate JONES/BOECON comments.and send a copy to the ACC coordinator, if ACC review is required. Return the document(s) to Document Control.

6.8.6 External Distribution - ACC shall:

Distribute document(s) to Architect-Engineer (A-E) and ACC.

Review, comment, approve or disapprove all documents.

Consolidate reviewers input from ACC, A-E and JONES/BOECON and coordinate with and send approvals, rejections and/or comments to Project Engineer.

6.8.7 The Project Engineer shall prepare the final input to vendor, with concurrence from ACC and submit final approved input to JONES/BOECON procurement. Sends copies of document(s) and distribution requirements to Document Control.

6.8.8 JONES/BOECON Procurement shall review and approve final input. Prepare final contractual response to vendor including cover letter, transmittal forms, drawings and send to Document Control.

6.8.9 Document Control logs cover letter and all enclosures. Mail package to vendor.

6.9 "Document Clarification Request (DCR) and/or Change Notice":

6.9.1 Document Control shall assign a sequential number to each "Document Clarification Request and/or Change Notice." (See attachment 300-J.)

6.9.2 When a "Document Clarification Request and/or Change Notice" is generated, Ref. POP-301, "Construction Engineering" the originator shall send the document to the Project Engineer. (See attachment 300-K.) DCR's originated by ERDA/ACC are designated by an ID control number assigned by ACC, shall not require review by Project Engineer.

6.9.3 The Project Engineer shall review the request for validity. If valid, he initials and routes it to Document Control.

6.9.4 Document Control shall log, (attachment 300-L), verify that the DCR has been initialed by the Project Engineer or his designee, photocopy the original for files, and

send the "Document Clarification Request and/or Change Notice" to ERDA/ACC representatives for disposition, as designated by the Project Engineer.

6.9.5 The ERDA/ACC representatives shall complete the response portion, sign and date in spaces provided, and send to JONES/BOECON Document Control.

6.9.6 Document Control shall log and photocopy the "Document Clarification Request and/or Change Notice" and send a copy to originator.

6.9.7 The Project Engineer or his designee shall assign distribution and maintain a record of actions open and closed on DCR and/or change notices.

6.9.8 Document Control shall record the DCR number on the NWCF Engineering Document Status Log (attachment 300-R) in the space provided, next to the document number the DCR affects. Make distribution of the DCR to all personnel that received distribution of affected Engineering documents and per assignment by Project Engineer, file original copy.

6.10 "Engineering Change Request" (ECR):

6.10.1 When an "Engineering Change Request" is generated, Ref. POP-301, "Construction Engineering", the originator shall send the ECR to Document Control (attachment 300-M:)

6.10.2 Document Control shall verify that ECR has been initialed by the Project Engineer and Quality Assurance Manager. Log and photocopy original for filing and send ECR to the ERDA/ACC representatives for disposition as designated by the Project Engineer.

6.10.3 When ECR is approved or disapproved, the ERDA/ACC representatives shall send it to JONES/BOECON Document Control.

6.10.4 Document Control shall log and send a photocopy to the originator and Project Engineer.

6.10.5 Project Engineer or his designee shall assign

distribution and return copy to Document Control.

6.10.6 Document Control shall record the ECR number on the "NWCF Engineering Document Status" log in the space provided next to the document number the ECR affects. Make distribution of the ECR to all personnel that received distribution of affected Engineering documents and per assignment by Project Engineer, file ECR.

6.11 Directive Letters from ERDA:

6.11.1 All directive letters received from ERDA shall be immediately date stamped and sent to Document Control.

6.11.2 Upon receipt Document Control shall:

Sequentially number all directive letters by date log, and send a photocopy of the directive letter to the Project Engineer for distribution requirements, and one (1) copy to ERDA.

Log directive letter number in space provided on "Engineering Documents Distribution Log" (attachment 300-A) for each document that is listed on the directive letter.

Make distribution and file one copy for records.

6.12 Minutes of Meetings:

6.12.1 All minutes of meetings shall be sent to Document Control.

6.12.2 Upon receipt Document Control shall:

Sequentially number all minutes of meetings by date, log, and send a photocopy to the Project Engineer for distribution requirements.

Make distribution and file one copy for record.

6.13 JONES/BOECON Forms:

6.13.1 All forms generated by JONES/BOECON shall be sent to Document Control.

6.13.2 Upon receipt Document Control shall:

Assign a sequential JONES/BOECON form number and log on the form log. (attachment 300-N.)

Maintain originals of all JONES/BOECON forms in file.

6.14 NWCF Construction Schedule Charts:

6.14.1 All NWCF Construction schedule charts shall be sent to Document Control.

6.14.2 Upon receipt Document Control shall:

Sequentially number all schedule charts by date, log, and send one copy to the Project Engineer for distribution requirements. (See attachment 300-P.)

Make distribution and file.

6.15 Approved Project Operating Procedures or their revisions.

6.15.1 All approved project operating procedures shall be sent to Document Control.

6.15.2 Upon receipt Document Control Shall:

Pull the Project Operating Procedures Log from the file.

Stamp each procedure "J/B Document Control"

Make Distribution as per assignment by administration manager.

Route distribution per paragraphs 6.2.2 and 6.2.3. (See attachment 300-Q.)

Maintain two (2) updated copies of all Project Operating Procedures in files to facilitate any additional distribution.

File the original Project Operating Procedure and the Project Operating Procedures Log.

| PROJECT OPERATING PROCEDURE | PROCEDURE NO. POP — 300 |
|---|---|
| TITLE OF PROCEDURE: CONTROL OF ENGINEERING DOCUMENTS | March 11, 1977 |
| PROJECT TITLE: New Waste Calcining Facility (NWCF) Energy Research and Development Administration (INEL) | Rev. No. & Date: 1 10-11-77 |

7.0 Quality Assurance:

7.1 The Quality Assurance Department shall periodically audit the Document Control section per POP-708, "Quality Assurance Audits" to assure compliance with this procedure.

8.0 Records and Reports:

8.1 Engineering Documents Log: NWCF Project, attachment 300-A.

8.2 Document Transmittal, attachment 300-B.

8.3 Approved for construction Engineering Documents Flow Chart, Attachment 300-C.

8.4 Document Request Form, attachment 300-D.

8.5 Review and Comment, For Approval Documents Flow Chart, attachment 300-E.

8.6 Constructibility Review Comments, attachment 300-F.

8.7 Special Process Procedures Flow Chart, attachment 300-G.

8.8 Vendor Data Flow Chart, attachment 300-H.

8.9 Document Clarification Request and/or Change Notice, attachment 300-J.

8.10 Document Clarification Request Flow Chart, attachment 300-K.

8.11 Document Clarification Request Log, attachment 300-L.

8.12 Engineering Change Request Flow Chart, attachment 300-M.

8.13 Form Log, attachment 300-N.

8.14 Schedule Log, attachment 300-P.

8.15 Project Operating Procedures Flow Chart, attachment 300-Q.

8.16 NWCF Engineering Document Status, attachment 300-R.

8.17 Engineering Masters and Reproducibles Check Out Sheet, attachment 300-S.