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DISTRICT LOUISVILLE KY S BARTLETT ET AL. APR 83

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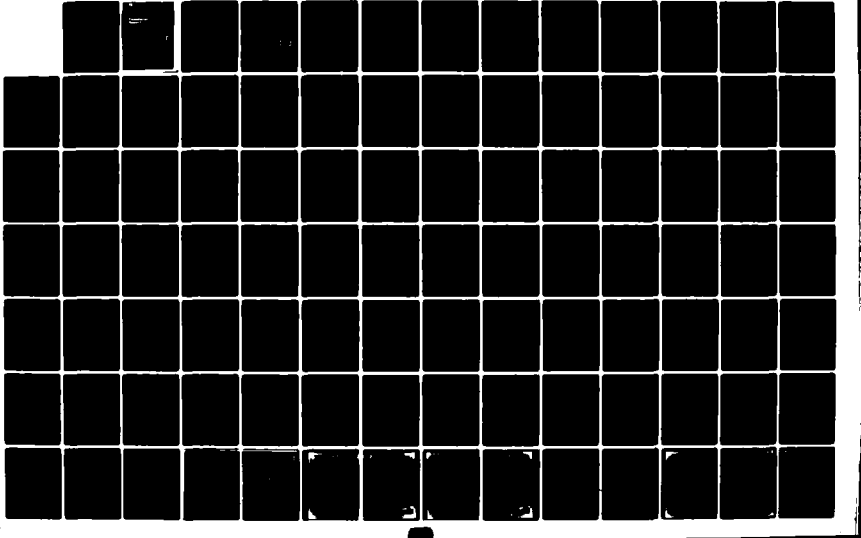

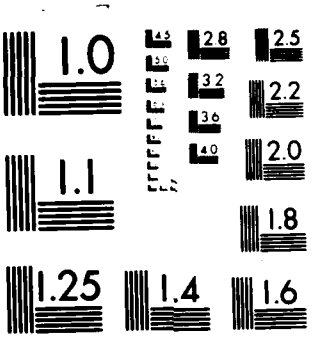

US Army Corps
of Engineers
Louisville District

(2)

Foundation Report

Dam & Spillway

Taylorsville Lake

Ohio River Basin
Salt River, Kentucky

APRIL 1983

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report covers the construction of the Taylorsville Dam and Spillway. Taylorsville Lake is a flood control structure on the Salt River in central Kentucky. It is in the network of flood control structures for the Ohio River Basin. The report contains a narrative, charts and photographs of the construction.

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U. S. ARMY ENGINEER DISTRICT

LOUISVILLE

TAYLORSVILLE LAKE

FOUNDATION REPORT

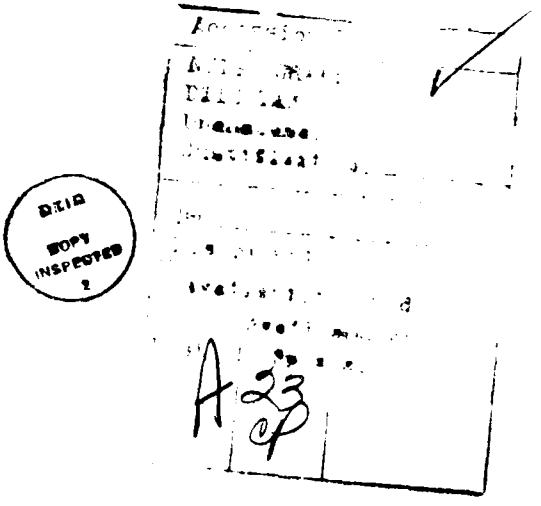
CONTRACT NO. DACW 27-79-C-0077

CONSTRUCTION OF DAM AND SPILLWAY

TAYLORSVILLE LAKE

SALT RIVER

KENTUCKY



TAYLORSVILLE RESIDENT OFFICE

TAYLORSVILLE LAKE
OHIO RIVER BASIN
SALT RIVER, KENTUCKY

FOUNDATION REPORT
DAM AND SPILLWAY

TABLE OF CONTENTS (Cont.)

TABLE OF CONTENTS (Cont.)

TABLES

PLATES

APPENDIX A

CONSTRUCTION PHOTOGRAPHS

FOUNDATION REPORT

CONTRACT NO. DACW 27-79-C-0077

CONSTRUCTION OF DAM AND SPILLWAY
TAYLORSVILLE LAKE
SALT RIVER
KENTUCKY

INTRODUCTION

1.01 PROJECT LOCATION AND DESCRIPTION. Taylorsville Lake is located on the Salt River 60 miles above the stream's confluence with the Ohio River and about four miles above Taylorsville in Spencer County, Kentucky. It also lies in a portion of Nelson and Anderson Counties. The site is approximately 26 miles southeast of Louisville, Kentucky. The lake project, with a drainage area of 354 square miles and a flood control pool surface area of 6,350 acres, will be operated principally for flood protection in the lower Salt River and as a unit for flood protection in the Ohio and Mississippi River basins. Other uses to be met include storage allocation to sediment accumulation, recreation, enhancement of the environment for fish and wildlife, and downstream water quality.

1.02 PROJECT PLAN. The plan for the project development consists of the construction of the following: an earth core, rock-filled dam; an operating tower; conduit and stilling basin in the right abutment; an open cut uncontrolled spillway through the right abutment; access roads; and recreational facilities. The project will also require relocation of roads and utilities and acquisition of necessary lands and existing developments.

The initial contract for the project was construction of an access road to the tailwater area on the right side and an access road to the left abutment area. These roads provided access for the construction of the outlet works and the dam and spillway.

1.03 SCOPE. The data presented in this report consists of the items associated with the dam, spillway, grouting, instrumentation, retreat channel, service bridge and North-South connector road (KY 2339). A detailed foundation report was prepared for the outlet works construction and is considered a part of this report. Copies of this report dated March 1978 are on file in the District and Ohio River Division offices for reference.

1.04 CONSTRUCTION AUTHORITY. The project was authorized by the Flood Control Act of 1966 designated as Public Law 89-789, 89th Congress, approved 7 November 1966, and funds for initiation of the project were included in the Appropriation Act for Fiscal year 1968.

1.05 PURPOSE OF REPORT. The purpose of this report is to insure the preservation for future use of complete records of foundation conditions encountered during construction and of methods used to adapt structures to these conditions. The report was prepared under the guidance of D. L. Basham. Mr. Ralph Hill and Sam Bartlett contributed substantially in the preparation of this report.

1.06 CONTRACTORS. Contract DACW 27-79-C-0077, Construction of Dam and Spillway, was awarded on 12 April 1979 to Barter Engineering Company (Rural Route 3, Harrisburg, Illinois 62946). It involved construction of an earth core, rock-filled dam; an open cut uncontrolled spillway; service bridge; and grout curtain. For purpose of this report the excavation and embankment were performed by the prime contractor, the drilling and grouting were performed by Mott, Inc.; and the service bridge was constructed by Ruby Construction. The prime contractor provided and maintained a quality control program and staff to perform sufficient inspection and tests of all items of work. Each of his subcontractors was responsible for providing his own quality control staff. The staff was made up of the job's supervisory staff supplemented by a staffed onsite laboratory.

1.07 CONTRACT SUPERVISION. Contract supervision was provided by the Government in the form of a Resident Office, administered by a Resident Engineer, acting as a representative of the District Engineer. Personnel requirements for supervision and inspection of the work varied from time to time. The inspection force was sufficient to maintain effective control of the work during construction of the dam and spillway. (See Table No. 1 for roster of personnel.) Depending on the number of shifts and crews assigned by the contractor to foundation preparation and grouting operations, the number of employees assigned to inspection of these construction operations varied from one to four.

Since the first stripping, foundation excavation and exploratory excavation, the foundation areas were frequently inspected by geologists and foundation design engineers from the District Office and the Ohio River Division.

FOUNDATION EXPLORATIONS

2.01 *INVESTIGATIONS PRIOR TO CONSTRUCTION.* The initial subsurface investigation began in November 1963 at a damsite located at river mile 58.9. The foundation investigations were expanded in February 1968 to include three possible alternate sites, one of which was at river mile 60.0 identified as Site No. 1. As a result of that investigation, Site No. 1, the present location of the dam, was determined to have a more favorable foundation condition than the other sites and continued investigations were recommended. A seismic survey was initiated in March 1969. Detailed additional drilling was made at Site 1 between April and June 1969. Results and interpretations of this drilling indicated that a deep bedrock channel did not exist at Site 1 or within 1,000 feet of the downstream toe as was encountered at the other sites. The borings consist of drive, drive-core, undisturbed samples by Denison and Shelby tubes, hand auger and test pits. All core borings were made by an NX-M double tube core barrel and diamond bit. The locations of all the borings made to this point are shown on Plates 16, 17, 17A and 18 of the GDM.

Subsequent to the submittal of the GDM in March 1971, investigations were resumed to further outline the foundation conditions in the dam, spillway and conduit. The investigations consisted of drive and core borings of NX and 6-inch size, test pits dug with a backhoe, depth and seismic velocity of foundation material by a portable seismograph, Bison Model 1570B; and a large test trench excavated by drag line on the downstream right bank of the dam. Suitable laboratory tests were performed on all recovered overburden and bedrock materials. Weathered shale and limestone were excavated for a remolded triaxial test from a test pit at the upstream end of the spillway. Low values from this test were not considered representative for the majority of the required excavation from the spillway. Subsequently, two 6-inch core borings were drilled, and the recovered materials were subjected to an additional remoded, triaxial test. A pressure test was performed on the right dam abutment to evaluate seepage and drill water loss noted during drilling of the borings. Boring location plans and logs are shown on Plates 21, 22 and 24 through 44 of DM #5 for Dam and Spillway.

2.02 INVESTIGATIONS DURING CONSTRUCTION

a. Significant Meetings. An onsite investigation was made on 28 August 1980 by District and Division personnel to evaluate the acceptability of a sandy, gravel material that was exposed downstream of the core trench in the old river bottom. The material was extremely wet and pumping under heavy equipment loads. Water would not drain due to the fineness of the material. Screening analysis run of a sample showed 16 percent passing the 200 sieve indicating that the material was more of a silty sandy gravel rather than a sandy gravel as shown on the cross sections. The adequacy of the contractor's dewatering system was discussed. It was concluded that additional sumps were not the answer since when sumps were dug, it took approximately 1/2 day to fill up. In order to observe the material conditions of the underlying brown clay a test pit was dug. The material was free draining as evidenced by water running into the test pit rapidly. It was concluded that the overlying blue-black silty sandy gravel should be removed within the river channel area. Approximately 8,000 cubic yards of material were removed.

On 29 October 1980 a second onsite investigation was made by the District and Division personnel for the purpose of reviewing grouting operations in the valley bottom portion of the core trench between Stations 7+00 and 8+15 to determine if additional grouting and/or excavation should be performed. Four NX exploratory core holes were drilled from Station 7+00 to Station 7+77 to check the extent of grouting. The cores did not identify any open bedding planes or zones of extensive grout takes. Small water flows (1-2 gpm) were encountered and believed to be coming from a horizontal bedding plane in limestone at Elevation 435±. Similar flows were also encountered during grouting. Additional cores revealed that the upper portion of the shale foundation between Stations 7+00 and 8+15 was disturbed to a depth of f[illegible] feet. Based on the review of the grouting activities and results of the exploratory corings, the following additional foundation treatment was initiated between Stations 7+00 and 8+15.

(1) Drill and grout additional tertiary holes to a depth below the zone that was making water in the primary and secondary grout holes. This was deemed prudent in order to increase confidence that zones relatively near the base of the core trench were tight.

(2) Remove the additional three feet of rock that was disturbed.

On 5 December 1980 an onsite investigation was made by District and Division personnel to inspect the foundation of the core trench from Stations 7+00 to 8+15. When hand cleaning began on the thin limestone layer, it contained numerous hairline cracks and joints in the surface. No long open fractures or joints were observed crossing the axis of the core trench, and no artisian flow was encountered. However, water would seep out of the joints whenever pressure was applied along a joint seam. Three grout holes that seeped water previously were encountered and plugged with a sand cement grout. Because of the many cracks in the surface and the presence of water between the layer of limestone and shale, consideration was given to lowering the grade. Further investigations which included removing an additional 6 to 8 inches of foundation in one area revealed that the next three to four layers

of rock were identical to the one presently exposed. The water between the layers of rock was clean and there was no evidence of any mud seams. It was, therefore, concluded that the present grade was acceptable. See Photo Nos. 414 thru 443.

Two onsite investigations were made on 13 and 17 August 1981 by District and Division personnel to consider other methods of foundation treatment in the core trench on the right abutment above Station 11+35. During the foundation excavation of the core trench between Stations 11+15 and 11+35, the condition of the founding rock within the core trench was badly deteriorated. Approximately four additional feet of material had to be removed from Stations 11+25 to 11+35 in order to found the impervious core on unweathered shale. See Photo Nos. 501 & 503. Still within this area some mud and soft seams were evident at the changed grade, but were satisfactorily treated with mortar. The backwall at Station 11+35 was in such poor condition that a dental wall was installed against the vertical rockface (1' thick x 4'± high) to isolate the weathered and solutioned rock. See Photo No. 502. The weathered rock could not be bridged; consequently, the top of the wall was still in weathered rock but covered with two thin solutioned limestone beds. It appeared that the next section of the core trench would be entirely in weathered rock with no possibility of excavating to unweathered rock. Engineering personnel were notified so that an analysis of the conditions could be made and a method of treatment could be formulated.

On 13 August a meeting was held to review and analyze the conditions in the field. It was agreed that the highly weathered rock condition could not be eliminated without major revisions in the foundation excavation methods. It was pointed out by District personnel that the weathered rock conditions in the core trench were anticipated in the final dam design as evidenced by the design core borings. Discussions of possible treatment centered around: (1) constructing a 5-foot deep cutoff trench to the top of the grout curtain (packer settings) and tie into the impervious core; (2) excavating rock according to contract specifications to two feet below the pregrouting grade; and (3) continuing to excavate to the top of the grout curtain (packer settings). A second meeting was scheduled for 17 August at which time the contractor had excavated a section of the core trench from Stations 11+35 to 11+55 so that further field observations could be made. See Photo Nos. 506 thru 508. A portion of this section was excavated to top of grout curtain while the other portion was excavated to the normal contract founding elevation two feet below the pregrouting excavation limits. Particular attention was focused on the bedding planes between the weathered shale and limestone for openings. Near the exposed surfaces some openings were noticed; however, no openings were noted when digging back into the exposed surface. It was believed that the openings at the surface were due to long exposure time. The shale beds were weathered but intact. The limestone beds contained a network of hairline fractures; however, no long open fractures or joints crossing the axis of the core trench were observed. Grout was evident along some of the bedding planes. There was no apparent evidence of openings or movement of material along the bedding planes. The following method of treatment was initiated: (1) the present method of excavation was to be continued, excavating to the top of the grout curtain (packer setting); (2) limestone beds were to be isolated and cut off so that they would be covered by shale, thus

preventing fractures being exposed at the impervious clay contact; (3) where the limestones were extensively solutioned with or without clay seams they were to be covered with dental concrete (3/4" aggregate) in a wedge shape (4) the walls now being used would be discontinued; and (5) when areas of extensive weathering (Station 12+40 to 12+60) are encountered, a close inspection of the rock will be made to determine if alternate methods of treatment are needed.

b. Exploratory Drilling. In addition to the four NX core holes discussed above, four other NX diamond core borings were drilled along the grout curtain on the left and right abutments to determine the effectiveness of the grouting operation. The location of these borings are shown on Plate 12 and the logs are on Plates 2 through 4.

In conjunction with the instrumentation installation, four bedrock piezometers and two observation wells were cored using an NX size barrel. Also, there were six overburden piezometers in which continuous drive samples 10 feet above the tip elevations were taken. In all cases the foundation did not differ materially from that originally anticipated. The logs for these holes are shown on Plates 5 through 11. Also see Photo Nos. 609 thru 616.

GEOLOGY AND SOILS

3.01 PHYSIOGRAPHY. The lake and dam area lies in the western portion of the Outer Blue Grass Region of Kentucky. This area conforms generally to the outcrop area of the Fairview and Clays Ferry Formation of Upper Ordovician age. These formations formally were called the Maysville and Eden, respectively. Topography developed on these formations consists of rounded, broad ridges with V-shaped valleys. Where limestone predominates, the valley slopes are steep, and the ridges are broad and nearly flat. Drainage is primarily dendritic; however, some stream control is noted from regional jointing. Surface elevations range from about 460± to 800± M.S.L. with the higher elevations occuring to the southeast of the damsite in the headwaters of Salt River.

3.02 GENERAL GEOLOGY. Salt River has undergone several erosional and depositional cycles in the geologic past. This cyclic behavior is responsible for the various soil types noted in the detailed drilling at the damsite as well as the well-defined terraces noted both above and below the damsite. Overburden on the valley ridges is residual lean to fat clays resulting from the chemical deterioration of the shale and limestone bedrock. Soils found on the abutment slopes are primarily residual with colluvial soils commonly found near the abutment toes. These soils are lean to fat clays containing varying amounts of limestone fragments and cobbles. Thickness of these soils may range from a minimum of one foot to over ten feet. Some thinly deposited clayey sand was noted in several test pits located on bedrock-supported terraces at about Elevation 540±, 70 feet below the existing streambed, in the far upstream valley borrow areas. It is in the valley bottom areas where the overburden becomes completely interbedded. During the site selection phase of the dam investigation, foundation drilling revealed the presence of lacustrine (lake) type deposits as well as fast-water alluvial cobble deposits, all overlain by silty clays of a more common alluvial origin. The lacustrine deposits can be correlated with known lake deposits found 40 to 60 miles downstream in the Shepherdsville, Kentucky, area on the Salt River. These deposits resulted from blockage of the Ohio River downstream from the mouth of the Salt River during the Pleistocene Epoch. In addition to the lake-type sediments, a fast-water derived deposit of limestone sand to boulder-size material was discovered at the damsite. Maximum size of the granular material is about 18 inches in diameter in the lower portion of the deposit. At the noted area this deposit ranges from top of rock elevation 450± to about 495±. The upper portion has a clay matrix which was derived by chemical weathering of the limestone granular material in the zone of oxidation. Bedrock in the general area is primarily thin to medium bedded calcareous shale interbedded with thin bedded limestone with a maximum single bed thickness of about one foot. At scattered locations on top of high ridges, a predominantly limestone formation can be found which represents the upper portion of the Fairview Formation. Underlying the interbedded limestone and shale is the Lexington Formation. At the damsite the top of the Lexington limestone is about Elevation 360±, 100 feet below streambed.

3.03 REGIONAL STRUCTURE AND FAULTING. The dam and reservoir area lies on the gently dipping western flank of the Cincinnati Arch, a northsouth trending

structural high located between the Appalachian Mountains on the east and the Western Kentucky-Illinois coal basins to the west. Locally, dip of the bedrock is interrupted by faulting and in some cases by folding. Regionally, dip is westerly 30 to 50 feet per mile. Kentucky has two broad-based fault systems in the central portion of the state. These are the east-west trending Rough Creek fault system, and the north-east-southwest trending Kentucky River-Little Hickman fault systems. These two major systems intersect southeast of Nicholasville, Kentucky. The two major fault systems form relatively narrow zones of high angle normal faults. Within each of the systems numerous grabens and karsts have been mapped. There is no known faulting at the damsite area. The closest major fault is approximately 35 miles southeast of the dam; however, there is a northwest striking minor fault some 20 miles to the east. The greatest recorded earthquakes are the New Madrid earthquakes of 1811 to 1812. The reaction of residents in the sparsely inhabited area of central Kentucky has been responsible for assigning a modified Mercalli intensity of VIII in the project area. The epicenter of the New Madrid earthquake is in the Mississippi Embayment area which is 250 miles southwest of the damsite. The embayment area has been seismically active during recent time. Faulting in the project area is late Pennsylvanian in age and there is no evidence of recent movement. Since fault systems can control the intensity of any earthquake, the proximity of major fault systems to the south of the damsite makes it possible for damaging earthquakes to occur within 20 miles of the damsite.

3.04 DESCRIPTION OF OVERBURDEN.

a. Abutments. The dam abutments range from the valley floor at about Elevation 500 to about 675 on the right to about 715± on the left. The soils, ranging from 5 to about 10 feet thick, are generally residual in origin, but become a combination of residual and colluvial silty clays with rock fragments to boulder size with decreasing elevations. The soil is derived from calcareous shale of the Clays Ferry Formation. The overburden is similar on both abutments consisting of silty clays with varying amounts of limestone slabs and fragments. The surface of the left abutment is hummocky suggesting surface instability in the overburden. This area is pasture without the stabilizing presence of tree growth such as is found on the right abutment. The abutment geology is shown in profile on Plate 12.

b. Valley. In the valley the principal soil types are alluvial in origin. These consist of silty clays and clayey silts deposited by an aggrading stream. Other deposits are slack water deposits such as are found in lakes. A third type, normally associated with fast water, was discovered in the downstream right bank area of the dam and consists of sand to boulder size material in matrixes of clay and/or limestone sand. The last type of material noted on the valley is thin zones of gravelly sand found in and adjacent to the present river channel. Geologic profiles along the dam toes and centerline show the distribution of the various soil types. In general, the very soft lake type silty clays, as well as the thin sand and gravel zones, are relegated to narrow areas either side of the stream channel. The alluvial cobble deposit is isolated to the right bank downstream area, and the brown silty clays of most recent origin overlie all other soil types or bedrock with the exception in the stream channel.

c. Spillway. The spillway is located in the right abutment remote from the dam. Spillway width is 230 feet with a crest elevation of 592. Maximum depth of cut was in the crest area with a depth of about 110 feet. The spillway will discharge into natural drainage which empties into Salt River about 1,200 feet downstream from the toe of the dam. Overburden is residual fat to occasionally lean clays derived from weathering of the lower portion of the Fairview Formation and the upper portion of the Clays Ferry Formation. Overburden is generally thin; however, thicknesses range from 10 to 14 feet on top of the hill near the crest structures. The lower portion of the overburden contains limestone slabs and fragments.

3.05 DESCRIPTION OF BEDROCK.

a. Abutments. Bedrock in the abutments is the Clays Ferry Formation which consists of interbedded limestone with individual beds reaching a maximum of 1 foot in thickness. Shale varies from 60 to 80 percentage. Depth of primary weathering is widely variable ranging from 12 to 25 feet deep below top of rock in the right abutment to 5 to 8 feet in the left abutment. Drill water was lost in highly solutioned limestone beds which are characterized by small cavities and open, solutioned jointing. However, permeability of the bedrock is very low, both horizontally and vertically, due to the restriction to water movement by the predominantly shale interbeds. The condition is more severe on the right abutment than on the left. Primarily, this is a result of the bedrock dip oriented towards the Salt River Valley on the right abutment. The depth of weathering rapidliy decreases with descending elevation. Below Elevation 500±, bedrock is relatively impervious. Occasional very soft clay seams 0.1 foot or less were encountered in the abutment borings. These soft zones are attributed to stress relief in the valley walls. The soft zones were not observed in the valley borings.

b. Valley. Bedrock is primarily a continuation of the formation noted in the abutments, i.e., the Clays Ferry. However, erosion of the bedrock surface is more variable below Elevation 500± than above. Several zones of preodominantly limestone interbeds have created a surface that resembles a series of steps or benches with relative steep back slopes. These benches occur where supported by underlying limestone beds. In addition, top of rock contours indicate a sudden lowering of the bedrock valley near the right bank dam centerline area from about Elevation 450-445 to about 460±. The alluvial cobble deposit lies immediately in and downstream of this feature. A zone within the Clays Ferry Formation, roughly Elevation 446± to about 460, is predominantly limestone with shale interbeds. However, there is no evidence of solutioning noted in this interval.

c. Spillway. Bedrock consists of limestone and shale interbeds in the same sequence noted in the dam abutments. Primary weathering is variable, ranging from 10 to 25 feet below top of rock. The weathering occurs primarily as solutioning along joints and fractures of the limestone beds, and as leaching of the calcareous material from the shale beds with subsequent softening. The weathering is most severe on the topographic high points in the spillway area which will be in the higher back slopes of the excavation.

EXCAVATION PROCEDURES FOR COMPONENT PARTS

4.01 GENERAL. The final foundation work for the earth and rock embankments was changed slightly from the original contract requirements which primarily effected an increase in the quantity of foundation excavation performed. Final excavation limits of both overburden and rock along the axis of the dam are plotted on Plate 13.

4.02 STAGE I COFFERDAM. The stripping of the foundation area of the Stage I cofferdam was initiated in the dry on 5 July 1979, by excavating the high abutment areas. This general stripping performed by scrapers consisted of the removal of topsoil, large roots, and clustered areas of roots. The depth ranged from 12 to 24 inches. These areas were inspected and the foundation approved by Mr Christman on 21 August 1979.

On 8 August 1979 the left tower tie-in was excavated, removing the backfill placed by the outlet works contractor back to the original rock foundation. This excavation was also performed in the dry. Impervious material was placed on the rock foundation on 10 August 1979, using hand-operated mechanical tampers. The right side tie-in was excavated on 5 September 1979, and initial embankment placed on 7 September 1979. Both sides were brought to elevation 490.

Initial stripping of the valley section of the Stage I cofferdam was started on 26 August 1979. The work progressed from the tower to the old river bottom and then to the left bank. Scrapers were initially used, but subsequently draglines had to be used to load the scrapers due to the saturated overburden with high organic content near the river channel or atop bedrock. Most of the material was wasted in the upstream waste area and the suitable material was stockpiled in the upstream random stockpile. The excavation was performed in the dry. Dewatering was accomplished by pumps. The depth of removal was predicted to be to a strata of sand and gravel, lean clay, or bedrock at approximately Elevation 460 or higher between Station 6+50 and the conduit. After all weak, compressible, or otherwise unsuitable materials including artificial fills, rubbish, buried drains, and deposits from the September 1979 floods had been removed, the sand and gravel strata to remain had to also be removed. This provided a bedrock foundation between Stations 6+93 and 8+65 for the cofferdam. This change was incorporated in contract modification P00015.

On 6 September 1979 the first section of foundation for the upstream cutoff was exposed. From 6+50 to the left tower cutoff the cutoff trench was excavated to bedrock. The trench on the left and right abutment was excavated to top of rock, clay material or weathered shale.

The cutoff trench to bedrock for the permanent cofferdam to be constructed on the upstream toe was deleted above Elevation 490 by modification P00015. This resulted in a decrease of foundation excavation. Initial clean-up of the cutoff foundation commenced on 22 October 1979. This consisted

of cleaning cracks, joints and crevices. No large cracks or joints were encountered. Springs or other sources of water encountered are mentioned in Paragraph 4.04c.

Embankment in the Stage I cofferdam was initiated on 23 October 1979. Embankment in the cutoff trench was initiated on 26 October 1979.

4.03 STAGE II COFFERDAM. The Stage II cofferdam stripping commenced on 17 october 1979. Abutment stripping was accomplished along with Stage I. Procedures and circumstances in the valley bottom were the same as Stage I. The sand and gravel strata that was to remain was also removed to bedrock. The abutment foundation consisted of lean clay.

The contractor requested to work the Stage I and II cofferdams simultaneously. This was approved provided Stage I received priority.

4.04 DAM.

a. Overburden. The overburden of soil and loose rock was removed to the upstream waste area after excavation, except when authorized for use. In the areas of shallow overburden the materials were excavated with bulldozers and scrapers. The deeper soil overburden was removed with full scale spreads of scrapers with a high percentage going to stockpiles upstream for later use as random earth materials. The overburden in the flood plain outside the areas of the cofferdam was removed as detailed under the cofferdam stripping. This increased stripping downstream of the dam centerline was also incorporated into modification P00015 after being evaluated by Engineering Division on 28 August 1980. The total increase of the removal of the sand and gravel strata amounted to 26,321 cu. yds. and a corresponding volume of random rock for additional embankment. The material from the existing cofferdam surrounding the outlet works was excavated with full scale spreads and most was stockpiled upstream for future use.

The outlet channel excavation was initiated with scrapers, but when the overburden became saturated with high organic content near the existing river channel or at top bedrock, it was excavated by using a dragline to load scrapers and subsequently hauled to the upstream waste area. The inlet channel was completely excavated with scrapers and bulldozers.

b. Rock. The only rock excavated in the foundation by drilling and blasting was in the main dam cutoff trench. Both the upstream and downstream slopes were presplit to required grade. The same equipment, materials and procedures used in the spillway were also used in the core trench. Hole depths ranged from 7 to 19 feet spaced 3 feet on centers. The burden and spacing pattern used was 7x6 feet. The bore hole size was 4 inches. A 1.23#/ yard powder factor was achieved. The shot rock was then removed with bulldozers and scrapers down to within 2 feet of bottom grade. This material was either hauled to a stockpile upstream or placed directly in the embankment. The last 2 feet, after grouting was completed, was removed by backhoes loading scrapers and by manual methods as the excavation approached bottom grade. This operation proceeded with the main dam embankment so as to not prolong exposure of the primarily shale foundation. In the few cases that this

exposure exceeded the required two calendar days the foundation was kept moist by covering with a plastic membrane. The rock surfaces within the earth core of the dam were completely cleaned by manual labor using air (no water) prior to initiating the embankment construction. Eighty percent of this operation was performed at night in order to keep ahead of the day shift embankment placing causing some problems in properly documenting the foundation by photographs. A small amount of foundation concrete was used, the details of which are covered in Paragraph 5.02.

The 5-foot wide transition zone on the upstream face of the impervious core was deleted in accordance with modification P00015 and contract specifications paragraph 2F-1. On 10 March 1980 the directive was issued to delete this zone which decreased the width of the core trench. At this time, the core trench had been presplit on both sides to Station 5+30. The decrease in foundation excavation over the remainder of the area was 3,928 cu. yds.

The bottom grade in the cutoff trench was originally revised from Station 11+00 to 15+80 from that shown on contract drawing TL 60-12.6/16 by case number 4 on 18 July 1980. The bottom grade was further revised in the field from Station 10+26 to 11+00 to 21 August 1980 to compensate for final ground elevations after the outlet works construction. On 14 November 1980 the bottom grade was revised in the field between stations 7+05 and 8+60. This revision was necessary after the partially excavated cutoff trench in that area was exposed during the court-ordered injunction of 4 April 1980 through 15 July 1980. All of these cutoff trench final grades were included in Modification P00015.

On 21 August 1981 cutoff trench grades were further revised from Station 10+25 to 13+15 and on 28 September 1981 the last revised grades were directed from Station 13+20 to 15+80. These grades changes are reflected in Case 115.

c. Dewatering System. Dewatering of the core trench foundation after overburden removal was by sumps and pumps. Water in the main embankment foundation was seepage from bedding planes at the lower elevations and from vertical joints and cracks in the shale foundation. There was no appreciable seepage from the abutments other than a few minor springs and seeps. See Table No. 2 for location, description, and treatment of seeps and springs. Prior to removal of the last two feet of rock to foundation grade a sump was excavated in the rock berm right and left of the backslope. Water was pumped from the deeper area into these sumps and by trenches was transferred downstream. See Photo No. 413. Trenches were shaped across the core trench on the abutments to prevent surface runoff from entering the valley bottom foundation. See Photo No. 451. In an effort to control seepage and surface runoff in the valley bottom portion of the core trench, the filter zones along the upstream and downstream face of the core trench were excavated to grade and one lift of sand and 57's installed along with two sumps prior to excavating the remaining portion of the trench to grade. (See Photo Nos. 405 thru 412.) The sumps consisted of 36-inch concrete pipe located 45.1 feet left of Station 6+36.5 and 50.8 feet right of Station 6+46.50. (See Photo Nos. 413 and 414.) Submersible air pumps were set in these sumps and dewatering was continuous until they were abandoned on 15 June 1981.

4.05 SPILLWAY AND BORROW AREAS.

a. Overburden. Removal of overburden in the spillway was initiated on 20 June 1979. Scrapers and dozers were used to stockpile topsoil, impervious and random earth materials for later use in the dam. These stockpiles were located adjacent to the spillway and in the upstream area so designated above the dam. It was at this time that it became evident that the clay material just above the rock contained large amounts of "floaters" that would cause a large amount of material to be unsuitable for use as impervious.

b. Rock. In order to obtain shale material for the permanent cofferdam in sufficient supply to meet the specification production requirements, the rock in the spillway had to be uncovered, drilled, and shot and some hauled to a stockpile. The drilling and blasting operations were initiated on 20 July 1979. The specifications specified that all rock slopes one vertical to one horizontal and steeper were to be excavated by pre-splitting, close line drilling, or other similar approved methods. The contractor elected to use the pre-splitting method. Based upon the results of two trial pre-split sections, the optimum pre-split hole spacing was three feet, center to center. A total of two pre-split test sections was utilized on the right side of the spillway between Stations 5+50 and 9+70, Elevation 655± to 630. The 3-inch diameter hole spacings ranged from 4-foot centers to 2-foot centers. In addition, the number of holes loaded ranged from each to alternating holes. In both test sections, each hole loaded on 3-foot centers produced the best pre-splitting results.

Dupont Tovex T (1-7/8" x 50') was used in loading the pre-split holes. A minimum of 3 feet of stemming was used. Reinforced Primacord downlines equal to the full depth of the hole were used which were attached to a Primacord and detonated with electric blasting caps.

Production drilling was accomplished using a Robbins RR 10 rotary drill. Hole sizes varied from 4 inches to 6-1/4 inches in diameter. The burden and spacing patterns ranged from 10' x 14' to 17' x 15', depending on the type rock shot. The depth of holes ranged from 19 to 49 feet. The depth, spacing and diameter of the holes were determined by observation of the manner in which the rock broke as the operation progressed.

Explosives used consisted of DuPont Tovex E placed in the bottom of the hole along with a HDP-1 booster primer (2" x 14 oz.). The remainder of the hole to within approximately 10' of the top was filled with ANFO-P. The shot was wired and detonated in the same manner as outlined above for pre-splitting. The shot pattern used was similar to a channel pattern. The MS delay periods used ranged from 100 at the center to 250 milliseconds out towards the pre-split face. The production shot ranged from 10,000 to 15,000 cubic yards with a resulting powder factor of approximately 1.2 pounds per cubic yard. The left wall consisted of two pre-split faces and the right consisted of three pre-split faces. Each face was offset from the face above 2 feet to facilitate drilling operations.

CHARACTER OF FOUNDATION

5.01 SOIL FOUNDATION. The entire embankment foundation area was first cleared of all trees and other vegetation and then stripped of all vegetation, roots, sod, rubbish, and other unsuitable material. After completion of the clearing and stripping, all depressions were filled with either impervious or rock material dependent upon the type of material which was to be placed immediately above. Immediately prior to placement of embankment, the foundation was scarified to a depth of six inches and compacted. The stripping in the valley bottom and abutments was generally to sand and gravel or lean clay.

5.02 ROCK FOUNDATION.

a. Bottom. The core trench was stripped to solid rock. The bottom portion of the core trench between Stations 7+00 and 8+00 was founded on a thin limestone layer. It contained numerous small cracks and joints, none of which traversed the entire width of the core trench, nor were they of sufficient size that required extensive cleaning or treatment. Shallow trenches were excavated through the thin limestone layer to drain trapped water. The vertical faces of these trenches were treated with concrete fillets. Prior to placement of the first lift of impervious, the rock surface was thoroughly cleaned of loose material using hand labor and compressed air in such combination as the rock surface would require to assure the desired bond.

b. Right Abutment. On the right abutment the core trench foundation consisted primarily of moderately to highly weathered brown shale with some thin, up to 8 inches thick, slightly weathered limestone seams. Very minor solutioning was evident along the clay-coated, very slightly honeycombed fractures within the thin limestone seams. The honeycomb depressions were very minor as the distance from top to bottom of the depressions was only about 1/8 inch. The shale beds were weathered but intact. The limestone beds contained a network of hairline fractures; however, no long open fractures or joints crossing the axis of the core trench were found. There was no apparent evidence of movement of material along the bedding planes.

The normal procedure for treating the foundation was to excavate the weathered and fractured material down to unweathered shale and clean the surface using the same methods as in the bottom. Because of the highly weathered condition of the material encountered on the right abutment, two concrete walls were required at the outset - one at Station 10+63 and the other at 11+35. See Photos 478 thru 480 and 504, 506 and 507. The walls were founded on firm shale and placed against the vertical rock back face forming a step-up to the next firm shale layer, thereby encapsulating the fill material on the impervious shales and between the upstream and downstream drains. While excavating for the second wall, it was found that the shale beds were all equally weathered, thereby making use of additional walls questionable. Engineering Division personnel were notified of the deteriorated condition of the rock so that an analysis of the conditions could be made and another method of treatment formulated. See Paragraph 2.02a, Investigations During Construction, for details of investigation. It was concluded that the core trench would be excavated down to the top of the grout curtain at packer

settings, unless the resulting surface showed conditions where there were zones of soft material, open bedding planes, or joints traversing the core trench, in which case further investigations would be undertaken. The remainder of the core trench was excavated to the top of the grout curtain and the surface prepared as discussed previously.

c. Left Abutment. On the left abutment the site geology consisted of near horizontal interbedded shales and limestones. Again the procedure was to excavate the weathered material down to the unweathered shale or limestone which was achieved essentially at original design elevations. No problems were encountered during excavation and final cleanup on the left abutment.

FOUNDATION TREATMENT

6.01 CURTAIN GROUTING.

a. General. Treatment of the foundation included construction of a single line grout curtain between dam Stations 1+60 and 15+80. With the exception of the use of packers, which was a directed change, the grout curtain was constructed essentially as designed. Drilling and grouting were done by zones, using split-spacing, stage-grouting methods. The spacing of the primary holes was set on 10-foot centers, followed by secondary holes on 5-foot centers and tertiary holes on 2.5-foot centers as warranted.

The grouting operation was divided into three areas: bottom, left abutment and right abutment.

As expected, due to the thin interbedded shale and limestone formation, grout takes were relatively small. Also, water and grouting pressures were low so as to preclude the possibility of jacking the foundation. In attempting to evaluate the effectiveness of the grouting operations, it should be noted that only neat grout was used.

The locations and depths of all grout holes for the entire grout line are shown on Plate Nos. 14 thru 16. A detailed record of the pressure testing and grouting of all holes is included as Table 3.

Grouting operations were initiated in September 1980 and completed during October 1981.

Drilling was accomplished by Chicago Pneumatic Model 65 air-powered diamond core drills mounted on air tracks and drill stands. Collar drills were used on steep areas where an air track could not maneuver. The diamond bits were manufactured by B. H. Mott & Sons and were 1-1/2" in diameter.

The grout mixers used were the double-tube type, each holding approximately 30 cubic feet. The mixers were equipped with a 1-1/2" Hersey Disc type water meter calibrated to read in cubic feet with a direct reading totalizer. The air-driven grout agitators were portable, and held approximately 30 cubic feet of material. The grout pumps were the Progressive cavity grout pumps Moyno's Models 2L6 and 2L8. The grout plant was powered by separate air motors for each mixer. Grout header consisted of 1-1/2" valves, Marshalltown pressure gages with readings 0 to 15 psi. Two gages were used in the grout line--one at the pumps, and the other on the grout header. The supply line was 1-1/2" I.D. hose.

b. Bottom. The bottom section was divided into an area between Stations 9+88 and 5+00. This area was further divided into 100-foot sections and drilled and grouted in alternating sections. Sections 7, 9 and 5 were drilled and grouted first followed by sections 6 and 8.

Sections 7 and 8 encountered artesian water approximately 18 feet below the top of rock. Holes were staged at this point. When trying to grout this

water-bearing seam from the top of the ground, numerous grouting problems developed. The low pressures being used due to weak surface rock could not overcome the artesian pressure. Also at these low pressures, indications of jacking were noted in Section 7. When such indications occurred, grouting was stopped and no excessive damage occurred.

To overcome the artesian flow, packers were used. The packers were set at 10 feet and the header pressure was increased to 10 psi. The water-bearing seam was extremely fine and little grout was introduced into this seam. Consequently the results were somewhat spotty. Some slowing of the artesian flow was noted in tertiary holes, but the flow was never completely stopped. Artesion flow was noted from 7+00 to 8+75. Following secondary holes, a series of core holes was intiated in Section 7 to explore the extent of uplift and artesian flow at 18-20 feet. The results of the core drill were inconclusive, but pointed to an actual fractured zone to 5 feet. The artesian zone was never pinpointed, but appeared to be a thin open bedding plane in this zone. Following the core hole drilling, a conference was held on 29 October 1980 to determine if additional grouting should be done. See Section 2, para. 2-02, covering details of investigation. As a consequence, it was decided to drill the entire series of tertiary holes in Section 7. This was done and some slowing of the artesian flow was noted as discussed above.

Also complicating the grouting in Sections 5 and 7 was the apparent uplift which occurred during the 3-month shutdown period between partial excavation and grouting. Indications included artesian water which washed and complicated grouting of the deeper artesian seam, excessive takes in apparently sound rock with resultant fears of jacking, and surface grout boils in areas away from the grout curtain when the grout finally did surface. Again, packers were utilized to overcome these problems. Packers were set at approximately 5 feet below the surface where the rock was tight. The additional 3 feet was removed during final excavation.

The holes in sections 9, 6 and 5 did not have any unusual problems other than occasional pulled casings and grout surface leaks. The holes in section 9 were mostly split due to the surface leaks. Whenever surface leaks occurred, the caulking methods prescribed in the contract specifications could not be followed. Instead, when surface leaks occurred, the leaking was cleaned out and ringed with sandbags. The sandbagged area was then filled with group pumped through the leak. In some instances, the extra weight of the grout, combined with lowered pressures, was enough to seal the leak. In most cases, however, this did not prove adequate to stop the leak. In these instances grouting was discontinued. Subsequently, the hole was redrilled and regrouted, followed by further split spacing. If the size of the leak did not warrant redrilling, the hole was usually split spaced to insure satisfactory grouting of the lower portion of the curtain.

When casings pulled, remedial treatment varied. If casing was pulled enough and the hole collapsed and could not be reopened, the hole was replaced. If the casing was loose, it was sometimes regrouted and redrilled before grouting. However, in most cases a packer was set immediately below the casing.

The two holes set at 30 degrees forward and reversed to check the tightness of the rock under the conduit were drilled without incident. The forward 30-degree hole at station 9+86 was drilled and grouted with no take. The reversed 30-degree hole at station 10+36 was drilled to the bottom of the curtain without problem. Water take was not excessive, but immediate problems occurred during grouting. Surface leaks were noted after some time under the contractor's plastic-lined sump adjacent to the conduit. When the surface leak was noted, a 6-foot packer was inserted to insure that no take was occurring below the conduit. The hole refused with no further take. After refusal, the hole was again hooked to the nipple and surface leaks were again noted (4-6 feet below the surface). The problem was again resolved by removing the unsound rock down to the elevation of the concrete plug adjacent to the conduit.

c. Left Abutment. No unusual grouting problems were noted on the left abutment other than pulled casings and excessive surface leaks. Again, the area was divided into 100-foot sections and grouted by alternate sections to preclude violating the 100-foot spacing requirement.

Many of the first holes on the left abutment were drilled during grouting operations in the bottom portion of the core trench. Consequently a long delay between drilling and grouting occurred. As a consequence, many of the primary holes were filled with debris because they were left uncapped or they physically caved in due to softening of the sidewalls under water. As a result, grouting in some primary areas of the curtain was dubious and extra split spacing was required.

Pulled casings were treated as mentioned in the bottom portion. Surface leaks were also treated as mentioned in the bottom grouting portion. Split spacing was required and was carried to tertiary spacing in some areas. See Grout Profile for exact locations.

Very little actual grout take was noted on the left abutment portion of the first zone curtain. In nearly all cases, grout takes resulted from surface leaks. As with other portions of the curtain, grouting pressures in the first zone were kept to a minimum (2-3 psi gauge pressure) to lessen the chances of surface leaks.

A second zone was included in the left abutment portion of the grout curtain to seal leaks suspected during design drilling operations. Second zone holes were drilled between stations 2+80 and 1+60. In this area, the first zone holes were limited to 22 feet and the second zone holes were drilled to elevation 540. Grout takes in the primary second zone holes were insignificant and no second zone split spaced holes were required.

Upon completion of grouting on the left abutment, a check core hole was drilled at station 1+65 to the base of the second zone. This hole was drilled to check the grout curtain and to provide a basis for further test drilling after blasting operatins in the area. Core appeared to be in good shape and the hole proved to be tight during pressure testing and grouting. A packer was set at 5 feet due to unstable surface conditions.

d. Right Abutment. As in other areas of the curtain, this portion of the grout curtain between stations 10+25 and 15+80 was divided into 100-foot sections and grouted alternately by sections thereafter.

When drilling and grouting commenced on the right abutment, a considerable difference in rock conditions was noted between the right and left abutment foundation rock.

Casings for all primary holes between sta. 10+30 and 15+80 were set at 2 feet and drilling was started in section 10 adjacent to the conduit. Immediate problems were encountered when several holes lost water immediately. During grouting, packers had to be used to prevent surface leaks. Consequently, final foundation grades had to be lowered approximately 3-5 feet.

Section 11 had fewer problems, but extensive split spacing and packer use was required to grout this section adequately. Again, final foundation grades had to be lowered to compensate for grouting difficulties. A check core hole at sta. 11+87 indicated weathered rock to 17.8 feet. The rock below that zone was jointed and fractured in areas which is normal in this type of thin bedded shale and limestones. The hole proved to be tight during pressure testing and grouting with a packer set at 4 feet.

Section 12 had proportionately more problems than any other section of the grout curtain. Continuous use of packers was required to isolate the badly weathered rock at the top of the curtain. All primary holes in this section lost drill water and had to be staged at least once. Although some of the losses appeared at the surface during grouting, most of these holes experienced proportionately large grout takes up to 48 cu. ft. of solids. Secondary holes were drilled to the bottom of the curtain in one stage. Some abnormal grout takes were still occurring, but generally the curtain started to tighten at this point. Packers had to be used continuously throughout this section. In a few instances packers could not be set at all in the grout holes. In these cases, surface leaks were treated and the hole was automatically split spaced. Split spacing down to tertiary holes was required from sta. 12+50 to 12+90, with tertiary casings set at 5 feet. The 5-foot casing settings alleviated many of the packer problems, but packers were still required in many of these holes. Several of the holes collapsed between drilling and grouting and had to be rewashed and redrilled in several instances. Although tertiary casings were set at 5 feet, higher than normal grout takes up to 12 bags were recorded in tertiary holes. Consequently, quaternary split spacing was required between sta. 12+50 and 12+75. This was the only area in the entire curtain which required quaternary splitting. A check core hole at 12+83 indicated weathered rock to 5.2 feet with fractured and jointed rock below that. This hole proved to be tight during pressure testing and grouting with a packer setting of 4 feet. During later analysis and discussions, the soft area between 12+30 and 12+90 was outlined for close inspection during final rock cleanup to determine if additional methods of foundation treatment would be required.

Section 13 first zone holes also had to be staged, but takes were proportionately less than those in section 12. Within areas, splitting to

tertiary holes was required. Although numerous drill water losses and high grout takes were recorded in primary holes, this section tightened up satisfactorily by tertiary splitting. Packers had to be used extensively. Final grade was lowered to compensate for deep packer settings.

A portion of section 13 (13+50 to 13+90) was included in the second zone portion of the grout curtain on the right abutment. When a second zone was required, the first zone was limited to 22 feet and the remainder of the hole down to elevation 530 was included in the second zone. The second zone portion of section 13 proved to be tight and only one hole 13+70 required splitting. The splits for this hole were also tight.

As the primary phase wound down the grout reach was extended and combined sections 14 and 15. The 100-foot minimum distance was kept between the drilling and grouting operations.

From Station 13+90 to 15+15 the secondary holes were all drilled and grouted. The primary and secondary holes along this section were all taken to the bottom of Zone II (Elev. 530.0). The top of rock did tighten up as successive holes were grouted and the grout was permitted to remain in the hole.

During drilling of both primary and secondary holes in the area 14+80-15+00 drill water was lost in Zones I and II. The area was stage grouted and two quaternary holes were needed to insure a tight foundation in Zone I. Tertiary holes were drilled to the bottom of Zone II to acquire refusal in this area.

The section between 15+40 and 15+60 required tertiary holes and at Stations 15+56.8 and 15+58.4 quaternary holes were employed to secure refusal within Zone I. A grout exploratory core hole was taken at Station 15+60, four feet downstream of centerline to check on this problem area. See Photo Nos. 617 and 618. The hole was cored 21.5 feet deep, pressure tested (tight) and was backfilled with a thick 1:1 grout mix.

As on the left abutment, surface leaks were primary treated with diking. Whenever a surface leak was noted, the area was cleaned and diked. The dike was then filled with grout pumped through the hole and grouting operations stopped. The hole was either redrilled or split spaced or both.

Surface leaks on the right abutment followed a different pattern than those occurring on the left abutment. In some cases the surface leaks occurred immediately just down hill from the casing as occurred on the left abutment. In these cases, the leak was attributed to weak rock at the base of the casing. In other more frequent instances, the hole would take quite a few cubic feet of grout before finally breaking out. In these instances, the hole was being grouted satisfactorily to refusal, but when refusal was reached, the weak rock at the base of the casing could not hold the additional pressure, with resulting surface leaks.

Grouting procedures varied somewhat on the right abutment when surface leaks were encountered. When surface leaks were encountered in primary holes, grouting was continued through the casing without packers in an attempt to

fill the surface voids. When surface leaks were encountered in secondary and tertiary holes, packers were set immediately to isolate the surface leaks and continue grouting the lower portion of the hole. In a few instances, after the lower portion of the hole refused, the header was set back on the casing and further attempts were made to seal the surface leaks. This method of treating required more than the expected quantity of cement grout.

The top of rock continued to give problems with its ease in being lifted with very low gage pressures. The normal sequence for the first zone (22 feet in depth) would be to drill, pressure test (using 4 psi) and to grout through the 2-foot nipple. In most cases the top of rock would take some grout at 3 psi gage pressure, then usually a breakout would occur at the rock surface. If the leak could not be stopped through established procedures, a packer would be set at 4- to 5-foot depth and grouting continued until refusal was achieved.

e. Quantities. Sub-items 8a, drilling grout holes and 8f, neat cement in grout, overran 115% of the contract quantity. This was a result of several factors. The drilling increase was due to (1) more splits drilled than anticipated, and (2) grout was permitted to set in the top zone and required redrilling. The thinly bedded top of rock warranted leaving the grout setup in the holes. This procedure had been established early in the grouting sequence. The top of rock and the problems it produced in grouting increased the grout take. The three-month suspension was also a contributing factor in the increased grout required to complete the curtain.

TABLE 1

ROSTER OF CORPS PERSONNEL

Name	Position	Duration on Project
Ken Ladd	Resident Engineer	29 Apr 79 - 2 Nov 80
Don Basham	Resident Engineer	2 Nov 80 - Present
Ralph Hill	Asst. Res. Engineer	10 Dec 75 - Present
Richard Chleborad	Civil Engrg Tech (Office Engineer)	10 Oct 76 - Present
Maniff Robertson	Construction Rep.	3 Jun 79 - Present
Carlton F. Beasley	Matls. Engrg Tech	18 Apr 76 - Present
Mary R. Stephenson	Matls. Engrg Tech	24 Mar 80 - Present
Lydia A. O'Bryan	Secretary (Typing)	1 Dec 80 - Present
Mona Klinstiver	Secretary (Typing)	27 Jul 80 - 11 Jan 81
Michael P. Lambert	Civil Engrg Tech	23 Sep 79 - 21 Jan 83
Sam Bartlett	Geologist	5 Oct 80 - 5 Aug 81
Duane Dyer	Geologist	5 Aug 81 - 8 Oct 81
Kevin J. Doyle	Civil Engrg Tech	20 Sep 81 - 26 Jun 82
Greg L. Gerding	Civil Engrg Tech	21 Sep 81 - Present
Joseph W. Miller	Civil Engrg Tech	13 Jun 82 - Present
William F. Batte	Construction Insp	19 Oct 80 - Present
Plomer C. Wilson	Construction Insp	18 Aug 74 - Present

TABLE NO. 2

LOCATION AND TREATMENT OF SPRINGS

Date Noted	Location			Flow	Remarks
	Station	Range	Elevation		
	7+80	565' U.S.			NX core hole
	8+50	565' U.S.			Toe trench. See Photos 208 & 212, diverted to dewatering sump. Later plugged.
	9+32	453' U.S.			See photo No. 211 for description
3/14/80	27+97± Conduit Station	10' Rt of ditch centerline			Dug out and filled with #357
4/03/81	6+15	404' D.S.	484.5	5 FPM±	Ran 4" perforated plastic pipe w/a min of 6" of #57 stone all around. Tied pipe to MH 3 of toe drain system. See Photo Nos. 606 & 607.
4/27/81	8+38	32' U.S.	456.6	Seep < 1 GPM	
4/27/81	8+38		453±	Little water	Small seeps all along foundation ledge
4/27/81	7+77.5	43' D.S.	457	1± GPM	Edge of core trench
4/27/81	7+89	38' U.S.	554.1	1± GPM	Edge of core trench 7+70 to 7+89
5/01/81	6+38	Along U.S. to center-line portion founda-tion 458.5			Seep line
5/06/81	8+75	32' U.S. 2' U.S. of D.S. Edge of trench			No spring; core hole location

TABLE NO. 2 (Cont.)

Date Noted	Location			Flow	Remarks
	Station	Range	Elevation		
5/ 8/81	8+95±	15' U.S.	462.75		Small seep
5/21/81	9+42	33' D.S. of core trench	467.8		Small seep
5/21/81	9+15	27' U.S. edge of core trench			1± GPM
5/26/81	6+60±	Left edge of core trench at O.B. contact	470±		1± GPM
5/28/81	5+75	U.S. in weathered rock slope		2 GPM	Year-round spring
5/28/81	5+55	55' D.S.	493±	No flow at time recorded	Continuously wet since trench cut
6/16/81	9+70	33' D.S. limit of core trench foundation		Seep only	
7/ 8/81	10+45	15-20' D.S. in abutment wall	486.9	Seep	
7/ 9/81	10+45	9' U.S. of back wall	486.9	Seep	Wetting bottom but not flowing appreciably
7/22/81	10+70	20' U.S.	494±	Seep	
7/24/81	4+80	23.5' D.S.	507.1±	.5± GPM continuous	
8/24/81	4+12	U.S. side wall	534	Little flow	Seeps in side wall wetting surface

TABLE NO. 2 (Cont.)

Date Noted	Location		Elevation	Flow	Remarks
	Station	Range			
8/24/81	3+90	6' D.S., 21' U.S. of U.S. bot. exc. limit	535.8	Small seep	
8/24/81	3+85	U.S. side wall	544.4	< .1 GPM	Flowing some water
8/24/81	3+64	L to U.S. limit	542.75	no flow	Very slow seep Damp rock only.
8/24/81	3+42	L to U.S. limit of trench	551.5	no flow	Very slow seep Damp rock only.
8/24/81	3+07	All along trench foundation	563.75	.5 GPM	Moss fungus, etc.
8/24/81	2+95	L to U.S. limit of trench	568.1	Very slow seep; no flow	Damp rock only
8/24/81	2+87	L to U.S. limit of trench		Very slow seep; no flow	Damp rock only
8/24/81	2+75	10' U.S. of L		Very slow seep; no flow	Damp rock only
8/24/81	2+67	All along trench foundation	580±	Very slow seep; no flow	Damp rock only
8/24/81	1+70	U.S. side slope		Very slow seep; no flow	Damp rock only
8/28/81	12+35	L backwall	539.5	Slow seep to wet rock.	No quantity; just enough
8/28/81	12+33	U.S. wall	541±	Very slow seep	No quantity

TABLE 3

PRESSURE TEST & GROUTING DATA

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
1+60	22	15 Dec 80	0.0 @ 4				5' packer
		16 Dec 80		0.0	4:1	3	nipple grouted
	91	30 Mar 81	0.0 @ 5				
		1 Apr 81		0.0	4:1	5	5' packer
1+64.5	87.6	9 Apr 81	0.0 @ 3				2' packer, slight packer leak
	87.6		0.0 @ 5				5' packer, slight packer leak
				0.25	4:1	5	
1+70	22	15 Dec 80	0.0 @ 4				5' packer
				0.0	4:1	3	2' packer
	86	30 Mar 81	0.16 @ 5				
		1 Apr 81		0.0	4:1	5	5' packer
1+80	20	15 Dec 80	0.0 @ 4				5' packer
		16 Dec 80		0.0	4:1	3	2' packer
	81	30 Mar 81	0.0 @ 5				
		1 Apr 81		0.0	4:1	5	5' packer
1+85	22	19 Jan 81	0.0 @ 3				
		20 Jan 81		0.0	3:1	3	
1+90	20	15 Dec 80	0.0 @ 4				5' packer
		16 Dec 80		3.0	4:1	3	surface leak
				6.0	1:1	0	3' below nipple
	20	18 Dec 80	0.61 @ 4	1.5	4:1	3	Redrilled
				2.0	2:1	3	
				28.0	1:1	3	Sealing surface leaks; no refusal
	77	30 Mar 81	0.0 @ 5				
		1 Apr 81		0.0	4:1	5	5' packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
1+95	22	19 Jan 81 20 Jan 81	0.0 @ 3	0.0	3:1	3	
2+00	22	11 Dec 80 15 Dec 80	0.15 @ 4	0.75	4:1	3	
	73	30 Mar 81 1 Apr 81	0.0 @ 5	0.0	4:1	5	5' packer
2+10	22	14 Dec 80 15 Dec 80	0.01 @ 4	0.0	4:1	3	
	69	30 Mar 81 1 Apr 81	0.05 @ 5	1.0 0.0	4:1 4:1	5 5	nipple 5' packer
2+20	22	11 Dec 80 15 Dec 80	0.0 @ 4	0.0	4:1	3	
	65	30 Mar 81 1 Apr 81	0.1 @ 5	0.25	4:1	5	5' packer after surface leak
2+30	22	11 Dec 80 15 Dec 80	0.0 @ 4	0.25	4:1	3	
	61	30 Mar 81 31 Apr 81	0.0 @ 5	0.0	4:1	5	no packer
2+40	22	11 Dec 80 15 Dec 80	0.0 @ 4	0.0	4:1	3	
	57	30 Mar 81 1 Apr 81	0.45 @ 5	0.0	4:1	5	5' packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
2+50	22	11 Dec 80	0.0 @ 4				
		15 Dec 80		0.0	4:1	3	
	54	30 Mar 81	0.0 @ 5				
		31 Mar 81		0.0	3:1	5	5' packer
							3' packer
2+60	22	11 Dec 80	0.0 @ 4				
		15 Dec 80		0.0	4:1	3	nipple leak; regrouted
	50	30 Mar 81	0.23 @ 5				surface leak below nipple
		31 Mar 81		0.0	3:1	5	5' packer
2+65	42	19 Jan 81	0.8 @ 3				
		20 Jan 81		2.0	4:1	3	
				0.5	3:1	3	refusal ±
							nipple leaked; used packer
2+70	22	11 Dec 80	37.0 @ 4				
		12 Dec 80		1.5	4:1	3	surface leak
	22	18 Dec 80	0.0 @ 4	0.5	4:1	3	redrilled bottom; 5' packer; loose nipple
	46	30 Mar 81	0.0 @ 5				6' packer; reset nipple
		31 Mar 81		0.0	3:1	5	5' packer
2+75	42	19 Jan 81	0.0 @ 3				
		20 Jan 81		0.0	4:1	3	
							leak @ 1+92
2+80	22	11 Dec 80	0.66 @ 4				
		12 Dec 80		29.0	4:1 to 1:1		sealing surface leaks
	22	18 Dec 80	0.0 @ 4	0.0	4:1	3	redrilled 20'; 2' packer
	44	30 Mar 81	0.3 @ 5				leak @ 2+85
		31 Mar 81		0.0	3:1	5	5' packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
2+85	42	19 Jan 81 20 Jan 81	0.0 @ 3	0.0	4:1	3	
2+90	22	11 Dec 80 12 Dec 80	0.27 @ 4	4.0	4:1	3	leak @ 3+00 20' D.S. ± leak @ 3+00 15' D.S.
	22	18 Dec 80	0.0 @ 4	0.0	4:1	3	redrilled 20'
	44	30 Mar 81 31 Mar 81	0.18 @ 5	0.0	3:1	5	leak on surface below nipple 5' packer
2+95	42	26 Jan 81 27 Jan 81	0.0 @ 3	0.0	3:1	3	
3+00	40	20 Nov 80 21 Nov 80	0.0 @ 4	0.0	4:1	3	3' packer
	28	25 Nov 80 26 Nov 80	0.0 @ 4	0.0	4:1	3	redrilled 3' packer
3+05	42	26 Jan 81 27 Jan 81	0.0 @ 3	0.0	3:1	3	
3+10	40	18 Nov 80 21 Nov 80	0.0 @ 4	0.0	4:1	3	3' packer 3' packer (air)
3+20	40	18 Nov 80 21 Nov 80	0.11 @ 4	0.0	4:1	3	3' packer (air)
3+30	40	18 Nov 80 21 Nov 80	0.02 @ 4	0.0	4:1	3	3' packer 3' packer (air)

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
3+40	5	18 Nov 80	0.0 @ 4				3' packer
		21 Nov 80		0.0	4:1	3	3' packer; redrill
	37	25 Nov 80	0.0 @ 4				
		26 Nov 80		0.0	4:1	3	3' packer
3+50	10	18 Nov 80	0.25 @ 4				4' packer
		21 Nov 80		0.25	4:1	3	3' packer; redrill
	42	25 Nov 80	0.0 @ 4				surface leak @ 3+53, 10' D.S.
		26 Nov 80		0.0	4:1	4	3' packer
3+60	33	18 Nov 80	0.0 @ 4				
		21 Nov 80		0.0	4:1	3	3' packer; redrill
	42	25 Nov 80	0.01 @ 4				
		26 Nov 80		0.0	4:1	3	3' packer
3+65	42	26 Jan 81	0.03 @ 3				
		27 Jan 81		0.0	4:1	3	refusal
3+70	34	18 Nov 80	0.37 @ 4				surface leak @ 3+80, 10' Rt.
		20 Nov 80		1.0	4:1	3	leak @ 3+80, 10' D.S.
				5.0	2:1	3	leak @ 3+65, 10' D.S.; redrilled
	42	25 Nov 80	0.0 @ 4				
		26 Nov 80		0.0	4:1	3	3' packer
3+75	42	26 Jan 81	0.06 @ 3				
		27 Jan 81		0.5	4:1	3	refused except slight leak

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
3+80	37	18 Nov 80	0.0 @ 4				
		20 Nov 80		0.0	4:1		3' packer; redrilled
	42	25 Nov 80	0.0 @ 4				
		26 Nov 80		0.0	4:1	3	3' packer
3+90	42	20 Nov 80	0.01 @ 4	0.0	4:1	3	3' packer
3+95	40	17 Dec 80	0.11 @ 4				
		18 Dec 80		0.0	4:1	3	
4+00	40	8 Dec 80	0.5 @ 4				leak @ 4+02 D.S.
		11 Dec 80	0.0 @ 4	0.0	4:1	3	redrilled, plugged; 3' packer
4+05	40	16 Dec 80	0.34 @ 4				
		18 Dec 80		0.75	4:1	3	
4+10	40	8 Dec 80	0.0 @ 4				
		10 Dec 80		0.25	4:1	3	
4+12.5	14	19 Jan 81	0.25 @ 3				
		22 Jan 81		0.0	3:1	3	5' packer; refusal
	42	26 Jan 81	0.07 @ 3				
		27 Jan 81		0.0	4:1	3	refusal
4+15	40	16 Dec 80	0.93 @ 4				
		17 Dec 80		3.5	4:1	3	surface leak @ 4+20 U.S.
				4.0	1:1	3	did not refuse

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
4+17.5	42	19 Jan 81 22 Jan 81	0.6 @ 3	1.5	3:1	1-2	loose nipple sealed surface leaks; refusal; 5' packer
4+20	40	5 Dec 80 10 Dec 80 11 Dec 80	0.32 @ 4	2.85 0.50	4:1 4:1	3 3	leak @ 4+21 U.S. 3' packer
4+25	40	16 Dec 80 17 Dec 80	0.2 @ 4	0.0	4:1	3	
4+30	40	5 Dec 80	0.11 @ 4	0.0	4:1	3	3' packer
4+40	40	5 Dec 80 8 Dec 80	0.10 @ 4	0.25	4:1	3	
4+50	40	5 Dec 80 8 Dec 80	0.0 @ 4	1.25	4:1	4	used packer
4+55	40	16 Dec 80 17 Dec 80	0.08 @ 4	0.0	4:1	3	
4+60	40	5 Dec 80 8 Dec 80	0.18 @ 4	0.0	4:1	3	
4+62.5	42	19 Jan 81 22 Jan 81	0.0 @ 3	0.0	3:1	3	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
4+65	40	16 Dec 80	0.68 @ 4				
		17 Dec 80		3.0	4:1	3	surface leak
				1.5	2:1	3	surface leak, 6' D.S., caulked
4+67.5	42	19 Jan 81	0.15 @ 3				
		22 Jan 81		0.0	3:1	3	refusal
4+70	40	5 Dec 80	0.0 @ 4				3' packer
		8 Dec 80		0.75	4:1	3	
4+80	40	5 Dec 80	0.0 @ 4				
		8 Dec 80		0.0	4:1	3	nipple loose; used packer
4+90	40	5 Dec 80	0.0 @ 4				nipple leak; used packer
		8 Dec 80		0.0	4:1	3	
5+00	4	2 Oct 80	0.95 @ 4				surface leaks
		13 Oct 80		3.0	4:1	3	surface leaks
				3.0	2:1	0-3	sealing surface leaks
	42	24 Oct 80	0.0 @ 4				loose nipple; 3' packer
		5 Nov 80		0.75	4:1	3	3' packer
5+10	42	13 Oct 80	0.12 @ 4				
		14 Oct 80		0.0	4:1	3	5' packer; slight leak @ casing
5+20	42	2 Oct 80	0.04 @ 4				
		14 Oct 80		0.0	4:1	4	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
5+30	42	2 Oct 80	0.47 @ 4				
		14 Oct 80		3.0	4:1	3	5+35 surface leak
				1.0	2:1	0	sealing leaks; no refusal
5+35	40	8 Dec 80	0.13 @ 4	0.3	4:1	3	
5+40	42	2 Oct 80	0.19 @ 4				
		13 Oct 80		0.5	4:1	3	refusal
5+45	42	4 Nov 80	0.28 @ 4				
		5 Nov 80		1.0	4:1	3	3' packer
5+50	42	2 Oct 80	0.09 @ 4				
		13 Oct 80		0.0	4:1	4	refusal
5+60	42	2 Oct 80	0.04 @ 4				
		13 Oct 80		0.0	4:1	4	refusal
5+65	40	4 Nov 80	0.06 @ 4				
		5 Nov 80		0.25	4:1	3	3' packer
5+70	42	2 Oct 80	0.02 @ 4				
		13 Oct 80		5.0	4:1	3	5+65 & 5+75 surface leaks
				4.0	1:1	0	sealing surface leaks
	42	24 Oct 80	0.0 @ 4	1.5	4:1	3	redrilled; 3' packer; loose nipple
	42	4 Nov 80	0.0 @ 4				redrilled; 3' packer
		5 Nov 80		0.0	4:1	3	3' packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
5+75	40	4 Nov 80	0.08 @ 4				
		5 Nov 80		0.0	4:1	3	3' packer
5+80 Rt	42	4 Nov 80	0.0 @ 4	0.25	4:1	3	
5+80	42	13 Oct 80	0.20 @ 4	2.0	4:1	3	3' packer; 5+85 surface leak
				1.0	1:1	3	refusal; redrill
	42	16 Oct 80	0.0 @ 4				lost hole
5+90	42	2 Oct 80	0.11 @ 4				
		13 Oct 80		0.0	4:1	4	refusal
6+00	42	22 Oct 80	0.09 @ 4				
		24 Oct 80		0.5	4:1	3	surface leak; redrill
	42	3 Nov 80	0.0 @ 4				
		4 Nov 80		0.0	4:1	3	
6+10	27	21 Oct 80	0.5 @ 4				
		24 Oct 80		3.0	4:1	3	surface leak near nipple; 3' packer
	42	3 Nov 80	0.0 @ 4				redrill
		4 Nov 80		0.0	4:1	4	3' packer
6+20 Rt	42	3 Nov 80	0.0 @ 4				
		4 Nov 80		0.75	4:1	3	
6+20		16 Oct 80					lost hole
6+30	42	21 Oct 80	0.05 @ 4				
		23 Oct 80		0.25	4:1	2	3' packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
6+40	42	21 Oct 80	0.0 @ 4				
		23 Oct 80		0.0	4:1	2	
6+50	42	20 Oct 80	0.0 @ 4				
		23 Oct 80		0.0	4:1	2	
6+60	42	22 Oct 80	0.0 @ 4				
		23 Oct 80		0.0	4:1	2	3' packer - leaked
6+70	42	21 Oct 80	0.0 @ 4				
		23 Oct 80		0.0	4:1	2	
6+80	42	22 Oct 80	0.0 @ 4				
		23 Oct 80		0.25	4:1	3	3' packer
6+85	42	3 Nov 80	0.0 @ 4				
		4 Nov 80		0.0	4:1	3	
6+90	42	16 Oct 80	0.0 @ 4				
		23 Oct 80		4.5	4:1	3	
6+95	42	3 Nov 80	0.0 @ 4				
		4 Nov 80		0.0	4:1	3	
7+00	42	15 Sep 80	0.3 @ 5				
		19 Sep 80		0.0	2:1	1	refusal
7+02.5	22	7 Nov 80	0.0 @ 10				
		11 Nov 80		0.0	4:1	7-8	

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
7+05	42	8 Oct 80	0.0 @ 3				
		9 Oct 80		4.0	4:1	9-10	10' packer; refusal
		9 Oct 80		0.0	4:1	3	refusal
7+07.5	22	7 Nov 80	0.0 @ 10				not grouted
7+10	18	15 Sep 80	0.62 @ 4				
		19 Sep 80		9.0	2:1	1	no refusal
	42	25 Sep 80	0.0 @ 4				
		29 Sep 80		0.0	4:1	3	
7+10, D.S.	40.4	24 Oct 80	0.0 @ 5				
		27 Oct 80		0.0	4:1	3-5	5' packer
				0.0	4:1	2-3	2' packer; backfilled
7+12.5	22	7 Nov 80	0.0 @ 10				not grouted; backfilled
7+15	42	8 Oct 80	0.0 @ 3				5' packer
		9 Oct 80		0.0	4:1	10	10' packer; refusal
				0.0	4:1	3	3' packer; refusal
7+15, 6' DS	12.8	24 Oct 80	0.0 @ 5				
		27 Oct 80		0.0	4:1	3-5	5' packer
				0.0	4:1	2-3	2' packer; backfilled
7+17.5	22	7 Nov 80	0.0 @ 10				
		11 Nov 80		0.0	4:1	7-8	10' packer; backfilled

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
7+20	19	15 Aug 80	0.4 @ 4				
		19 Aug 80		0.0	2:1	1	refusal
	25	25 Aug 80	0.04 @ 4				redrill; 3' packer
		29 Aug 80		0.0	4:1	1.5-3	3' packer
	42	1 Oct 80	0.0 @ 3				3' packer
		2 Oct 80		0.0	4:1	3	3' packer
7+22.5	22	7 Nov 80	0.0 @ 10				
		11 Nov 80		0.0	4:1	7-8	10' packer; backfilled
7+25	28	8 Oct 80	0.0 @ 3				3' packer
		9 Oct 80		0.0	4:1	10	10' packer; refusal
				0.0	4:1	3	3' packer; refusal
		14 Oct 80		0.0	4:1	10	10' packer; redrill
				0.0	4:1	3	3' packer
7+27.5	22	7 Nov 80	0.0 @ 10				not grouted; backfilled
7+30	18	15 Sep 80	0.6 @ 3				slight leak coupling
		19 Sep 80		7.0	2:1	1	
	42	25 Sep 80	0.0 @ 3				3' packer
		29 Sep 80		4.5	4:1	1.5	7+30 leak D.S.
	42	1 Oct 80	0.0 @ 3				redrill
		2 Oct 80		2.0	4:1	3-1.5	jacking rock near surface
7+32.5	22	7 Nov 80	0.03 @ 10				
		11 Nov 80		0.0	4:1	7-8	10' packer; backfilled

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
7+35	42	8 Oct 80	0.0 @ 3				3' packer
		9 Oct 80		0.0	4:1	3	3' packer
		14 Oct 80		2.0	4:1	8-2	10' packer
7+37.5	22	7 Nov 80	0.02 @ 10				
		11 Nov 80		0.0	4:1	7-8	10' packer
7+38	10.1	24 Oct 80	0.08 @ 5				4.5' packer
		27 Oct 80		2.0	4:1	3	4.5' packer
				0.0	4:1	3	2' packer; refusal; backfilled
7+40	19	15 Sep 80	0.13 @ 3				
		19 Sep 80		13.0	2:1	1	7+30 leak
	42	25 Sep 80	0.15 @ 3				
		29 Sep 80		5.0	4:1	5-2	7+30 surface leak
7+42.5	22	7 Nov 80	0.0 @ 10				not grouted; backfill
7+45	42	8 Oct 80	0.15 @ 3				4' packer
		9 Oct 80		1.0	4:1	10	10' packer
7+47.5	20	7 Nov 80	0.10 @ 10				10' packer
		11 Nov 80		0.0	4:1	7	10' packer
7+50 V	29	15 Sep 80	0.4 @ 3				
		19 Sep 80		15.0	3:1	0	
				22.0	2:1	1	
	42	25 Sep 80	0.0 @ 3				
		26 Sep 80		2.0	4:1	1	surface leak; loose packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
7+50 B	42	1 Oct 80	0.1 @ 3				
		2 Oct 80		0.5	4:1	3	refusal
7+50 F	19	15 Sep 80	0.3 @ 3				
	42	25 Sep 80	0.07 @ 3				
		26 Sep 80		0.0	4:1	2	refusal
7+52.5	22	7 Nov 80	0.2 @ 10				
		11 Nov 80		0.0	4:1	7-8-10	10' packer; backfilled
7+55	42	8 Oct 80	0.0 @ 3				
		9 Oct 80		5.5	4:1	8	10' packer; plugged
7+55 B	22	7 Nov 80	0.04 @ 10				
		11 Nov 80		6.0	4:1	7	10' packer; backfilled
7+55 F	22	7 Nov 80	0.04 @ 10				
		11 Nov 80		0.0	4:1	7-8	10' packer; backfilled
7+55 R		15 Oct 80		5.5	4:1	8-3	10' packer; slight water btwn packer & top of hole
				0.0	4:1	3	refusal
7+57.5	22	7 Nov 80	0.0 @ 10				
		12 Nov 80		0.0	4:1	7-8	10' packer; backfilled
7+60	18	15 Sep 80	0.7 @ 3				
		19 Sep 80		12.0	2:1	1	
	42	25 Sep 80	0.1 @ 3				
		26 Sep 80		0.0	4:1	1-6	7.5' packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
7+60, 5'DS	40.4	24 Oct 80	0.1 @ 5				5' packer, slight leak
		28 Oct 80		4.0	4:1	3-5	5' packer
				1.5	2:1	5	5' packer; refusal
				2.0	4:1	3-2	2' packer; refusal
7+62.5	22	7 Nov 80	0.0 @ 10				
		12 Nov 80		0.0	4:1	7-8-10	10' packer; backfilled
7+65	42	8 Oct 80	0.18 @ 3				lost hole
7+65 R		15 Oct 80					grouted from 7+55 R
7+67.5	22	10 Nov 80	0.03 @ 10				
		12 Nov 80		0.0	4:1	7-8-10	10' packer; backfilled
7+70	8	15 Sep 80	0.2 @ 3				
		19 Sep 80		12.0	2:1	1	
	42	25 Sep 80	0.15 @ 3				
		26 Sep 80		0.0	4:1	2	refusal
7+72.5	22	10 Nov 80	0.0 @ 10				
		12 Nov 80		0.25	4:1	7-8-10	10' packer; backfilled
7+75	42	8 Oct 80	0.06 @ 3				
		15 Oct 80		1.5	4:1	10-8	10' packer
		15 Oct 80		0.0	4:1	3	3' packer; refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
7+77	23.2	24 Oct 80	0.04 @ 5				
		28 Oct 80		2.0	4:1	3	4.5' packer
				0.0	4:1	3	2' packer; backfill
7+77.5	22	10 Nov 80	0.0 @ 10				10' packer
		12 Nov 80		0.0	4:1	7-8-10	10' packer; backfill
7+80	18	15 Sep 80	0.45 @ 3				
		19 Sep 80		12.0	2:1	1	
	42	25 Sep 80	0.0 @ 3				
		26 Sep 80		0.0	4:1	1-3	
7+82.5	22	10 Nov 80	0.0 @ 10				not grouted; backfilled
7+85	21	8 Oct 80	0.05 @ 3				
		15 Oct 80		3.5	4:1	6-1	7.5' packer
				0.0	4:1	3	refusal
	42	24 Oct 80	0.10 @ 3				3' packer
		28 Oct 80		0.0	4:1	10	10' packer
				0.25	4:1	3	3' packer; refusal
7+87.5	22	10 Nov 80	0.0 @ 10				
		12 Nov 80		0.0	4:1	7-8-10	10' packer; backfilled
7+90	18	15 Sep 80	0.18 @ 3				
		19 Sep 80		24.0	2:1	1	
	42	25 Sep 80	0.0 @ 3				
		26 Sep 80		0.0	4:1	3	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
7+92.5	22	10 Nov 80	0.01 @ 10				
		13 Nov 80		0.0	4:1	7-8-10	10' packer; backfilled
7+95	42	8 Oct 80	0.02 @ 3				
		16 Oct 80		0.0	4:1	8	10' packer
				0.5	4:1	3	refusal
7+97.5	22	10 Nov 80	0.11 @ 10				
		13 Nov 80		1.0	4:1	7-8-10	
						8-5-3	10' packer; refusal
8+00	18	15 Sep 80	0.7 @ 3				
		19 Sep 80		13.5	2:1	1	
				0.0	4:1	3-4	
	42	1 Oct 80	0.15 @ 4				
		2 Oct 80		1.0	4:1	3	refusal
8+02.5	22	10 Nov 80	0.05 @ 10				
		13 Nov 80		0.0	4:11	5-7-8	10' packer; backfill
8+05	18	23 Oct 80	0.38 @ 3				
		28 Oct 80		2.5	4:1	6-3	10' packer
8+07.5	22	10 Nov 80	0.13 @ 10				
		13 Nov 80		0.25	4:1	7-8-10-8	10' packer; backfill
8+10	18	15 Sep 80	0.7 @ 3				
		19 Sep 80		9.5	2:1	2	refusal
		26 Sep 80		2.0	4:1	5-3	
	42	1 Oct 80	0.23 @ 4				
		2 Oct 80		2.0	4:1	3	

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
8+12.5	22	10 Nov 80	0.0 @ 10				
		13 Nov 80		0.0	4:1	7-8-10	10' packer; backfilled
8+15	31	23 Oct 80	0.0 @ 3				nipple loose; 3' packer
		28 Oct 80		0.0	4:1	5	10' packer
8+17.5	22	10 Nov 80	0.06 @ 10				10' packer
		13 Nov 80		2.5	4:1	7-5-3	10' packer
8+20	42	2 Oct 80	0.15 @ 4	1.0	4:1	3.5	3' packer; refusal
8+30	42	1 Oct 80	0.35 @ 4				
	42	8 Oct 80	0.01 @ 3				redrill
		10 Oct 80		1.5	4:1	10	10' packer
				0.0	4:1	3	3' packer; refusal
8+35	40	23 Oct 80	0.0 @ 3				3' packer
		29 Oct 80		0.5	4:1	7-8-10-7	10' packer
				0.25	4:1	3	3' packer
8+40	42	1 Oct 80	1.1 @ 4				8+25 surface leak
		3 Oct 80		4.0	3:1	3	
				6.0	2:1	3	
				16.0	1:1	3	surface leaks; no refusal
	42	8 Oct 80	0.0 @ 4				
		10 Oct 80		7.0	4:1	10-5	10' packer
				0.0	4:1	3	3' packer; refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
8+42.5	22	10 Nov 80	0.15 @ 10				10' packer
		13 Nov 80		0.25	4:1	7-8-10	10' packer
				0.0	4:1	3	3' packer; backfill
8+45	40	23 Oct 80	0.09 @ 3				3' packer
		29 Oct 80		3.0	4:1	7-8-10	10' packer
				2.0	4:1	3	surface leak @ 8+25; 3' packer; refusal
8+47.5	22	10 Nov 80	0.24 @ 10				10' packer
		13 Nov 80		0.0	4:1	7-8-10	10' packer
				0.25	4:1	3	3' packer; backfill
8+50	5	1 Oct 80	0.95 @ 4				
		3 Oct 80		0.0	2:1	3	refusal
	42	8 Oct 80	0.11 @ 4				
		10 Oct 80		0.0	4:1	6	10' packer
				0.0	4:1	3	
8+52.5	22	10 Nov 80	0.17 @ 10				10' packer
		13 Nov 80		3.0	4:1	7-5	10' packer
				0.5	3:1	5	10' packer
		14 Nov 80		0.0	4:1	3	3' packer; backfill
8+55	42	23 Oct 80	0.22 @ 3				
		29 Oct 80		1.0	4:1	7	10' packer
		3 Nov 80		1.5	4:1	3	3' packer; backfill

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
8+57.5	22	10 Nov 80	0.0 @ 10				10' packer
		14 Nov 80		0.0	4:1	7-8-10	10' packer
				1.5	4:1	3	3' packer; backfill
8+60	42	1 Oct 80	0.25 @ 4				
		2 Oct 80		5.0	4:1	3	
				1.0	3:1	3	no refusal
8+70	42	1 Oct 80	0.0 @ 4				
		3 Oct 80		0.5	4:1	3	refusal
8+80	42	1 Oct 80	0.125 @ 4				
		3 Oct 80		1.5	4:1	3.5	refusal
8+85	42	23 Oct 80	0.31 @ 3				
		31 Oct 80		1.5	4:1	6	8' packer; refusal
				0.0	4:1	3	3' packer; refusal, backfill
8+90	42	1 Oct 80	0.0 @ 4				
		3 Oct 80		0.5	4:1	3	refusal
8+95	42	23 Oct 80	0.05 @ 3				
		3 Nov 80		3.0	4:1	7-5-3	10' packer
				1.5	4:1	0.25	3' packer; backfill

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
9+00	42	10 Sep 80	0.32 @ 5				8+94 surface leak
		16 Sep 80		2.0	4:1	0	sealing surface leaks
				10.0	1:1	0	
	42	23 Sep 80	0.0 @ 5				redrill
		24 Sep 80		0.0	4:1	3	refusal
9+05	42	8 Oct 80	0.07 @ 4				
		16 Oct 80		0.25	4:1	10	10' packer
				0.0	4:1	3	3' packer
9+10	42	10 Sep 80	0.62 @ 5				
		17 Sep 80		2.0	4:1	4	
				10.0	3:1	3	
				30.0	1:1	0	sealing leaks
	42	23 Sep 80	0.02 @ 3				redrill
		24 Sep 80		0.0	4:1	3	refusal
9+15	42	8 Oct 80	0.0 @ 4				
		16 Oct 80		1.5	4:1	5-8	10' packer
				0.0	4:1	3	
9+20	42	10 Sep 80	0.33 @ 5				
		17 Sep 80		5.5	1:1	2	sealing surface leaks
	42	23 Sep 80	0.0 @ 3				redrill
		24 Sep 80		0.0	4:1	3	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
9+30	9	10 Sep 80 17 Sep 80	0.44 @ 5	1.5	3:1	2	refused or plugged redrilled 2'-9'
	42	23 Sep 80 24 Sep 80	0.25 @ 3	3.0	4:1	3	refusal
9+35	42	8 Sep 80 16 Sep 80	0.34 @ 4	0.75	4:1	3	refusal
9+40	21	10 Sep 80 17 Sep 80	0.44 @ 4	19.0 2.0	3:1 2:1	2 2	refusal; redrill
	42	23 Sep 80 24 Sep 80	0.0 @ 3	0.0	4:1	3	refusal
9+45	42	8 Oct 80 16 Oct 80	0.2 @ 4	1.5	4:1	3	refusal
9+50	7	10 Sep 80 16 Sep 80	0.84 @ 4	8.0	1:1	0	sealing leaks; redrill
	42	23 Sep 80 24 Sep 80	0.06 @ 3	1.0	4:1	3	refusal
9+55	42	8 Oct 80 16 Oct 80	0.17 @ 4	0.0	4:1	3	refusal
9+60	42	10 Sep 80 16 Sep 80	0.44 @ 4	6.0	1:1	0	sealing surface leaks redrill
	42	23 Sep 80 24 Sep 80	0.0 @ 3	0.0	4:1	3	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
9+70	39	15 Sep 80	0.4 @ 3				3' packer
		18 Sep 80		4.0	3:1	2	refusal
	42	23 Sep 80	0.0 @ 3				
		24 Sep 80		0.0	4:1	3	refusal
9+80	42	15 Sep 80	0.02 @ 3				
		18 Sep 80		0.0	3:1	3	refusal
9+86	60	6 May 81	0.0 @ 4	0.0	4:1	4	
9+88	42	10 Sep 80	0.15 @ 4				
		18 Sep 80		0.0	3:1	4	refusal
10+30	42	12 May 81	0.2 @ 4				
		14 May 81		2.8	3:1	2	
				0.8	3:1	2	5' packer
10+36	60	6 May 81	0.3 @ 4	2.5	4:1	4	
				0.0	3:1	3	6' packer
				1.5	3:1	3	
10+40	42	4 May 81	0.3 @ 3				
		6 May 81		0.3	3:1	2	
				0.0	3:1	2	6' packer
10+45	42	12 May 81	0.0 @ 4				
		14 May 81		0.3	3:1	2	

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
10+50	42	4 May 81	0.0 @ 3				
		6 May 81		0.0	3:1	2	
10+60	42	4 May 81	0.25 @ 3				
		7 May 81		1.0	3:1	2	refusal
10+65	42	26 May 81	0.0 @ 4				
		27 May 81		2.0	3:1	2	refusal
10+70	18	4 May 81	1.0 @ 3				
				3.0	3:1	2	
				0.0	3:1	2	5' packer
	42	12 May 81	0.44 @ 4				
		14 May 81		0.0	3:1	3	5' packer
10+72.5	42	16 Jun 81	0.54 @ 4				surface leaks
		17 Jun 81		0.2	3:1	2	0-1' packer
10+75	15	26 May 81	1.0 @ 4				
		27 May 81		8.0	3:1	0	
				0.0	3:1	2	6' packer; redrill
	25	8 Jun 81	1.0 @ 4				
		9 Jun 81		12.5	3:1	2	10+70 surface leak
				3.0	2:1	2	10+65 surface leak
				5.0	1:11	2	
	42	11 Jun 81	0.0 @ 4	0.0	3:1	2-11	redrilled

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
10+77.5	30	16 Jun 81	0.92 @ 4				
		17 Jun 81		0.3	3:1	2-5	0-1' packer
				2.2	3:1	1	10+78 surface leak
				1.0	1:1	1	
10+80	42	4 May 81	0.0 @ 3				
		7 May 81		0.3	3:1	2	
				1.7	3:1	2	5' packer
10+85	42	26 May 81	0.2 @ 4				
		27 May 81		0.0	3:1	2	refusal
10+90	42	4 May 81	0.6 @ 3				
		7 May 81		7.0	3:1	2	refusal
10+92.5	42	16 Jun 81	0.62 @ 4				
		17 Jun 81		0.2	3:1	2-5	0.5'-1' packer
10+95	42	26 May 81	0.5 @ 4				
		27 May 81		4.0	3:1	2-1	sealing leaks
				5.0	1:1	2	sealing leaks
	42	8 Jun 81	0.0 @ 4				
		9 Jun 81		0.0	3:1	2-11	refusal
10+97.5	42	16 Jun 81	0.0 @ 4				
		17 Jun 81		0.0	3:1	5	refusal
11+00	42	8 Jun 81	0.5 @ 4				surface leak @ nipple
		9 Jun 81		0.3	3:1	2	3' packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
11+10	42	8 Jun 81	0.4 @ 4				
		11 Jun 81		2.0	3:1	3	
11+15	42	18 Jun 81	0.26 @ 4				
		19 Jun 81		0.3	3:1	2-3	refusal
11+20	42	8 Jun 81	0.3 @ 4				
		11 Jun 81		3.0	3:1	2	surface leaks
				3.0	1:1	1	3' & 4' packer, surface leaks
11+25	42	19 Jun 81	0.13 @ 4	0.5	3:1	2-3	refusal
11+30	42	8 Jun 81	0.25 @ 4				nipple packer
		11 Jun 81		1.0	3:1	2-3	surface leaks; 3' packer; refusal
11+40	42	8 Jun 81	0.58 @ 4				
		11 Jun 81		1.0	3:1	3	refusal
11+45	42	23 Jun 81	0.3 @ 4	2.5	3:1	2-3	surface leak; 0-1' packer; refusal
11+50	36	8 Jun 81	0.56 @ 4				
		11 Jun 81		6.5	3:1	2	surface leaks
				1.5	1:1	2	4.5' packer; refusal
	42	18 Jun 81	0.34 @ 4				
		19 Jun 81		2.0	3:1	2-3	
11+55	42	23 Jun 81	0.4 @ 4				
		23 Jun 81		1.4	3:1	2-5	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
11+60	12	8 Jun 81	1.14 @ 4				
		15 Jun 81		6.5	3:1	2-3	5' packer
	42	18 Jun 81	0.33 @ 4				
		19 Jun 81		1.5	3:1	2-3	0'-1' packer; refusal
11+65	42	23 Jun 81	0.4 @ 4	4.0	3:1	2-3	surface leak; 0'-1' packer; refusal
11+70	16	8 Jun 81	1.38 @ 4				
		15 Jun 81		8.3	3:1	2-3	refusal
	42	18 Jun 81	0.1 @ 4				
		19 Jun 81		0.2	3:1	2-3	refusal
11+75	42	22 Jun 81	0.22 @ 4				
		23 Jun 81		1.0	3:1	2-3	refusal
11+80	18	8 Jun 81	1.36 @ 4	6.0	3:1	2	nipple packer
		15 Jun 81		7.0	2:1	2-3	surface leaks
	42	18 Jun 81	0.05 @ 4				
		19 Jun 81		0.5	3:1	2-3	refusal
11+82.5	42	29 Jun 81	0.1 @ 4	0.0	3:1	2	refusal
11+85	7	23 Jun 81	1.3 @ 4	5.6	2:1	2-3	refusal
	42	25 Jun 81		4.5	3:1	3	refusal
11+87	44	10 Aug 81	0.3 @ 4	0.5	3:1	3	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
11+87.5	42	26 Jun 81	0.1 @ 4				
		29 Jun 81		0.25	3:1	2	refusal
	42	2 Jul 81	0.3 @ 4				
		7 Jul 81		0.25	3:1	5	surface leak; 6' packer; refusal
11+90	42	8 Jun 81	0.82 @ 4				surface leaks
		17 Jun 81		0.5	3:1	2-3	surface leaks; 0-1' packer
		19 Jun 81		0.0	3:1	3	5' packer; refusal
11+92.5	42	17 Jul 81	0.85 @ 4	1.0	3:1	3	loose nipple; 7' packer
11+95	42	7 Jul 81	0.0 @ 4	11.0	3:1	3	surface leaks; 3' packer
				1.0	2:1	3	refusal
11+97.5	42	17 Jul 81	0.3 @ 4	0.25	3:1	3	7' packer; refusal
12+00	12	12 May 81	1.2 @ 4				
		21 May 81		8.0	3:1	2	
				6.0	2:1	2	
				8.0	1:1	2.5	surface leaks; refusal
	42	9 Jun 81	0.88 @ 4				nipple packer
		25 Jun 81		4.5	3:1	3	3' packer; refusal
12+05	42	7 Jul 81	0.0 @ 4				
		8 Jul 81		0.5	3:1	3	3.5' packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
12+10	16	12 May 81	1.0 @ 4				
		21 May 81		6.0	3:1	2	
				12.0	2:1	2	
				10.0	1:1	2-1	sealing surface leaks; no refusal
12+15	42	7 Jul 81	0.4 @ 4				
		8 Jul 81		1.0	3:1	3	surface leaks; 4' packer
12+20	22	12 May 81	1.0 @ 4				
		21 May 81		8.0	3:1	2	
				2.0	2:1	2	refusal
	42	9 Jun 81	0.78 @ 4				nipple packer
		25 Jun 81		4.3	3:1	3	3' packer; refusal
12+22.5	42	17 Jul 81	0.7 @ 4	1.0	3:1	3	6' packer; refusal
12+25	42	7 Jul 81	0.4 @ 4				
		8 Jul 81		4.5	3:1	3	4' packer
12+27.5	42	17 Jul 81	0.4 @ 4	4.0	3:1	1	surface leaks; 10' packer
12+30	18	12 May 81	1.06 @ 4				
		21 May 81		10.0	3:1	2	
				3.5	2:1	2	refusal
	42	9 Jun 81	0.48 @ 4				nipple packer
		29 Jun 81		5.0	3:1	2	5' packer
				2.0	2:1	2	no refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
12+35	42	7 Jul 81	0.8 @ 4				
		8 Jul 81		0.5	3:1	3	4' packer; refusal
12+40	20	12 May 81	1.0 @ 4				
		22 May 81		4.5	3:1	2-1	no refusal
	42	9 Jun 81	1.02 @ 4				nipple packer
		29 Jun 81		1.0	3:1	2	loose nipple; 6' packer
12+45	42	7 Jul 81	0.5 @ 4				
		8 Jul 81		1.5	3:1	3	5', then 10' packer after surface leak
12+50	17	12 May 81	1.02 @ 4				
		22 May 81		6.0	3:1	2	
				18.0	3:1	2	refusal
	42	9 Jun 81	1.2 @ 4				nipple packer
		29 Jun 81		6.5	3:1	2	
				18.0	2:1	2	
				6.0	1:1	2	surface leak; no refusal
12+51.5	42	29 Jul 81	0.25 @ 4	0.0	3:1	3	refusal
12+52.5	42	17 Jul 81	0.5 @ 4				
		20 Jul 81		9.0	3:1	3	
				1.0	2:1	3	refusal
12+53.5	42	29 Jul 81	0.1 @ 4	0.25	3:1	3	refusal
12+55	42	7 Jul 81	0.7 @ 4				
		9 Jul 81		4.0	3:1	3	5' packer
				1.0	3:1	3	no refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
12+57.5	42	17 Jul 81	0.15 @ 4				
		21 Jul 81		3.0	3:1	3	surface leaks; no refusal; redrill
	42	22 Jul 81	0.0 @ 4	0.0	3:1	3	refusal
12+60	22	12 May 81	0.44 @ 4				
		22 May 81		0.0	3:1	2	refusal
	42	9 Jun 81	1.16 @ 4				nipple packer
				1.0	3:1	-	3' packer; poorly seated
12+61.5	42	29 Jul 81	0.4 @ 4	1.5	3:1	3	refusal
12+62.5	29	17 Jul 81	0.7 @ 4				
		21 Jul 81		3.0	3:1	3	
				2.0	1:1	3	no refusal
	42	22 Jul 81	0.1 @ 4	1.0	3:1	3	refusal
12+63.5	42	29 Jul 81	0.45 @ 4	1.0	3:1	3	refusal
12+65	42	7 Jul 81	0.45 @ 4				7' & 10' packer
		9 Jul 81		0.0	3:1	3	lost hole
12+66.5	42	29 Jul 81	0.45 @ 4	0.25	3:1	3	refusal
12+67.5	42	17 Jul 81	0.56 @ 4				
		22 Jul 81	0.01 @ 4	0.0	3:1	3	refusal
12+68.5	42	29 Jul 81	0.2 @ 4	0.25	3:1	3	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
12+68.5	42	29 Jul 81	0.2 @ 4	0.25	3:1	3	refusal
12+70	22	12 May 81	1.04 @ 4				
		22 May 81		6.0	3:1	2	refusal
	42	9 Jun 81	0.74 @ 4				nipple packer
		30 Jun 81		6.0	3:1	2	5' packer; refusal
12+71.5	42	29 Jul 81	0.1 @ 4	0.75	3:1	3	refusal
12+72.5	42	17 Jul 81	0.6 @ 4				
		21 Jul 81		10.0	3:1	3	
				12.0	2:1	3	refusal
		22 Jul 81	0.0 @ 4	0.0	3:1	3	refusal redrilled
12+73.5	42	29 Jul 81	0.15 @ 4	0.25	3:1	3	refusal
12+75	42	7 Jul 81	0.5 @ 4				
		8 Jul 81		4.0	3:1	3	5' packer; refusal
12+77.5	42	17 Jul 81	0.1 @ 4				
		21 Jul 81		0.0	3:1	3	refusal
12+80	25	12 May 81	1.0 @ 4				
		22 May 81		3.5	3:1	2	6' packer; refusal; redrill
	42	9 Jul 81	0.46 @ 4				nipple packer; redrill
	42	26 Jun 81	1.0 @ 4				
		30 Jun 81		2.0	3:1	2	10' packer; refusal, redrill
	42	6 Jul 81	N. A.				
		9 Jul 81		0.0	3:1	2	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
12+83	45.6	10 Aug 81	0.1 @ 4	0.5	3:1	3	4' packer; refusal
12+85	42	1 Jul 81 9 Jul 81	0.5 @ 4	1.5	3:1	3	5' & 10' packer; refusal
12+90	20	12 May 81 22 May 81	0.65 @ 4	5.5	3:1	2	6' packer; refusal nipple packer
	42	9 Jun 81 30 Jun 81	0.82 @ 4	1.0	3:1	2	surface leak; 10' packer
12+95	42	9 Jul 81	0.4 @ 4	1.5	3:1	3	5' packer; refusal
13+00	20	20 May 81 27 May 81	1.0 @ 4	4.5 3.5 0.0	3:1 1:1 1:1	2 2 2	 6' packer
	42	9 Jul 81 10 Jul 81	0.8 @ 4	2.0	3:1	3	surface leak; 7' packer; refusal
13+05	42	29 Jul 81 30 Jul 81	0.3 @ 4	0.5	3:1	3	refusal
13+05	42	20 Jul 81 22 Jul 81	0.5 @ 4	2.5	3:1	3	loose nipple refusal
	42	30 Jul 81	0.8 @ 4				redrilled *grouted thru 13+07.5*
13+07.5	42	29 Jul 81 30 Jul 81	0.9 @ 4	0.5	3:1	3	loose nipple 3.5' packer; refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
13+10	22	20 May 81	1.5 @ 4				
		27 May 81		3.5	3:1	2	refusal
	42	9 Jul 81	0.5 @ 4				
		10 Jul 81		3.0	3:1	3	5' packer; refusal
13+15	42	20 Jul 81	0.4 @ 4				
		21 Jul 81		2.0	3:1	3	packer - 5' & 7'; refusal
13+20	32	20 May 81	1.5 @ 4				
		28 May 81		0.5	3:1	2	loose nipple; 6' packer; refusal
	42	9 Jul 81	0.6 @ 4				
		10 Jul 81		2.0	3:1	3	5' packer
13+25	42	20 Jul 81	0.6 @ 4				
		21 Jul 81		2.0	3:1	3	surface leak; 5' packer; refusal
13+30	32	20 May 81	1.34 @ 4				
		28 May 81		4.75	3:1	2-1	surface leak
				0.5	1:1	2	no refusal
	42	9 Jul 81	0.01 @ 4				
		10 Jul 81		0.25	3:1	3	5' packer; refusal
13+35	42	20 Jul 81	0.3 @ 4				
		23 Jul 81		0.25	3:1	3	loose nipple; 5' packer; refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
13+40	22	20 May 81	1.5 @ 4				
		28 May 81		2.0	3:1	2	nipple leak; nipple & 6' packer
	42	9 Jul 81	0.5 @ 4				
		10 Jul 81		7.0	3:1	3	5' packer; refusal
13+45	42	20 Jul 81	0.3 @ 4				
		23 Jul 81		0.25	3:1	3	refusal
13+50	32	20 May 81	1.2 @ 4				casing loose
		28 May 81		10.5	3:1	2-1	6' packer
				2.0	1.5:1	1-2	
	50	4 Aug 81	0.1 @ 4	1.0	3:1	6	redrilled; surface leak; 8.5' packer; refusal
13+52.5	42	29 Jul 81	0.8 @ 4				loose nipple
		30 Jul 81		1.0	3:1	3	5' & 7' packer; refusal
13+55	22	20 Jul 81	0.25 @ 4				
		23 Jul 81		0.25	3:1	3	5' packer; refusal
13+57.5	42	29 Jul 81	0.3 @ 4				
		30 Jul 81		0.25	3:1	3	3.5' packer
13+60	15	20 May 81	1.2 @ 4				
		28 May 81		4.5	3:1	2	surface leaks; 6' packer
	22	9 Jul 81	0.1 @ 4				
		13 Jul 81		0.25	3:1	3	5' packer
	52	4 Aug 81	0.5 @ 4	0.0	3:1	8	10' packer

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
13+62.5	42	29 Jul 81	0.25 @ 4				
		30 Jul 81		0.25	3:1	3	refusal
13+65	22	20 Jul 81	0.7 @ 4				
		23 Jul 81		7.25	3:1	3	
				12.0	2:1	3	surface leak
				15.0	1:1	2	
	22	5 Aug 81	0.9 @ 4				redrilled
		10 Aug 81	0.05 @ 4				
		10 Aug 81		0.0	3:1	3	refusal
	52	19 Aug 81	0.02 @ 4				
		20 Aug 81		0.5	3:1	3	refusal
13+67.5	42	29 Jul 81	0.7 @ 4				loose nipple
		30 Jul 81		0.25	3:1	3	3.5' packer
13+70	22	20 May 81	1.1 @ 4				casing leak
		28 May 81		1.5	3:1	2	loose nipple; 6' packer
	48	4 Aug 81	0.45 @ 4	0.25	3:1	8	10' packer; refusal
	56	10 Aug 81	0.6 @ 4	10.0	3:1	8	10' packer
				6.0	2:1	8	
				1.0	1:1	8	refusal
13+75	22	20 Jul 81	0.06 @ 4				
		23 Jul 81		0.0	3:1	3	refusal
	56	19 Aug 81	0.3 @ 4	0.5	3:1	3	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
13+80	27	20 May 81	1.2 @ 4				casing leak
		28 May 81		10.5	3:1	2	loose nipple; 6' packer; refusal
	58	4 Aug 81	0.25 @ 4	0.5	3:1	8	10' packer; refusal
13+82.5	42	29 Jul 81	0.3 @ 4				
		30 Jul 81		0.5	3:1	3	refusal
13+85	22	20 Jul 81	0.3 @ 4				
		23 Jul 81		2.0	3:1	3	5' & 10' packer; refusal
13+87.5	22	29 Jul 81	0.1 @ 4				
		30 Jul 81		0.25	3:1	3	refusal
13+90	22	20 May 81	1.3 @ 4				
		29 May 81		5.25	3:1	2	surface leaks
				9.0	1:1	2-1	surface leaks
				0.0	3:1	2	6' packer; refusal
	60	3 Aug 81	0.15 @ 4				redrilled
		4 Aug 81		0.25	3:1	8	10' packer; refusal
13+92.5	22	29 Jul 81	0.15 @ 4				
		30 Jul 81		0.0	3:1	3	refusal
13+95	22	20 Jul 81	0.4 @ 4				
		23 Jul 81		3.0	3:1	3	
				1.0	2:1	3	refusal
	60	30 Sep 81	0.02 @ 4				
		1 Oct 81		1.0	3:1	7	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
13+97.5	22	30 Jul 81	0.7 @ 4	2.0	3:1	3	loose nipple; 3.5' packer; refusal
14+00	22	19 Aug 81	0.02 @ 4				
		20 Aug 81		3.75	3:1	3	
				0.50	2:1	3	
				0.0	1:1	1	refusal
	60	21 Sep 81	0.82 @ 4	9.0	3:1	3	
				12.0	2:1	3	refusal
14+05	22	1 Sep 81	0.3 @ 4				
		8 Sep 81		0.0	3:1	3	refusal
	62	30 Sep 81	0.02 @ 4				
		1 Oct 81		0.0	3:1	7	refusal
14+10	5	19 Aug 81	0.16 @ 4				
		20 Aug 81		18.75	2:1	0	
				21.0	1:1	0-1.5	
	22	26 Aug 81	0.55 @ 4	5.0	3:1	3	refusal
	62	21 Sep 81	0.45 @ 4				
		22 Sep 81		7.0	3:1	4	refusal
14+12.5	22	9 Sep 81	0.08 @ 4	0.0	3:1	3	refusal
14+15	22	1 Sep 81	0.49 @ 4				
		8 Sep 81		10.0	3:1	3	refusal
	64	30 Sep 81	0.0 @ 4				
		1 Oct 81		0.0	3:1	7	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
14+17.5	22	9 Sep 81	0.01 @ 4	0.0	3:1	3	refusal
14+20	6	19 Aug 81	1.2 @ 4				
		24 Aug 81		4.0	3:1	0	surface leak
				9.0	2:1	0	
				6.0	1:1	0	
	22	25 Aug 81	0.55 @ 4	7.0	3:1	3	surface leak
		26 Aug 81		1.0	1:1	1	
	64	21 Sep 81	1.08 @ 4				
		22 Sep 81		19.0	3:1	4	
				5.0	2:1	4	refusal
14+25	22	1 Sep 81	0.19 @ 4				
		8 Sep 81		0.0	3:1	3	refusal
	66	30 Sep 81	0.19 @ 4				
		1 Oct 81		4.0	3:1	7	8' packer; refusal
14+30	6	19 Aug 81	1.2 @ 4				
		24 Aug 81		3.0	2:1	0	surface leak
				6.0	1:1	0	
	22	26 Aug 81	0.55 @ 4	3.0	3:1	2-3	4' packer; refusal
	66	18 Sep 81	0.48 @ 4				
		22 Sep 81		0.0	3:1	4	refusal
14+35	22	1 Sep 81	0.21 @ 4				
		8 Sep 81		3.0	3:1	3	refusal
	68	30 Sep 81	0.24 @ 4				
		1 Oct 81		1.0	3:1	7	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
14+40	11	19 Aug 81	1.2 @ 4				
		24 Aug 81		4.0	3:1	3	surface leak
				3.0	2:1	3	
	22	26 Aug 81	0.85 @ 4	16.0	3:1	3	4' packer; refusal
	25	21 Sep 81	1.35 @ 4				
		22 Sep 81		1.0	3:1	4	
	68	24 Sep 81	0.05 @ 4				
		1 Oct 81		0.0	3:1	7	refusal
14+45	22	1 Sep 81	0.7 @ 4				
		8 Sep 81		12.0	3:1	3	4' packer
				1.0	1:1	2	
				0.0	2:1	2	5' packer; refusal
	71	30 Sep 81	0.05 @ 4				
		1 Oct 81		0.0	3:1	7	refusal
14+50	13	19 Aug 81	1.13 @ 4				
		24 Aug 81		7.0	2:1	0	surface leak
	22	26 Aug 81	0.7 @ 4				3.5' packer
		27 Aug 81		1.0	3:1	3	refusal
	55	21 Sep 81	1.17 @ 4				
		22 Sep 81		7.0	3:1	0	
				9.0	2:1	0	
				20.0	1:1	4	refusal
	71	24 Sep 81	0.0 @ 4				
		1 Oct 81		0.0	3:1	7	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
14+55	22	1 Sep 81	0.14 @ 4				
		8 Sep 81		0.0	3:1	3	refusal
	73	30 Sep 81	0.19 @ 4				
		1 Oct 81		3.0	3:1	7	refusal
14+60	8	19 Aug 81	1.16 @ 4				
		24 Aug 81		13.0	2:1	0	surface leak
				2.0	1:1	0	surface leak
	22	26 Aug 81	0.8 @ 4				
		27 Aug 81		4.0	3:1	0-3	3.5' packer
				2.0	2:1	2	
				6.0	1:1	2	refusal
	73	17 Sep 81	0.15 @ 4	1.0	3:1	3	refusal
14+65	22	1 Sep 81	0.18 @ 4				4' packer
		8 Sep 81		4.0	3:1	3	refusal
	75	30 Sep 81	0.24 @ 4				
		1 Oct 81		0.0	3:1	7	refusal
14+70	8	19 Aug 81	1.2 @ 4				
		24 Aug 81		18.0	2:1	3	refusal
	22	26 Aug 81	0.45 @ 4				
		27 Aug 81		1.0	2:1	3	refusal
	75	17 Sep 81	0.29 @ 4				
		23 Sep 81		2.0	3:1	5	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
14+75	22	1 Sep 81	0.06 @ 4				
		8 Sep 81		0.0	3:1	3	refusal
	77	30 Sep 81	0.25 @ 4				
		1 Oct 81		1.0	3:1	7	refusal
14+80	22	19 Aug 81	0.94 @ 4				
		24 Aug 81		4.0	2:1	1	surface leak
				4.0	1:1	2	
	35	21 Sep 81	1.2 @ 4				
		23 Sep 81		5.0	3:1	5	refusal
	77	24 Sep 81	0.11 @ 4				
		2 Oct 81		0.5	3:1	5	refusal
14+82.5	22	10 Sep 81	0.17 @ 4	0.5	3:1	3	refusal
14+85	22	1 Sep 81	0.47 @ 4				
		8 Sep 81		7.0	3:1	3	
				1.0	2:1	2	refusal
	79	30 Sep 81	0.28 @ 4				
		2 Oct 81		0.5	3:1	5	refusal
14+86.8	22	14 Sep 81	0.04 @ 4	0.0	3:1	3	refusal
14+87.5	22	10 Sep 81	0.1 @ 4	9.0	3:1	3	
				3.0	2:1	3	refusal
14+88.6	22	14 Sep 81	0.54 @ 4	1.0	3:1	3	4' & 5' packer; refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
14+90	10	24 Aug 81		4.0	2:1	3	nipple leak
				4.0	1:1	2	nipple leak; refusal; redrill
	22	26 Aug 81	0.07 @ 4				
		27 Aug 81		0.0	3:1	3	refusal
	81	21 Sep 81	0.92 @ 4				
		23 Sep 81		5.0	3:1	5	refusal
14+92.5	80	7 Oct 81	0.3 @ 4	2.4	3:1	7	refusal
14+95	22	1 Sep 81	0.42 @ 4				
		9 Sep 81		0.0	3:1	3	refusal
	64	30 Sep 81	1.4 @ 4				
		2 Oct 81		11.0	3:1	5	
				21.0	2:1	5	
				10.0	1:1	6	refusal
	80	5 Oct 81	0.11 @ 4	0.0	3:1	7	refusal
14+97.5	80	7 Oct 81	0.52 @ 4	2.5	3:1	7	refusal
15+00	22	13 Aug 81	1.0 @ 4	6.0	3:1	3	
				10.0	1:1	0	surface leaks
	81	21 Sep 81	0.27 @ 4				
		23 Sep 81		4.0	3:1	5	refusal
15+05	22	31 Aug 81	0.4 @ 4				
		9 Sep 81		1.0	3:1	3	refusal
	80	7 Oct 81	0.03 @ 4	0.0	3:1	5	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
15+10	22	13 Aug 81	0.9 @ 4	2.0	3:1	3	
	22	19 Aug 81	0.02 @ 4	0.1	3:1	3	refusal
	43	30 Sep 81	1.36 @ 4				
		2 Oct 81		4.0	2:1	7	refusal
	80	5 Oct 81	0.44 @ 4	3.0	3:1	7	refusal
15+15	22	31 Aug 81	0.3 @ 4				
		9 Sep 81		0.0	3:1	3	refusal
	80	7 Oct 81	0.34 @ 4	2.0	3:1	6	refusal
15+20	22	13 Aug 81	1.1 @ 4	8.0	3:1	0	
				6.0	2:1	0-2	
				11.0	1:1	2	surface leaks
15+25	22	31 Aug 81	0.49 @ 4				
		9 Sep 81		3.0	3:1	3	refusal
15+30	7	13 Aug 81	1.2 @ 4	6.0	3:1	3	surface leaks
	22	19 Aug 81	0.86 @ 4	6.0	3:1	3	
				1.0	3:1	3	4' packer; refusal
15+35	22	31 Aug 81	0.4 @ 4				
		9 Sep 81		1.0	3:1	3	refusal
15+40	22	13 Aug 81	1.2 @ 4	7.0	2:1	3	loose nipple
				0.5	1:1	3	4' packer; refusal
15+42.5	22	14 Sep 81	0.14 @ 4	0.0	3:1	3	refusal

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
15+45	22	31 Aug 81 9 Sep 81	0.7 @ 4	9.0	3:1	3	refusal
15+47.5	22	14 Sep 81	0.53 @ 4	3.0 2.0	3:1 2:1	3 2	4' & 7' packer; refusal
15+50	22	13 Aug 81 14 Aug 81	1.2 @ 4	5.5	3:1	3	loose nipple; 3.5' packer; refusal
15+52.5	22	14 Sep 81	0.09 @ 4	0.0	3:1	3	refusal
15+55	22	31 Aug 81 10 Sep 81	1.1 @ 4	16.0 13.0	3:1 2:1	3 3	refusal
15+56.8	22	21 Sep 81	0.05 @ 4	0.0	3:1	3	refusal
15+57.5	22	14 Sep 81	0.68 @ 4	6.0 3.0	3:1 2:1	3 3	refusal
15+58.4	22	21 Sep 81	0.05 @ 4	0.0	3:1	3	refusal
15+60	5	13 Aug 81 19 Aug 81 20 Aug 81 24 Aug 81	1.2 @ 4 0.6 @ 4	1.5 6.0 2.0 1.0	3:1 1:1 3:1 2:1	3 0 0 0	3.5' packer surface leaks

TABLE 3 (Continued)

Hole No.	Stage Depth (ft.)	Date of Operation	Pressure Test (cfs @ psi)	Grout Take (c.f.)	Grout Mix Water-Cement (ratio)	Injection Pressure (psi)	Remarks
15+60, 4'DS	24.5	8 Oct 81	0.12 @ 4		1.1		grout check; backfill
15+65	22	31 Aug 81 10 Sep 81	0.3 @ 4	1.0	3:1	3	refusal
15+70	22	13 Aug 81 14 Aug 81	1.1 @ 4	6.5 3.0	3:1 2:1	3 3	loose nipple; 3.5' packer no refusal
15+75	22	31 Aug 81 10 Sep 81	0.14 @ 4	0.0	3:1	3	refusal
15+80	22	13 Aug 81 14 Aug 81	1.2 @ 4	5.0 0.5	3:1 2:1	3 3	refusal

TABLE NO. 4

SEQUENCE OF CONSTRUCTION

Date	Description of Occurrence
9 May 79	Started clearing retreat channel.
21 May 79	Started excavation in outlet channel.
4 Jun 79	Started excavation for tower tie-in.
8 Jun 79	Started building haul road from upstream stockpile.
5 Jul 79	Started placing sand backfill along conduit.
5 Jul 79	Started stripping for permanent cofferdam foundation.
17 Jul 79	Placed first concrete paving downstream of stilling basin.
21 Jul 79	Started drilling operations, pre-split spillway.
26 Jul 79	Flood - Elevation 493.2.
1 Aug 79	Started work on North Access Road.
10 Aug 79	Completed impervious on left side of tower to Elev. 490.
22 Aug 79	Mott started moving equipment on job to grout riprap.
26 Aug 79	Started stripping valley bottom between tower and river.
30 Aug 79	Flood - Elevation 483.
7 Sep 79	Placed impervious on right side of tower to Elev. 481.
12 Sep 79	Constructed upstream diversion cofferdam.
13 Sep 79	Diverted river.
14 Sep 79	Flood - Elevation 501.
21 Sep 79	Flood - Elevation 498.7.
26 Sep 79	Installed log boom.
27 Sep 79	Flood - Elevation 490.7.

TABLE NO. 4 (Cont.)

Date	Description of Occurrence
10 Oct 79	Flood - Elevation 491.
17 Oct 79	Started stripping Stage II cofferdam foundation.
23 Oct 79	Started hauling R.R. fill to Stage I cofferdam.
29 Oct 79	Started haualing R.R. fill to Stage II cofferdam.
2 Nov 79	Flood - Elevation 492.6.
11 Nov 79	Flood - Elevation 497.7.
18 Dec 79	Completed permanent cofferdam to Elev. 555.
10 Jan 80	Installed movement monuments on upstream face of permanent cofferdam.
16 Jan 80	Started excavation in core trench, old diversion cofferdam.
14 Feb 80	Started piezometer installation.
3 Mar 80	Started pre-split drilling in core trench.
4 Apr 80	Federal Court ordered suspension of work.
15 Jul 80	Suspension lifted.
18 Jul 80	Started cleaning mud out of core trench and resumed excavating rock in core trench.
31 Jul 80	Started blanket fill downstream diversion cofferdam.
2 Sep 80	Started drilling for grout curtain.
8 Sep 80	Started rockfill in old river channel between core trench and diversion cofferdam.
19 Sep 80	Started grouting.
22 Sep 80	Completed fill in old river channel to Elev. 480.
19 Nov 80	Started final excavation in core trench to top of grout curtain.
6 Dec 80	Placed first lift of impervious in core trench.
15 Dec 80	Placed random material in core trench to seal for winter.

TABLE 4 (Cont.)

Date	Description of Occurrence
16 Mar 81	Contractor resumed work.
31 Mar 81	Started removing random material in core trench.
2 Apr 81	Started 3-foot horizontal blanket on 480 fill.
14 Apr 81	Resumed placing impervious in core trench.
19 Jun 82	Completed impervious to Elev. 480.
24 Jun 81	Started 10 on 1 inclined drain, Elev. 483.
23 Jun 81	Installed toe drain system.
5 Oct 81	Completed embankment to Elev. 555.
8 Oct 81	Completed drilling and grouting.
5 Nov 81	Started placing riprap on upstream face of dam.
9 Nov 81	Started hauling from left abutment, South Connector Road.
17 Dec 81	Shutdown for winter.
2 Mar 82	Contractor resumed work.
5 May 82	Completed embankment to Elev. 592.
3 Jun 82	Completed core trench excavation on right abutment.
22 Jun 82	Completed core trench excavation on left abutment.
24 Jun 82	Started service bridge piers.
25 Jun 82	Completed embankment to Elev. 621.
16 Jul 82	Placed concrete control sill.
13 Aug 82	Started electrical work.
23 Aug 82	Completed service bridge piers.
3 Sep 82	Started placing structural steel beams.
22 Sep 82	Completed structural steel beams.

TABLE NO. 4 (Cont.)

Date	Description of Occurrence
27 Sep 82	Completed service bridge abutment.
25 Oct 82	Poured service bridge slab.
10 Nov 82	Dewatered and cleaned stilling basin.
2 Dec 82	Painted service bridge structural steel.
9 Dec 82	Completed riprap on upstream face of dam.
4 Jan 83	Substantial contract completion & impoundment date.

TABLE NO. 5

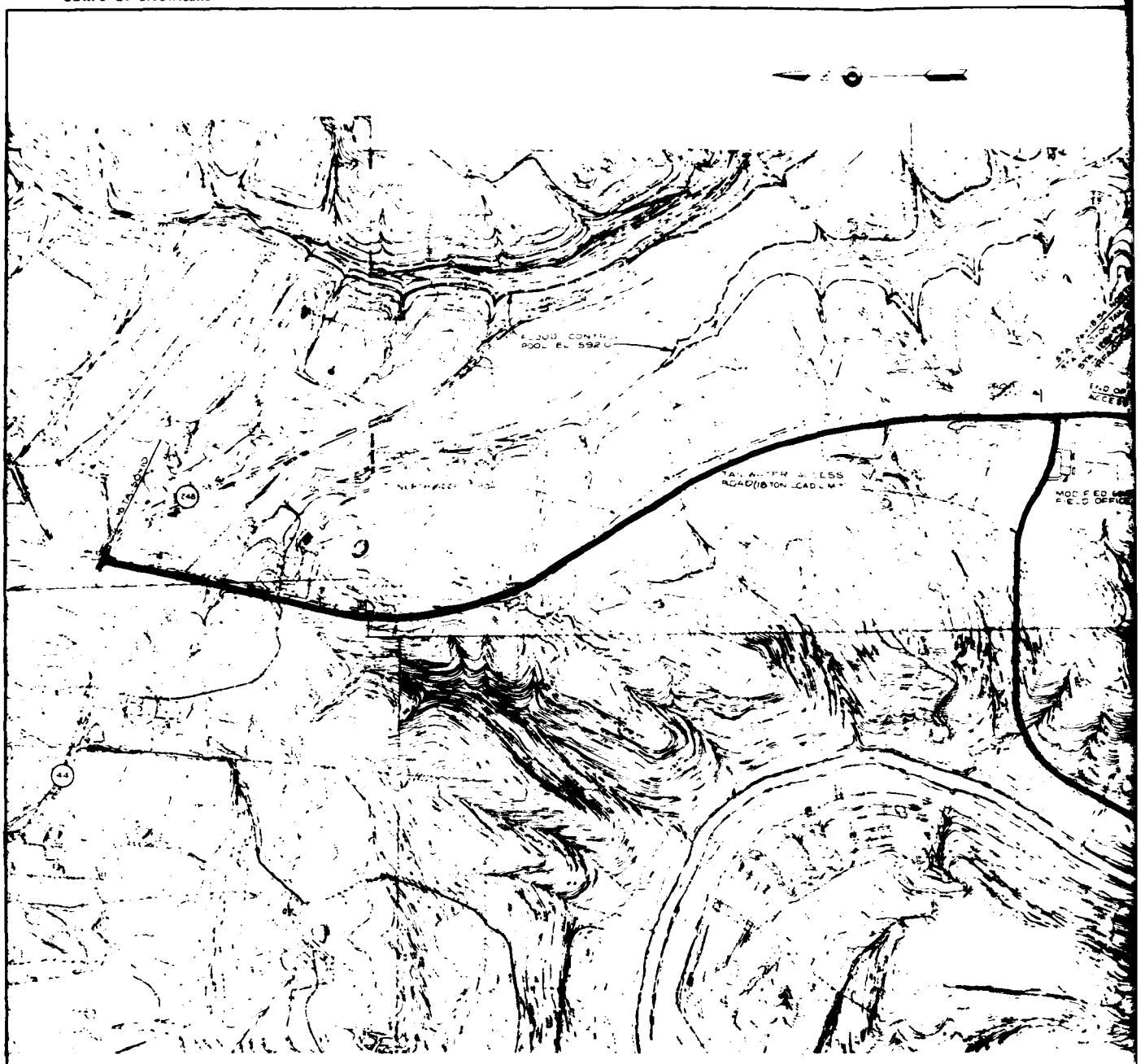
ESTIMATED AND FINAL QUANTITIES
RELATIVE TO FOUNDATION WORK

Bid Item No.	Description	Unit	Orig. Est. Constr Qty	Final Qty
3	Excavation Channel	CY	111,600	121,800
4	Excavation Dam Foundation	CY	230,700	287,491
5	Excavation Spillway & Roadway (Rt. Abutment)	CY	1,988,000	1,728,875
6	Excavation, Roadway (Lt. Abutment	CY	143,200	153,607
7a	Preparation & Cleaning of Dam Foundation - Concrete	CY	30	29
8	Drilling & Pressure Grouting			
	a. Drilling grout holes	LF	11,600	14,237.50
	b. Drilling exploratory holes in rock	LF	500	315.8
	c. Portland cement in pressure grout	CF	2,520	2,057
	d. Mineral filler in pressure grout	CF	170	0
	e. Sand in pressure grout	CF	920	0
	f. Placing neat cement grout	CF	4,090	5,457.5
	g. Placing mortar grout	CF	2,720	0
	h. Connection to grout hole	Ea	860	575
	i. Pressure washing	Hr	30	1.75
101	Overburden Drilling for Instrumentation	LF	260	167
102	Bedrock Drilling for Instrumentation	LF	520	534

TABLE NO. 6

MODIFICATIONS RELATIVE
TO FOUNDATIONS

P00015	Addition and Deletion of Materials for Dam Embankment
P00021	Control Spring, Dam Foundation
CASE 113	Lower Grade in Core Trench, Right Abutment



THE NORTH AUDUBON ROAD AND TAILWATER ACCESS ROAD WERE CONSTRUCTED WITH A NUMBER 3 STABILIZED BASE COURSE OVER A PREVIOUS CONTRACT WORK. UNDER THIS CONTRACT WILL REQUIRE THE RESHAPING OF THESE ROADS AND SURFACING WITH A 3" DOUBLE ASPHALTIC BITUMINOUS SURFACE COURSE OF TYPE I AGGREGATES AND BITUMINOUS MATERIALS. DETAILS FOR THIS WORK ARE SHOWN ON SHEET TL-60-2 W102.

400 0 400 800
GRAPHIC SCALE

BENCH MARKS

TBM OL-3-71 BRASS ROD WITH USCE DISK STAMPED "OL-3-71" LOCATED APPROX 300' RT AT STA 24+400 "A" LAKEWATER ACCESS ROAD AT THE LANDWARD BASE OF A 60" TRIPLE SYCAMORE EL 481.67

TBM 0+00 @ DAM AXIS CONCRETE MONUMENT WITH USCE DISK IN TOP EL 717.41 (LOCATION SHOWN ON THIS SHEET AND ALSO ON SHEET 5)

TBM 80+26.48 @ DAM AXIS CONCRETE MONUMENT WITH USCE DISK IN TOP EL 671.77 (LOCATION SHOWN ON THIS SHEET AND ALSO ON SHEET 5)

LEGEND

- ROADS CONSTRUCTED IN NATIONAL
- ROADS TO BE CONSTRUCTED THIS C
- WORK LIMITS
- LOCATION OF TBM
- RIGHT OF WAY

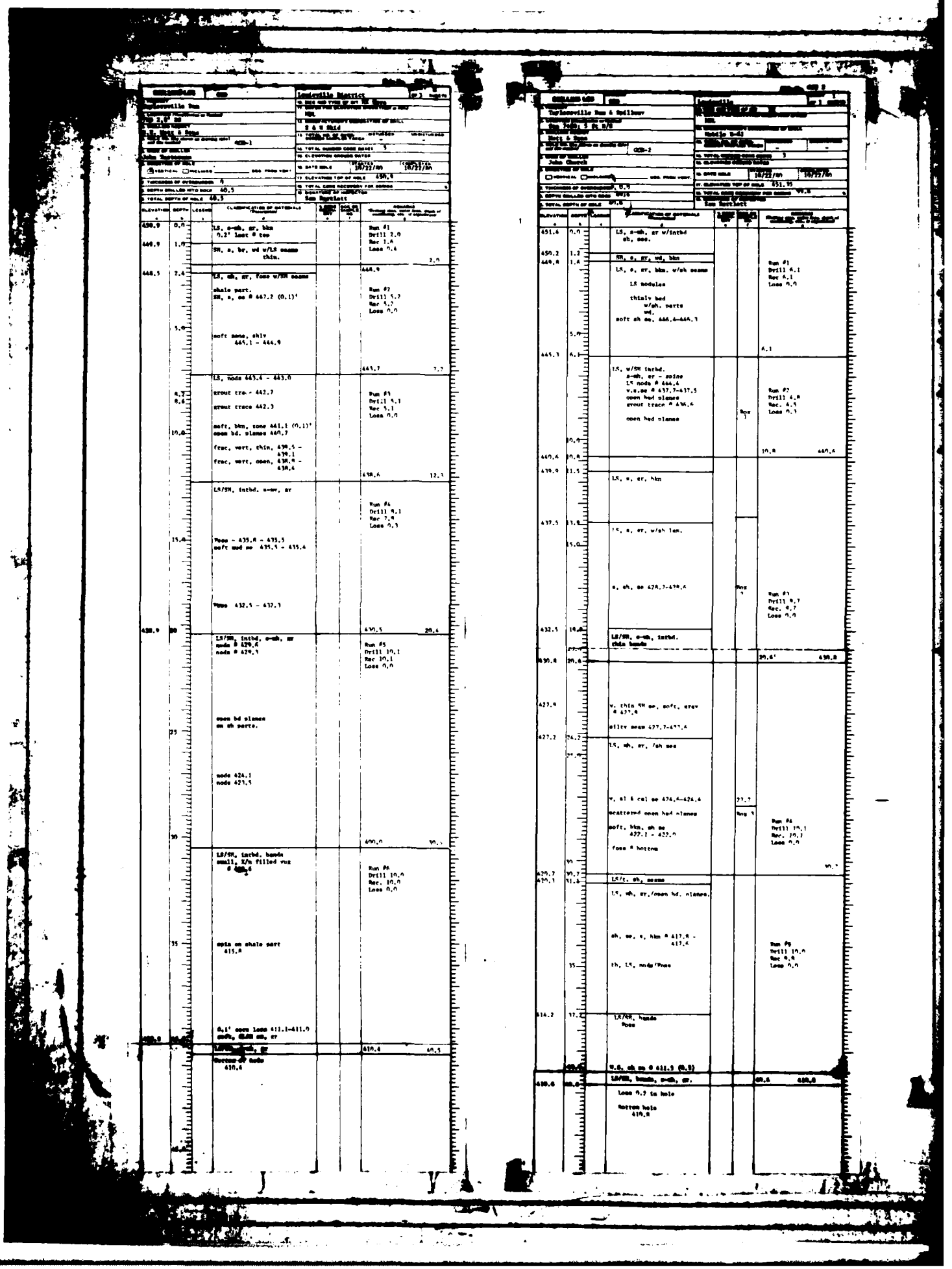
U. S. ARMY

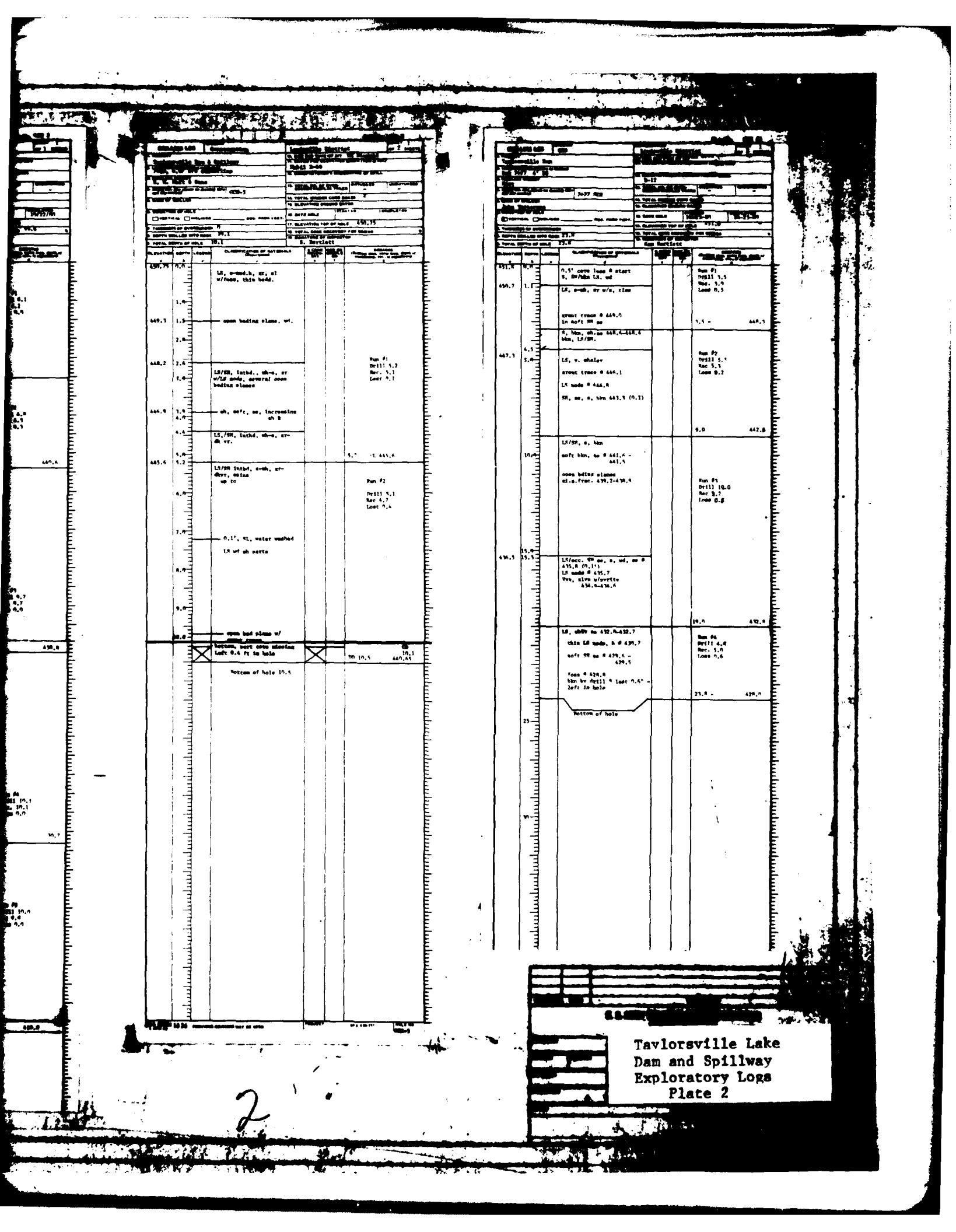
GRAPHIC SCALE

LEGEND

- ROADS CONSTRUCTED IN INITIAL CONTRACT PRIOR TO OUTLET WORKS
- ROADS TO BE CONSTRUCTED THIS CONTRACT
- WORK LIMITS
- LOCATION OF TBM
- RIGHT OF WAY

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE CORPS OF ENGINEERS LOUISVILLE, KENTUCKY	
DESIGNED JP	TAYLORSVILLE LAKE SALT RIVER, KENTUCKY DAM AND SPILLWAY GENERAL PLAN
DRAWN FJD	
CHECKED MC	
SUBMITTED	
SCALE 1:400	DATE
	DRAWING NUMBER PLATE NO. 1





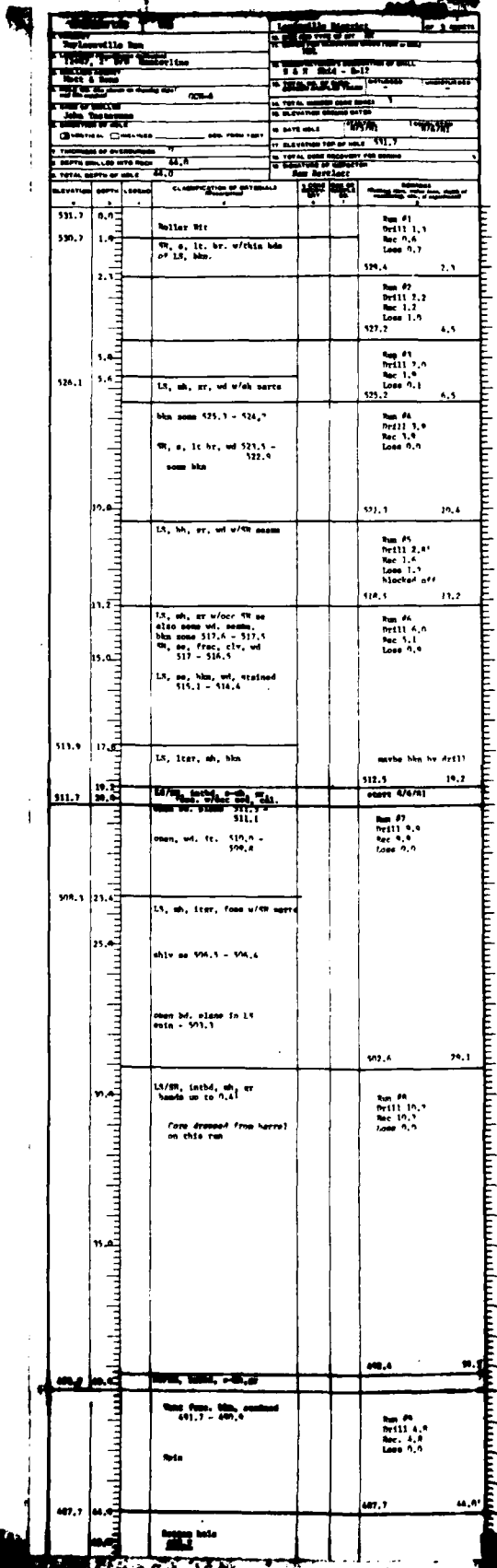
Taylorsville Lake
Dam and Spillway
Exploratory Logs
Plate 2

DRILLING LOG — Division: ORD — Installation: Louisville District — of 5 sheets

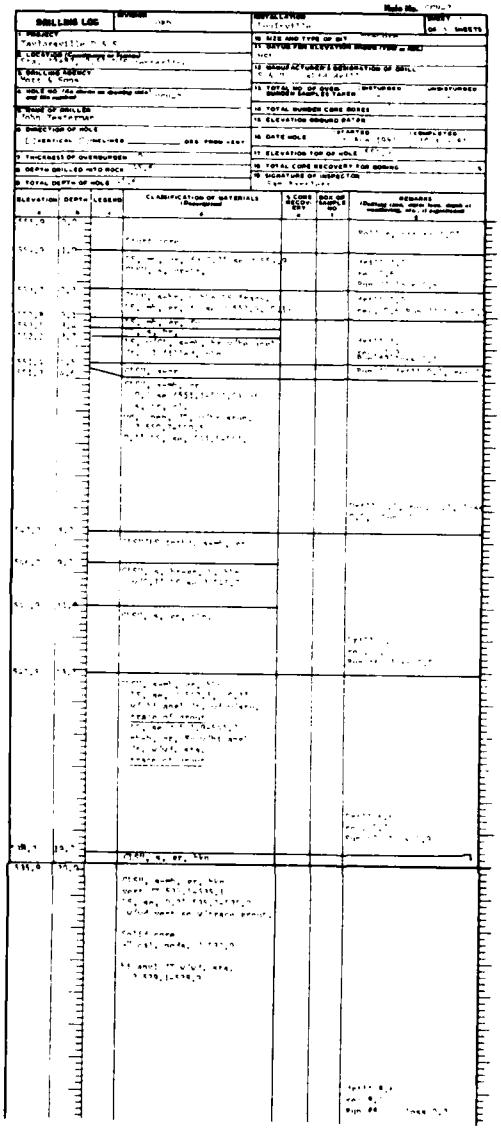
1. Project: Taylorsville Dam
2. Location: 1464.5, 3 ft W/S of centerline
3. Drilling agency: Hall & Sons
4. Hole no.: GCN-5
5. Name of driller: Church
6. Direction of hole: ☐ Vertical ☐ Inclined ____ deg. from vert.
7. Thickness of overburden: 0
8. Depth drilled into rock: 87.55
9. Total depth of hole: 87.55

10. Size and type of bit:
11. Datum for elevation shown (TBM or MSL):
12. Manufacturer's designation of drill:
13. Total no. of over-burden samples taken: Disturbed / Undisturbed
14. Total number core boxes: 7
15. Elevation ground water:
16. Date hole: Started 7 April 1981; Completed 9 April 1981
17. Elevation top of hole: 621.5
18. Total core recovery for boring: %
19. Signature of inspector: Sam Bartlett

Elevation (a)	Depth (b)	Legend (c)	Classification of materials (Description) (d)	% Core recovery (e)	Box or sample no. (f)	Remarks (g)
621.5	0.0		LS, s-mh, gr, bkn			Run No. 1, Loss 0.2; Drill 1.0, Rec 0.8
	0.8		LS, s-mh, gr, bkn, silty			620.5; Run #2; Drill 2.7; Rec 2.7; Loss 0.0
618.6	2.9		LS, mh, ltgr w/foss; hi angl. frac. 619.2-618.9			617.8
	3.7		LS w/vert frac 617.3-617.2; silty seam 616.2-616.1			Run #3; Drill 2.3; Rec 2.1; Loss 0.2
	5.0					615.5
614.2	7.0 / 7.3		LS, s-mh, gr w/soft seams; soft seam 613.3-613.0			Run #4; Drill 3.2; Rec 1.4; Loss 0.0; 612.3 9.2
	9.2		vert frac open 612.2-611.9			
	10.0		LS, mh, gr; hard LS. ss, 610-609.7; silty seam, 609.0-608.1; High angle vert frac 608.0-606.2			Run #5; Drill 10.0; Rec 9.8; Loss 0.2
	15.0		silty LS w/small Sh ps 605.5-605.2; foss - 604.5			
604.0	17.5		LS, s, bkn, w/foss; LS, shlyss 602.9-602.0			602.3 19.2
	19.2					
601.3	20.0		spin @ 602.2			
601.5	20					
600.0	20.4		LS, s-mh, gr, bkn; hi angl. frac. 600.4-600.0			
599.0	22.5		LS/SH intbd, ltgr, mh w/foss			Run #6; Drill 9.9; Rec 9.9; Loss 0.0
	25					
595.2	26.3		LS, mv, ltgr, w/foss			
	29.1		vert, open, frac 592.0-591.6			592.4 29
	30		s, shly, ss 591.6-591.5			Run #7; Drill 3.8; Rec 3.7; Loss 0.1
588.9	32.6		LS, mh, ltgr, w/SS, thinly bd			588.6 32.9
	32.9		LS			
588.2	33.3		LS, hd, ltgr, w/foss, bkn			Run #8; Drill 6.4; Rec 6.3; Loss 0.1
	35		bkn sh parts @ 586.4			
			hi angl frac in cal zone 583.9-583.1			
	39.3					582.2 39.3
581.5	40		spin			
			LS, mh-h, ltgr, bkn; hi, angl, frac 580.6-580.3			
			hi angl frac, open 579.1-578.7			
			spin			
577.1	44.4		LS, mh-h, ltgr, frac, open 577.1-576.8			
	45					
575.1	46.4		LS, mh-h, ltgr w/foss; hi angl frac, open 573.7-573.4			572.2 49.3
	49.3		LS, mh-h, ltgr w/foss			
	50					
	51.6		spin @ silty plane; hi angl frac 568.8-568.3; foss @ 567.8; spin on silty plane			Run #10; Drill 10.0; Rec 10.0; Loss 0.0
	55					
	59.3		soft, ss, bkn w/spin 562.5-562.3			562.2 59.3
561.5	60		LS, mh-h, ltgr, w/foss; thinly bd.; spin; sent, hi angle frac healed 558.0-557.7; foss zone 557.4-557.5			Run #11; Drill 5.8; Rec 5.4; Loss 0.4; 556.4 65.1
	65		0.3' core loss/soft 555.9-555.6; LS nods @ 555.5; high cal content			Run #12; Drill 10.9; Rec 10.7; Loss 0.2
	70		thin bd. LS			
			LS nods 547.9-547.2			
	75		slick @ 546.6-546.5; 0.2' core loss @ 546.5 546.3			545.5 76
	76.0		LS, mh-h, ltgr, thin bd			
541.5	80		spin @ 541.6			
			hi angle frac, open 541.2-540.9; spin; spin @ sh part; foss			Run #13; Drill 10.8; Rec 10.8; Loss 0.0
	85					
534.7	86.8		bottom hole			534.7 86.8

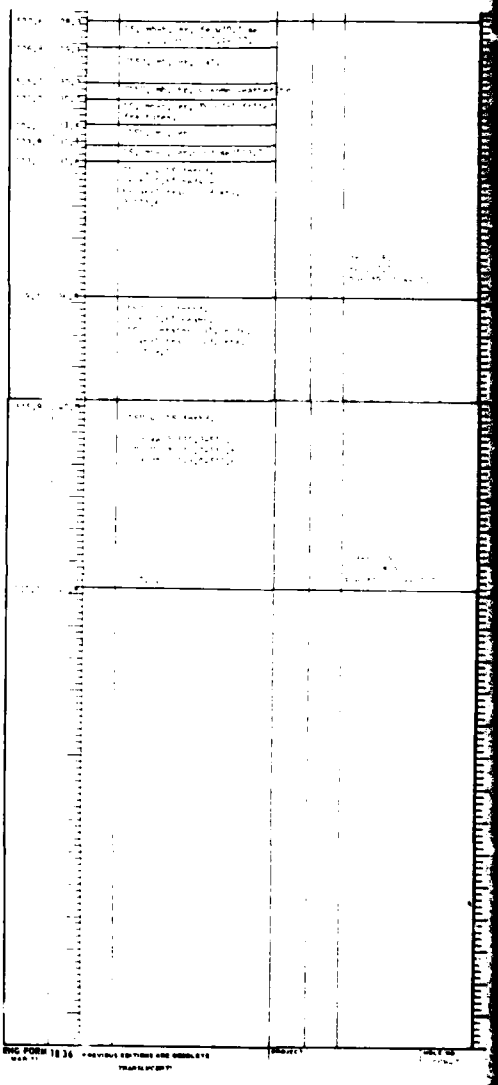


Taylorsville Lake
Dam and Spillway
Exploratory Logs
Plate 3

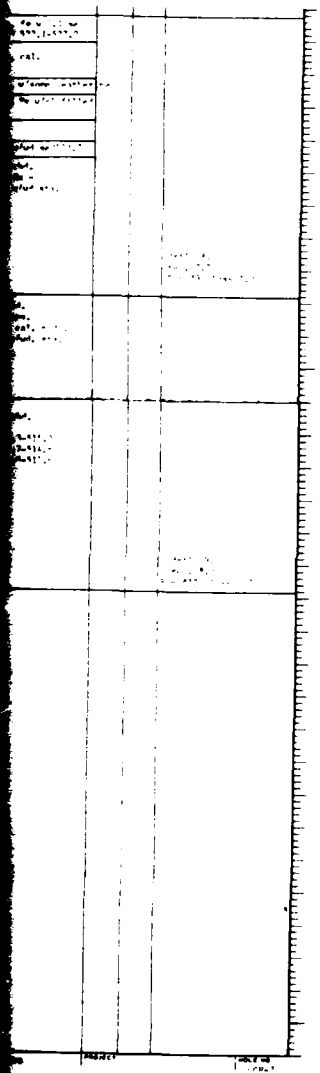


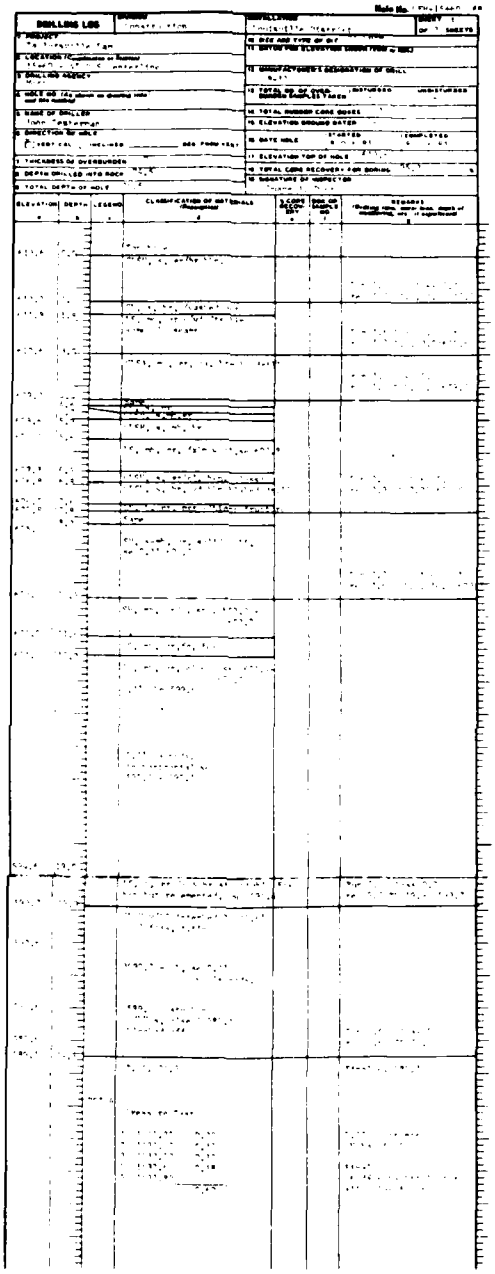
DRILLING LOG

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOV'D	NO. OF BLOWS PER 6"	REMARKS (Drilling time, depth from start of weathering, etc., if significant)



U. S. ARMY





REVISION	DATE	DESCRIPTION	BY	APP'D

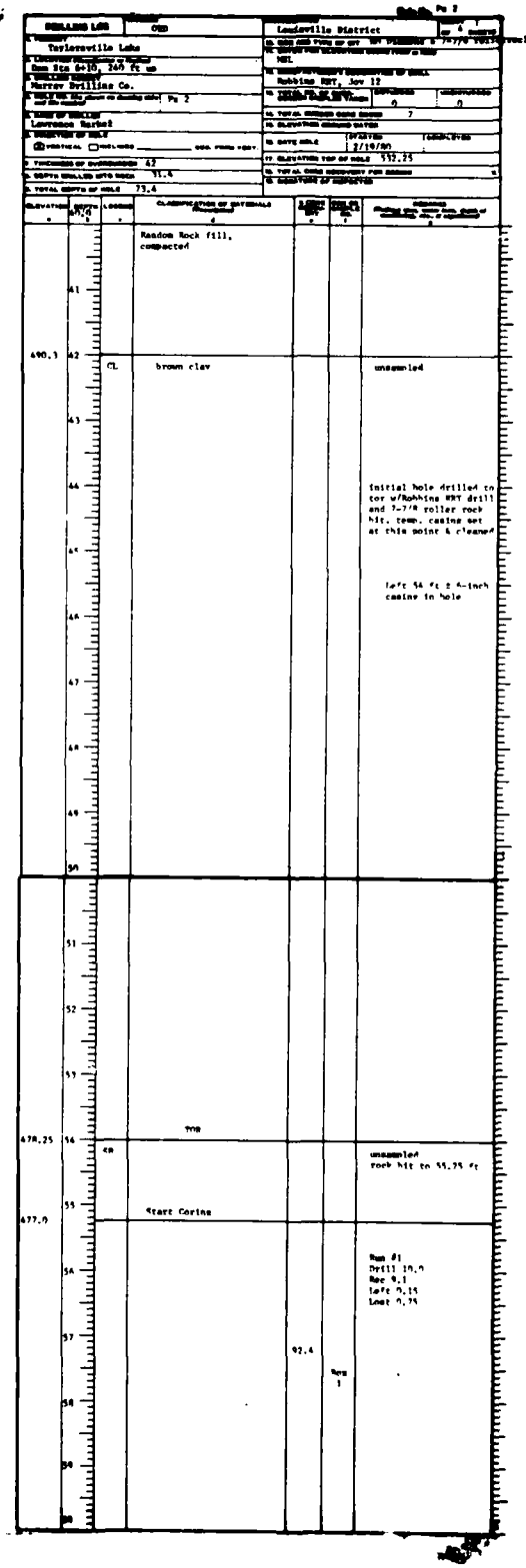
U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

DESIGNED
DRAWN | TRACED
CHECKED
QUANTITIES
SCALE

Taylorsville Lake Dam and Spillway Exploratory Logs Plate 4

DRAWING NUMBER

1 2

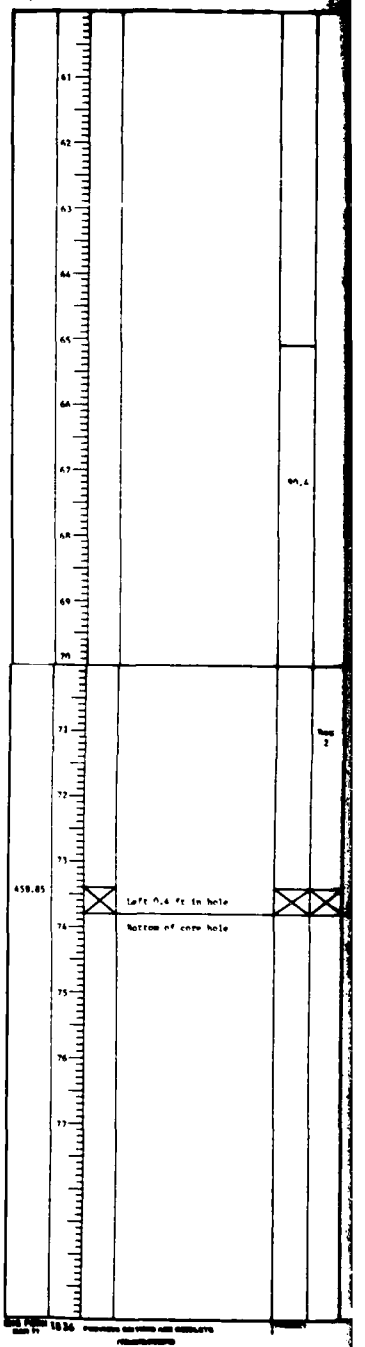


DRILLING LOG — CWO

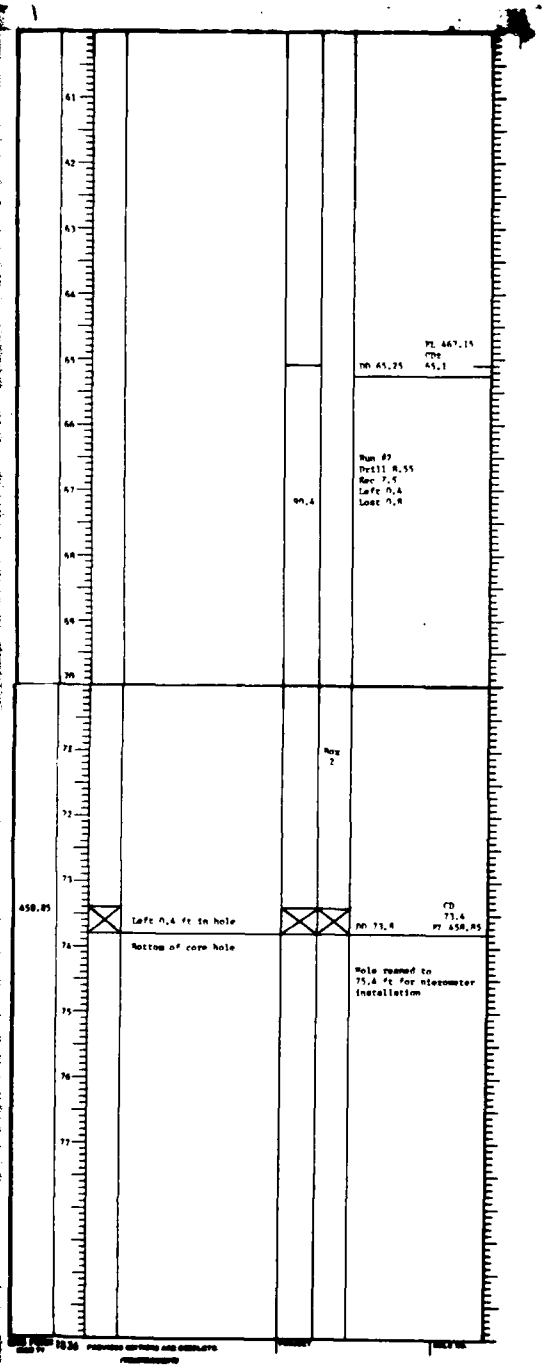
Louisville District

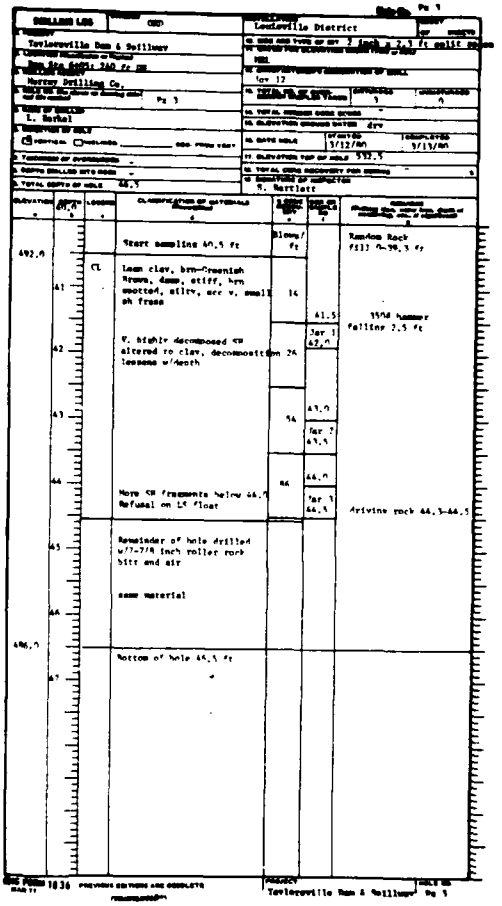
1. PROJECT: Taylorsville Lake
2. LOCATION (Coordinates or Station): Dam Sta 0+10, 260 ft up
3. DRILLING AGENCY: Mercer Drilling Co.
4. HOLE NO. (As shown on drawing title) and sheet number: Pg 2
5. NAME OF DRILLER: Lawrence Barbel
6. DIRECTION OF HOLE: (X) VERTICAL ( ) INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 42
8. DEPTH DRILLED INTO ROCK: 31.4
9. TOTAL DEPTH OF HOLE: 73.4
10. DATE AND TYPE OF BIT: NXT Pilotbit & 7-7/8" roller bit
11. DIRECTION OF HOLE: NSL
12. MANUFACTURER'S DESIGNATION OF DRILL: Robbins RRT, Jov 12
13. TOTAL CORE RECOVERY FOR BORING: DISTURBED 0, UNDISTURBED 0
14. TOTAL CORED ROCK BORED: 7
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 2/19/80, COMPLETED
17. ELEVATION TOP OF HOLE: 532.25
18. TOTAL CORE RECOVERY FOR BORING:
19. SIGNATURE OF INSPECTOR:

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE RECOVERY	CORE SIZE	REMARKS
	41		Random Rock fill, compacted			
490.3	42	CL	brown clay			unsampled
	43					
	44					Initial hole drilled to cor w/Robbins RRT drill and 7-7/8 roller rock bit, temp. casing set at this point & cleaned
	45					
	46					Left 54 ft 2 4-inch casing in hole
	47					
	48					
	49					
	50					
	51					
	52					
	53					
478.25	54	CH	TPR			unsampled
477.0	55		Start Coring			rock hit to 55.35 ft
	56					
	57			92.4	NQ3	Run #1 Drill 10.0 Rec 9.1 Left 0.15 Lost 0.75
	58					
	59					
	60					



	61					
	62					
	63					
	64					
	65					
	66					
	67					99.4
	68					
	69					
	70					
	71					
	72					
	73					
458.85	74		Left 0.4 ft in hole Bottom of core hole			
	75					
	76					
	77					

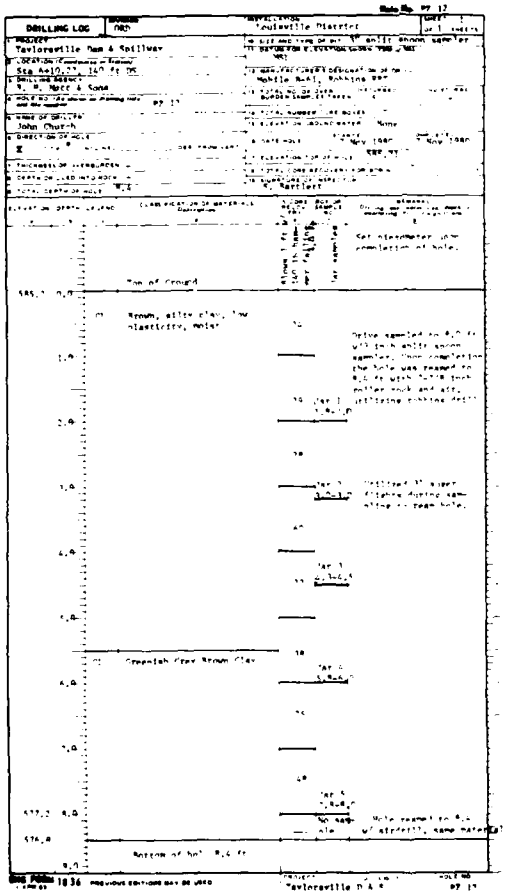




U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS

Taylorsville Lake
Dam and Spillway
Piezometer Logs
Plate 5

2



DRILLING LOG

Taylorsville Dam & Spillway

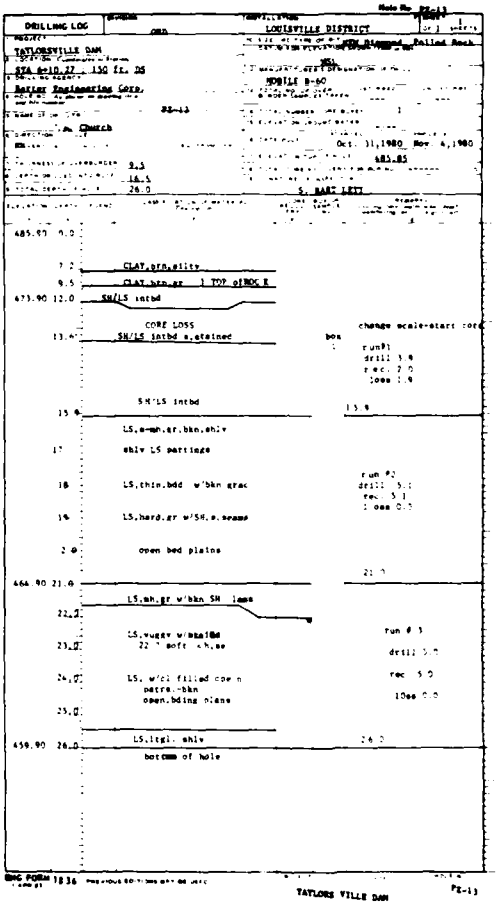
Louisville District

Run of Ground

Brown, silty clay, low plasticity, moist

Greenish Gray Brown Clay

Bottom of hol



DRILLING LOG

LOUISVILLE DISTRICT

TAYLORSVILLE DAM

Better Engineering Corp.

MOBILE B-60

John Church

Oct. 31,1980 Nov. 4,1980

485.85

S. HART LETT

CLAY,grn,silty

CLAY,brn,gr

SH/LS intbd

CORE LOSS

SH/LS intbd a.stained

SH/LS intbd

LS,a-mn,gr,bkn,shlv

shlv LS partings

LS,thin,bdd w/bkn grac

LS,hard,gr w/SH,a.seams

open bed plains

LS,mn,gr w/bkn SH lams

LS,vuggy w/sm/lbd

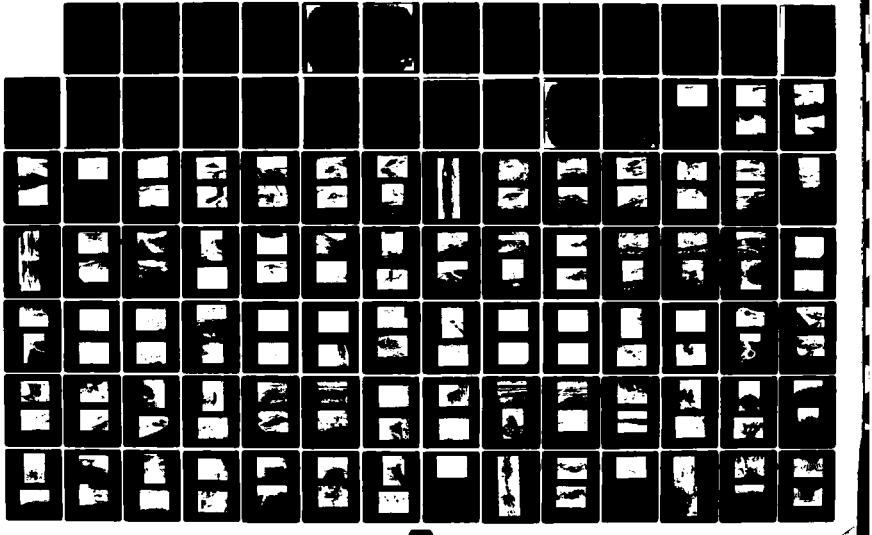
LS, w/cl filled cav n petra.-bkn open,bdng plans

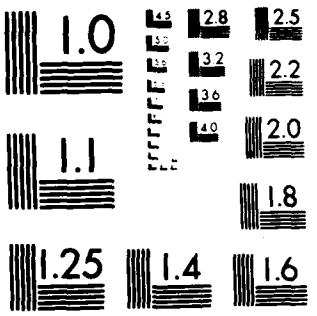
LS,ltgl. shlv

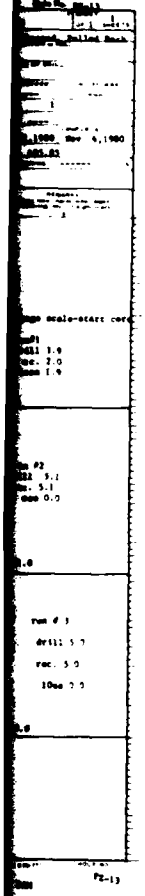
bottom of hole

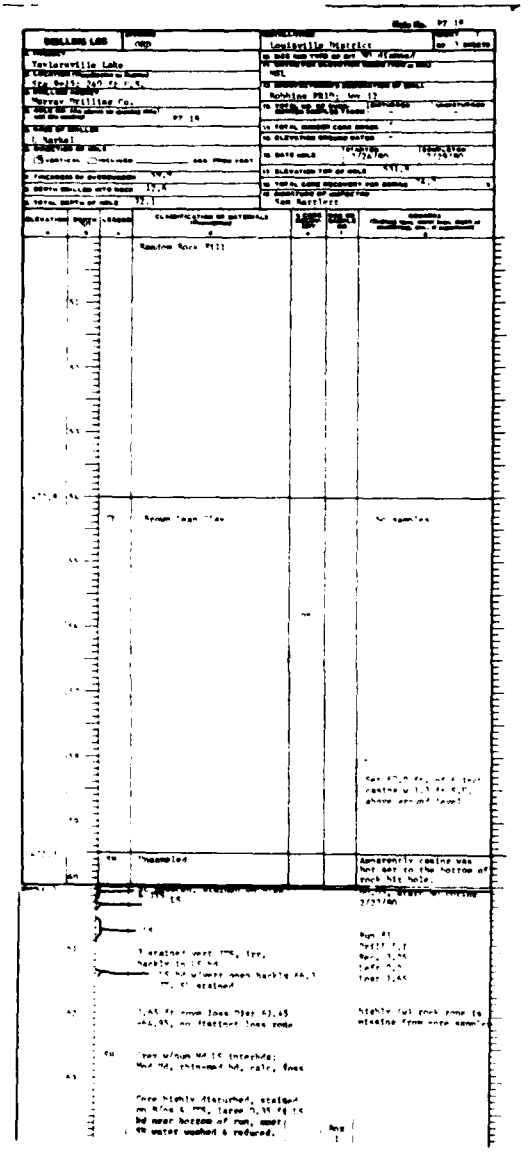
TAYLORSVILLE DAM

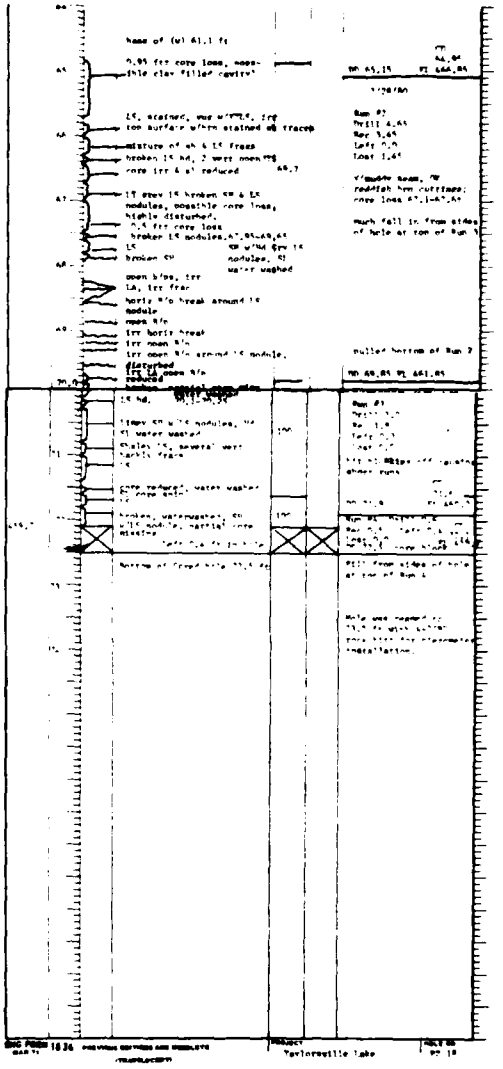
AD-A128 092 FOUNDATION REPORT DAM & SPILLWAY TAYLORSVILLE LAKE OHIO 2/3
RIVER BASIN SALT RIVER KENTUCKY(U) ARMY ENGINEER
DISTRICT LOUISVILLE KY S BARTLETT ET AL. APR 83
UNCLASSIFIED F/G 13/13 NL







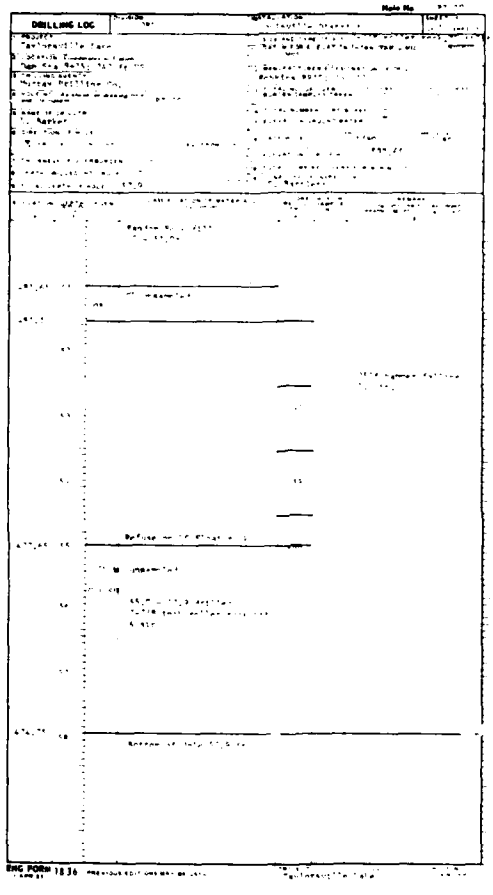




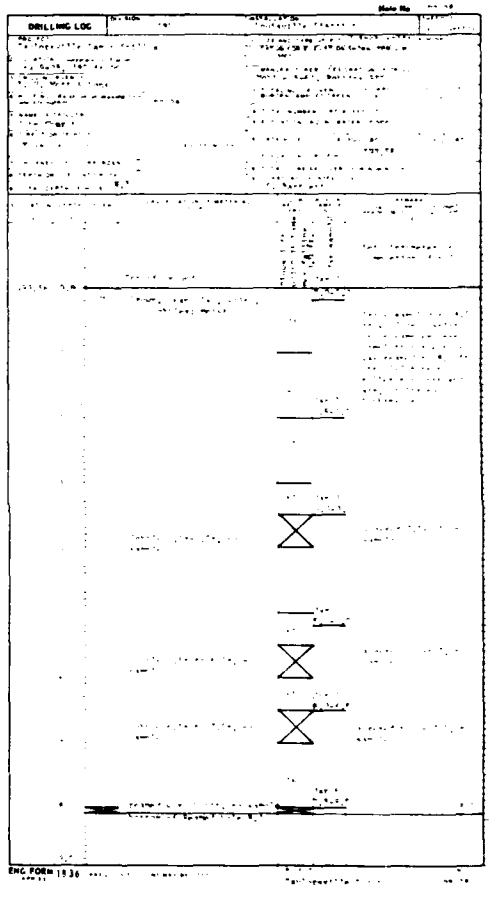
DIVISION	DATE	DESCRIPTION	BY APP'D

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

Taylorsville Lake Dam and Spillway Piezometer Logs Plate 6

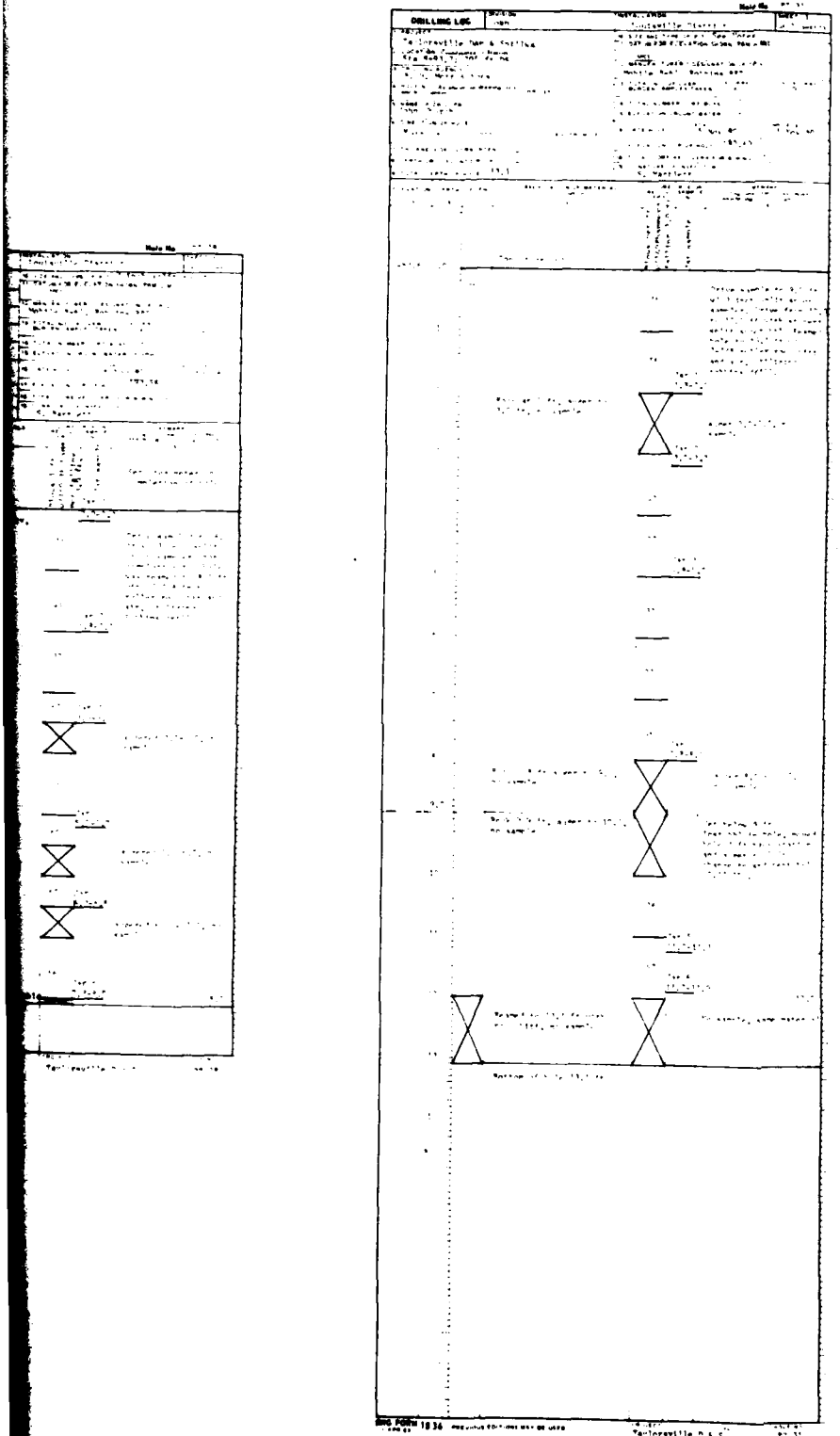

DRILLING LOG

ENG FORM 1836


DRILLING LOG

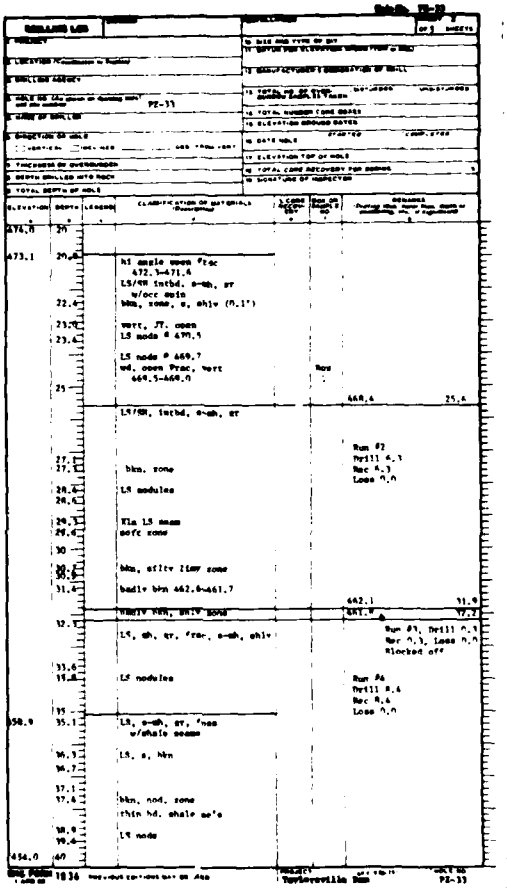
ENG FORM 1836

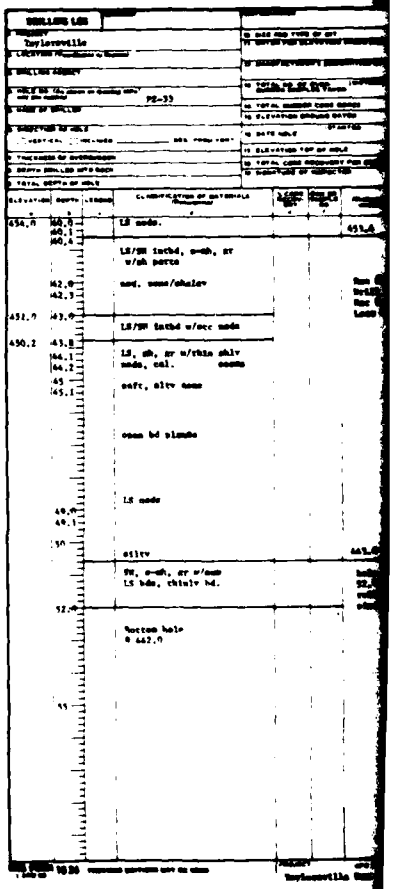
U. S. ARMY

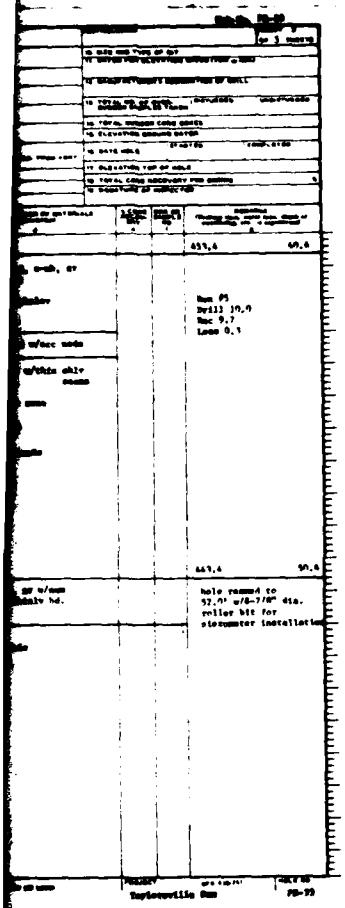


U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

Taylorsville Lake
Dam and Spillway
Piezometer Logs
Plate 7

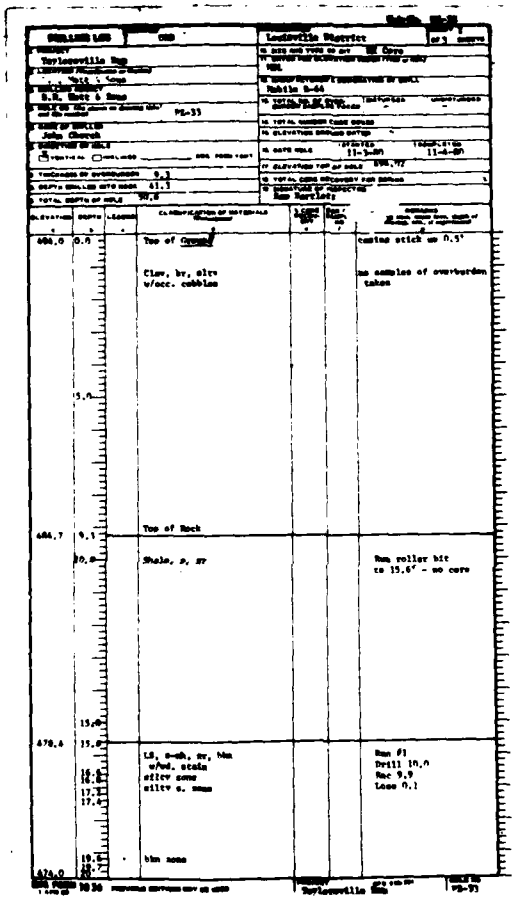






Run #5
Drill 10.0
Rec 9.7
Loss 0.1

hole reamed to 57.0' w/8-7/8" dia. roller bit for piezometer installation



Top of Ground

Clay, br, slty w/occ. cobbles

no samples of overburden taken

Top of Rock

Shale, g, sr

Run roller bit to 15.6' - no core

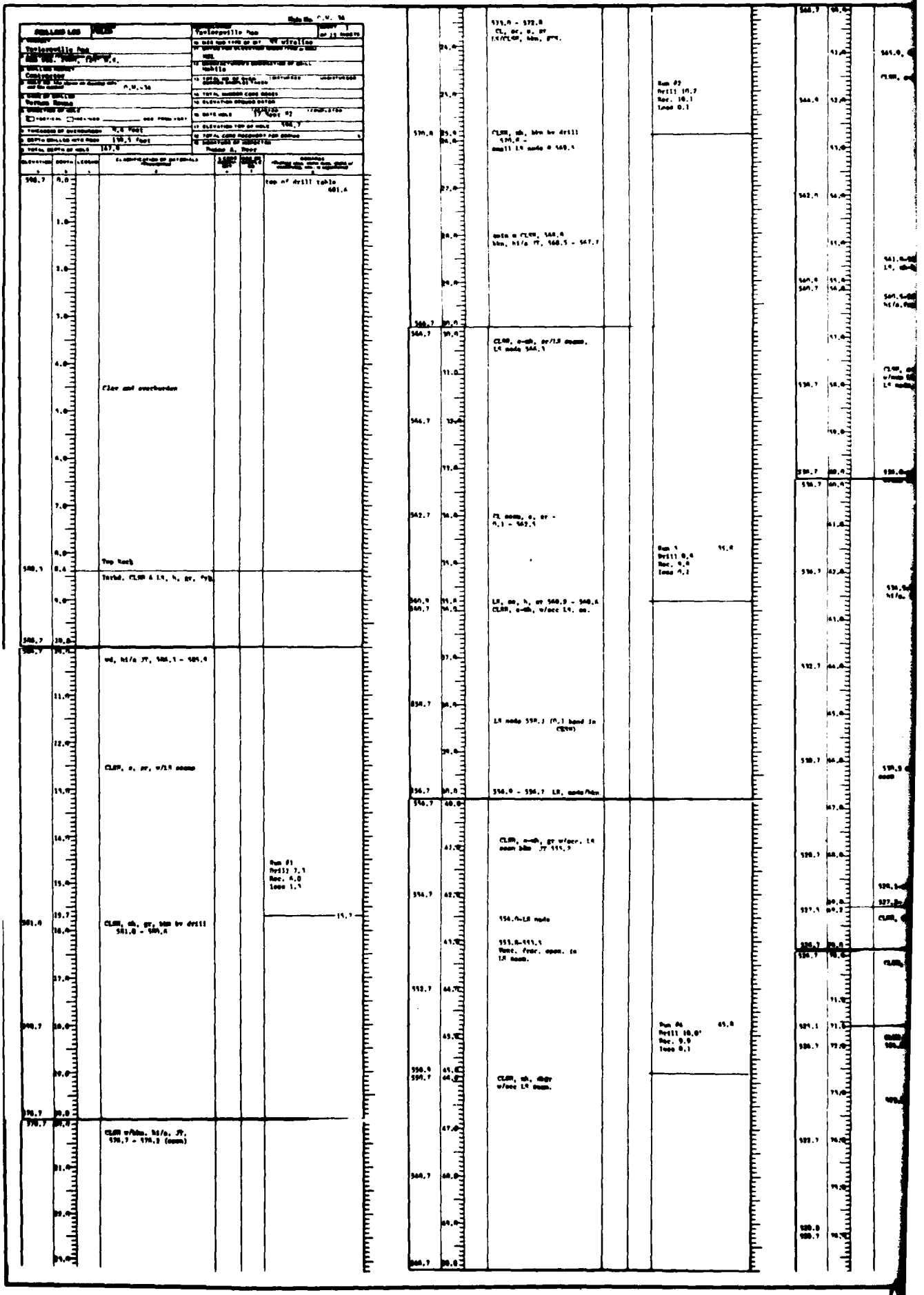
LS, g-wh, sr, bm w/wd. strata
silty zone
silty z. zone

bm zone

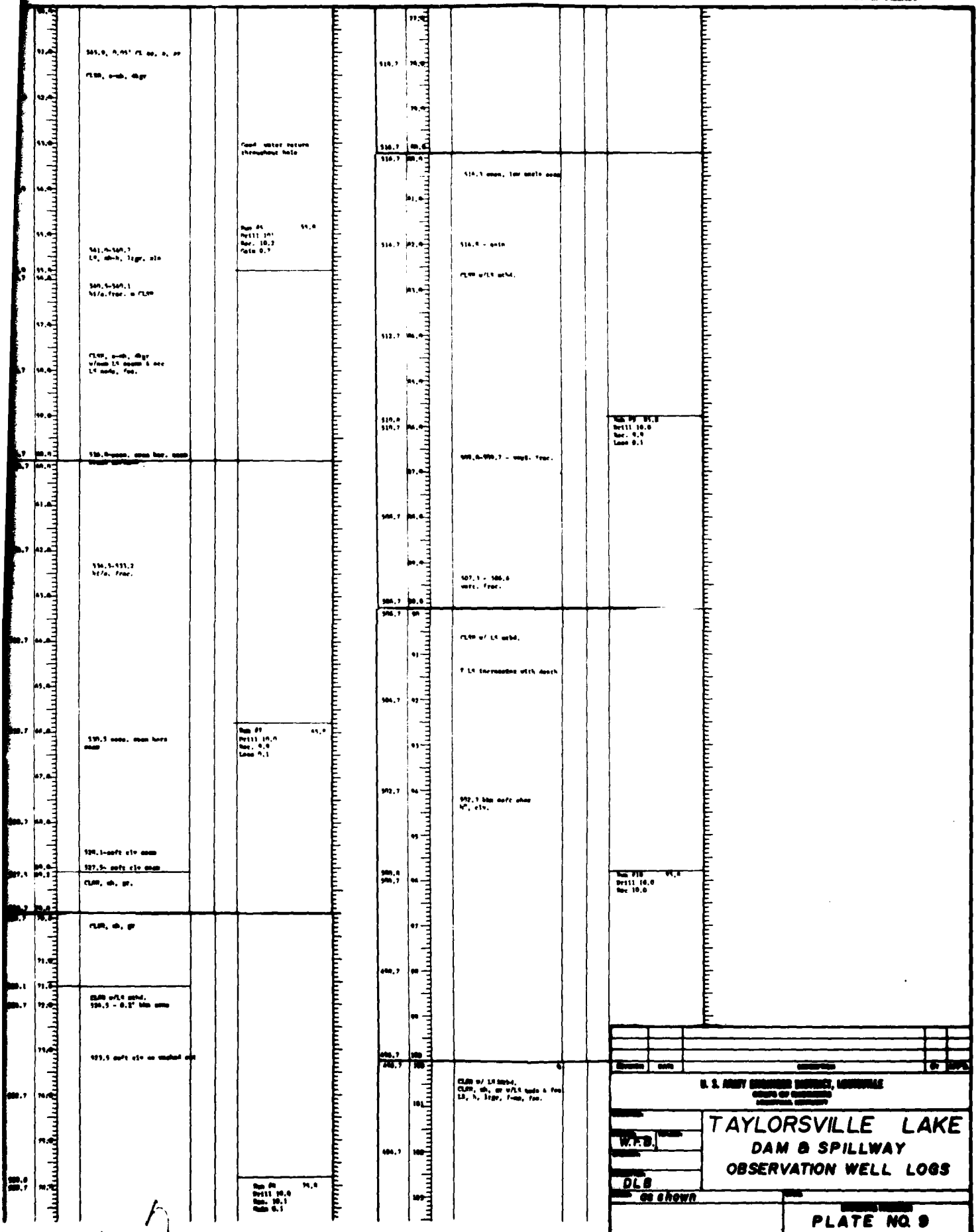
Run #1
Drill 10.0
Rec 9.9
Loss 0.1

Taylorsville Lake
Dam and Spillway
Piezometer Logs
Plate 8

CORPS OF ENGINEERS



U. S. ARMY



Revision	Date	Description	By	Appd.

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

W.F.B.

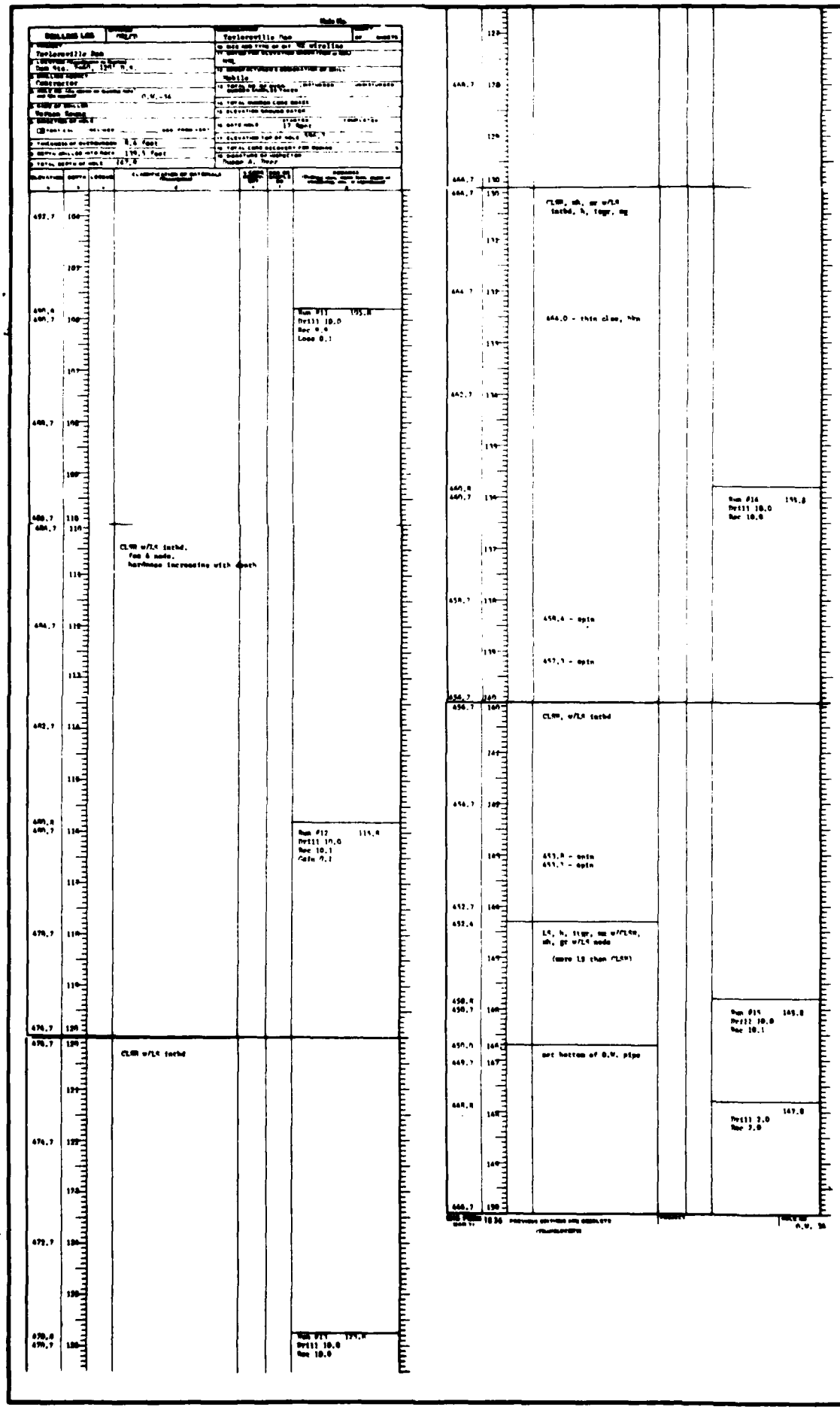
DLB

as shown

TAYLORSVILLE LAKE
DAM & SPILLWAY
OBSERVATION WELL LOGS

PLATE NO. 9

CORPS OF ENGINEERS



DRILLING LOG

Taylorsville R. A. — Taylorsville Dam

O.W.-35

Thickness of overburden: 10.0'
Depth drilled into rock: 153.7'
Total depth of hole: 163.7'
Date hole: 9-15-82
Elevation top of hole: 608.75

Elevation	Depth	Classification of materials	Remarks
608.75		overburden	
		clay overburden	
598.75	10	Top Rock	Top Rock 598.75
598.75		LS, dk, lrgr, mg w/clay br, soft. 55-95	10.0 Top Rock
			Intermittent clay seams will probably have some loss
594.45	14.3	CLSH, o-sh, gr	
593.7	15		
593.05	15.7	CL, s, gr, shly	
			Run 16.8
			Run #1 18.5 Drill 8.5 Rec 7.2 Loss 1.3
			C.B.
590.35	18.4	CLSH, o-sh, gr	
588.7	20		
587.05	21.7	LS, sh-h, lrgr	
586.25	22.5	LS, sh, 1/3 core abrading washered out vertical jt.	
585.75	23	LS, sh-h, gr w/sc, sd. sh bkn, ssh. sd seams	
583.7	25		
			Run #2 28.5 Drill 4.4 Rec 4.0 Loss .4
579.55	29	CLSH, o-sh, gr w/lmbd br clay, hi bkn, occ ls seam (max 0.4') w/fos	
578.7	30		
578.7		CLSH, o-sh, gr w/lmbd br clay, h, bkn, occ, LS se (max 0.4') w/fos	Intermittent mud seams
573.7	35		
			Run #3 38.6 Drill 10.1 Rec 7.1 37.7 *Loss 3.2 *due to mud seams
568.7	40		
568.7		same	soft shale with clay mud seams
563.7	45		

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

W.F.B

DLB

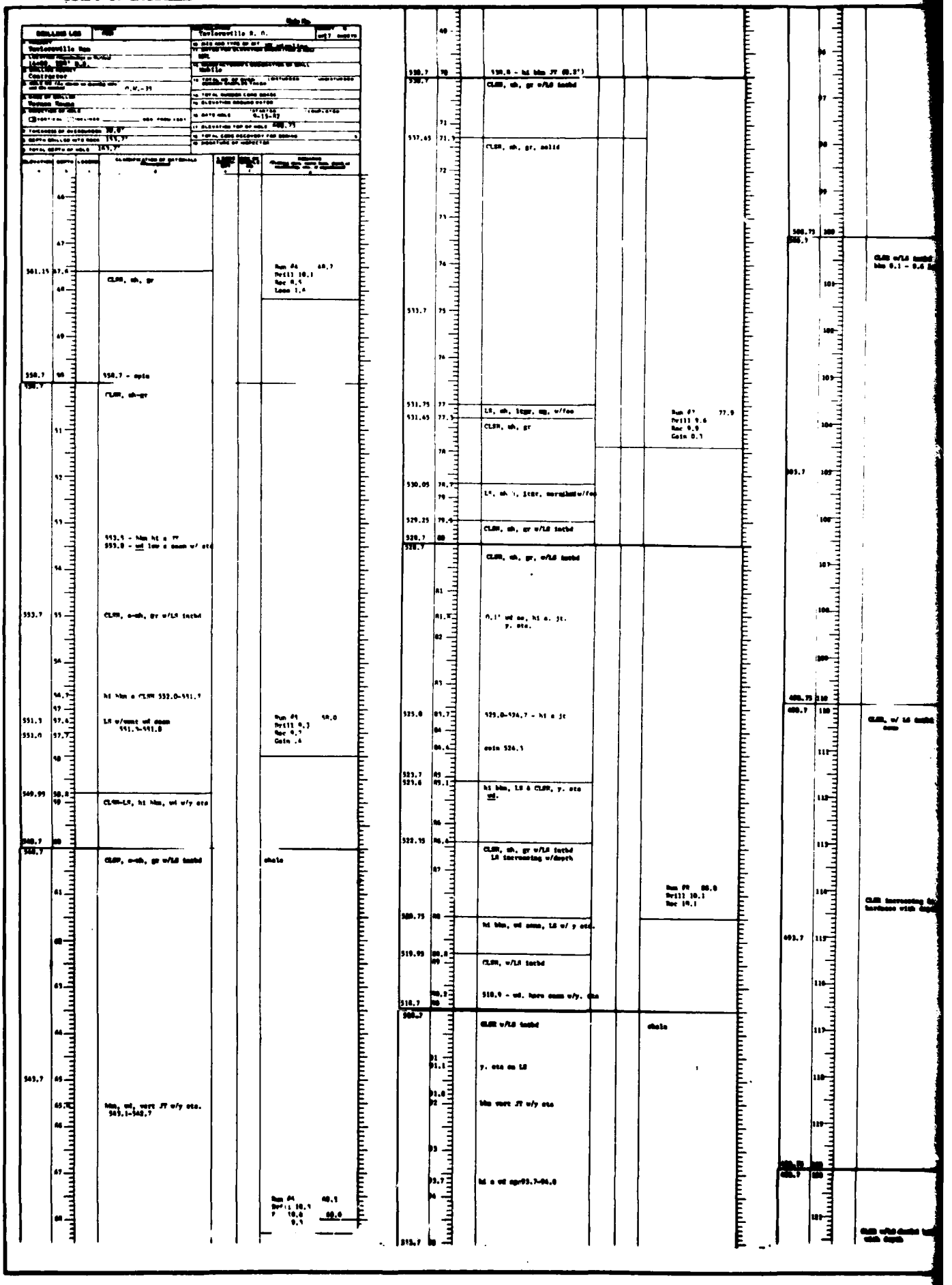
as shown

TAYLORSVILLE LAKE
DAM & SPILLWAY
OBSERVATION WELL LOGS

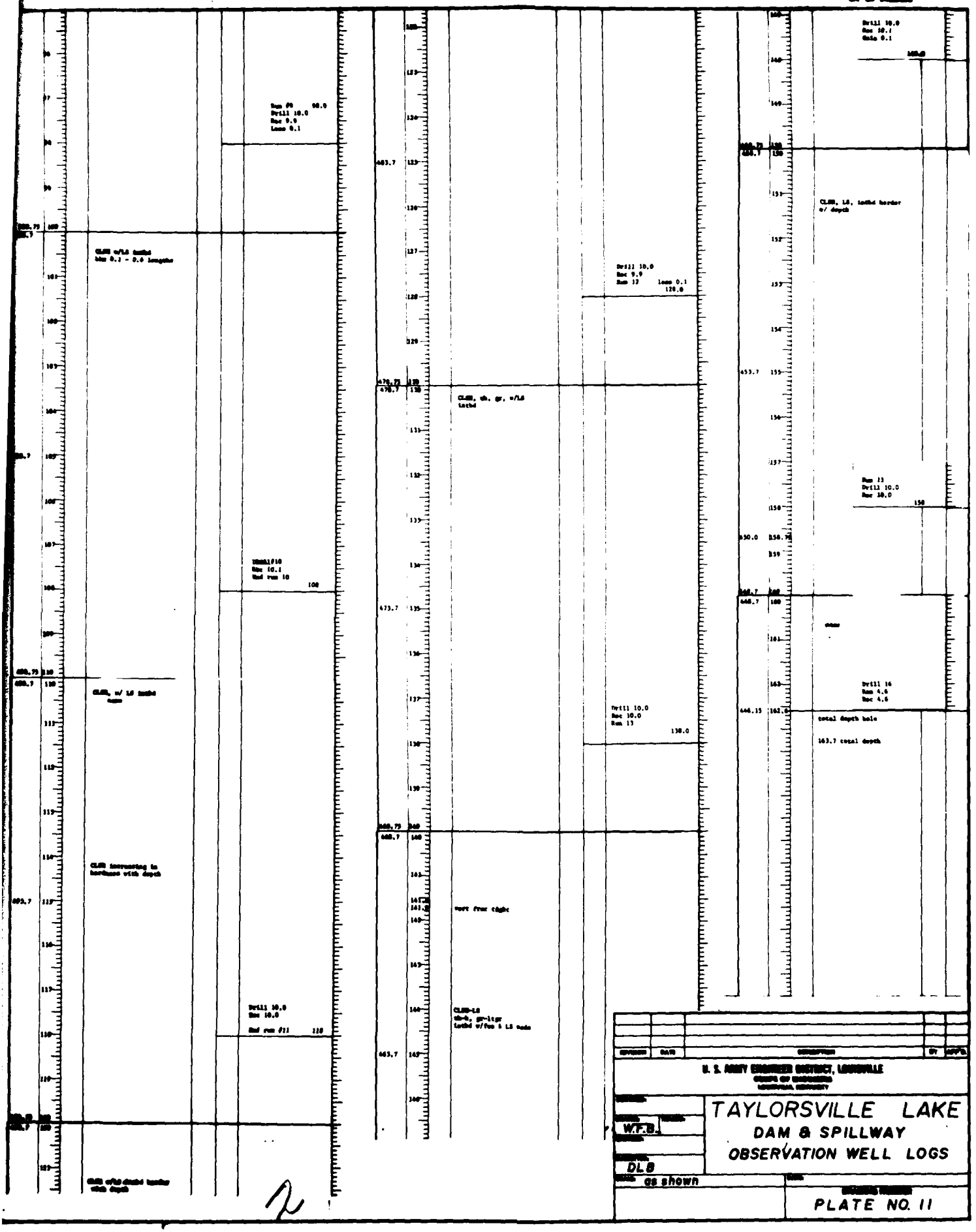
PLATE NO. 10

2

CORPS OF ENGINEERS



U. S. ARMY



REVISIONS	DATE	DESCRIPTION	BY	APP'D

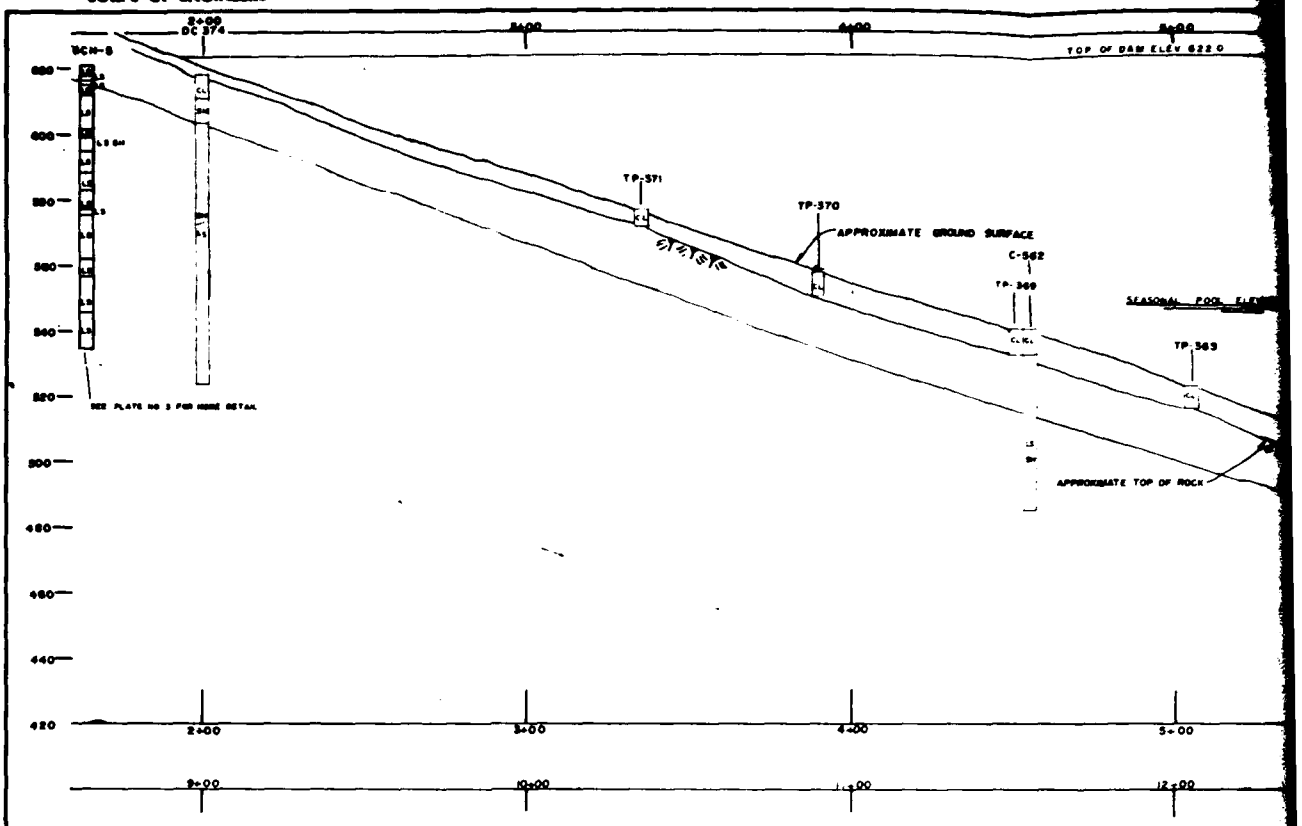
U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

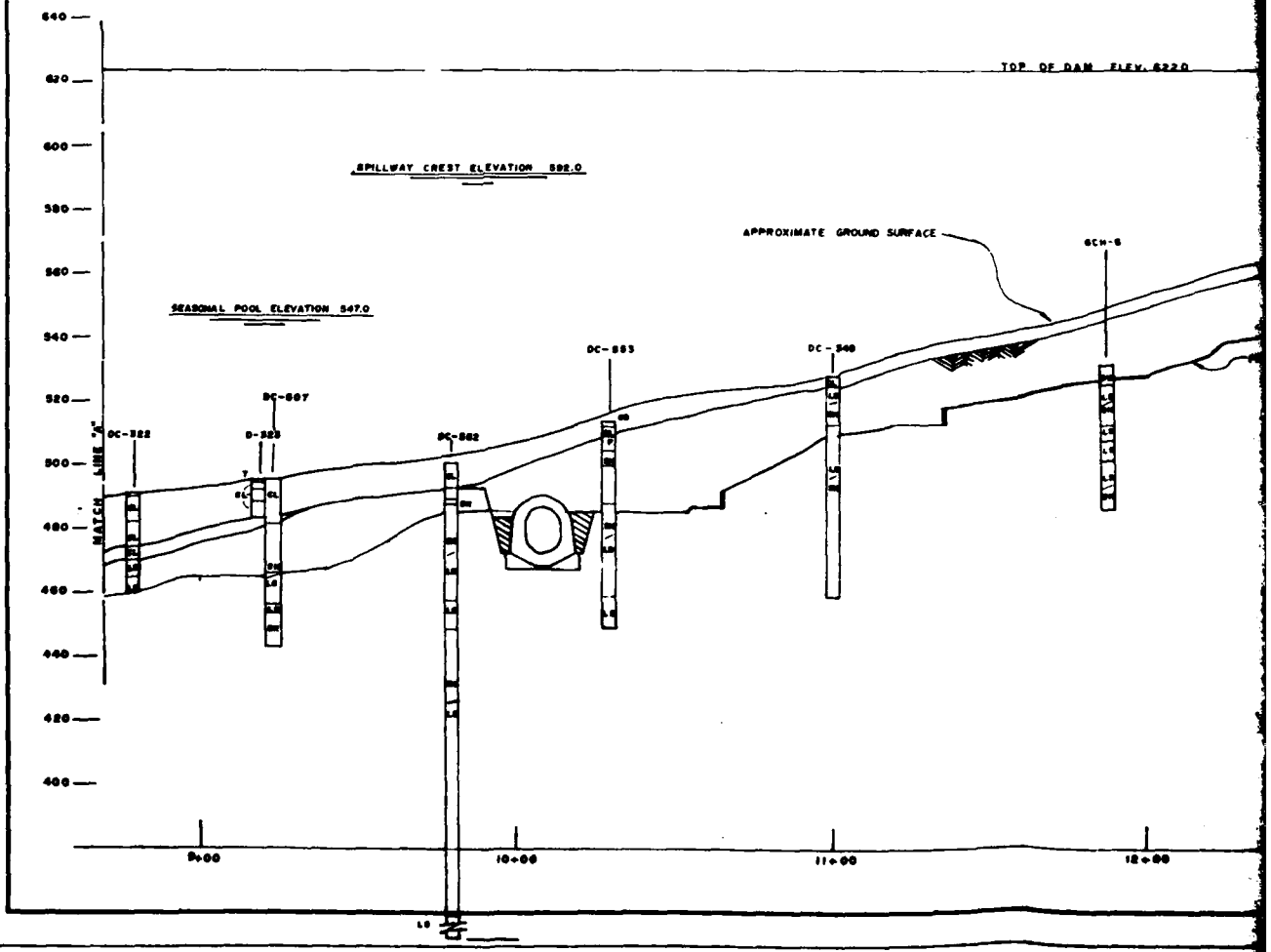
DESIGNED W.F.B.
DRAWN DLB
CHECKED
SCALE AS shown

TAYLORSVILLE LAKE
DAM & SPILLWAY
OBSERVATION WELL LOGS

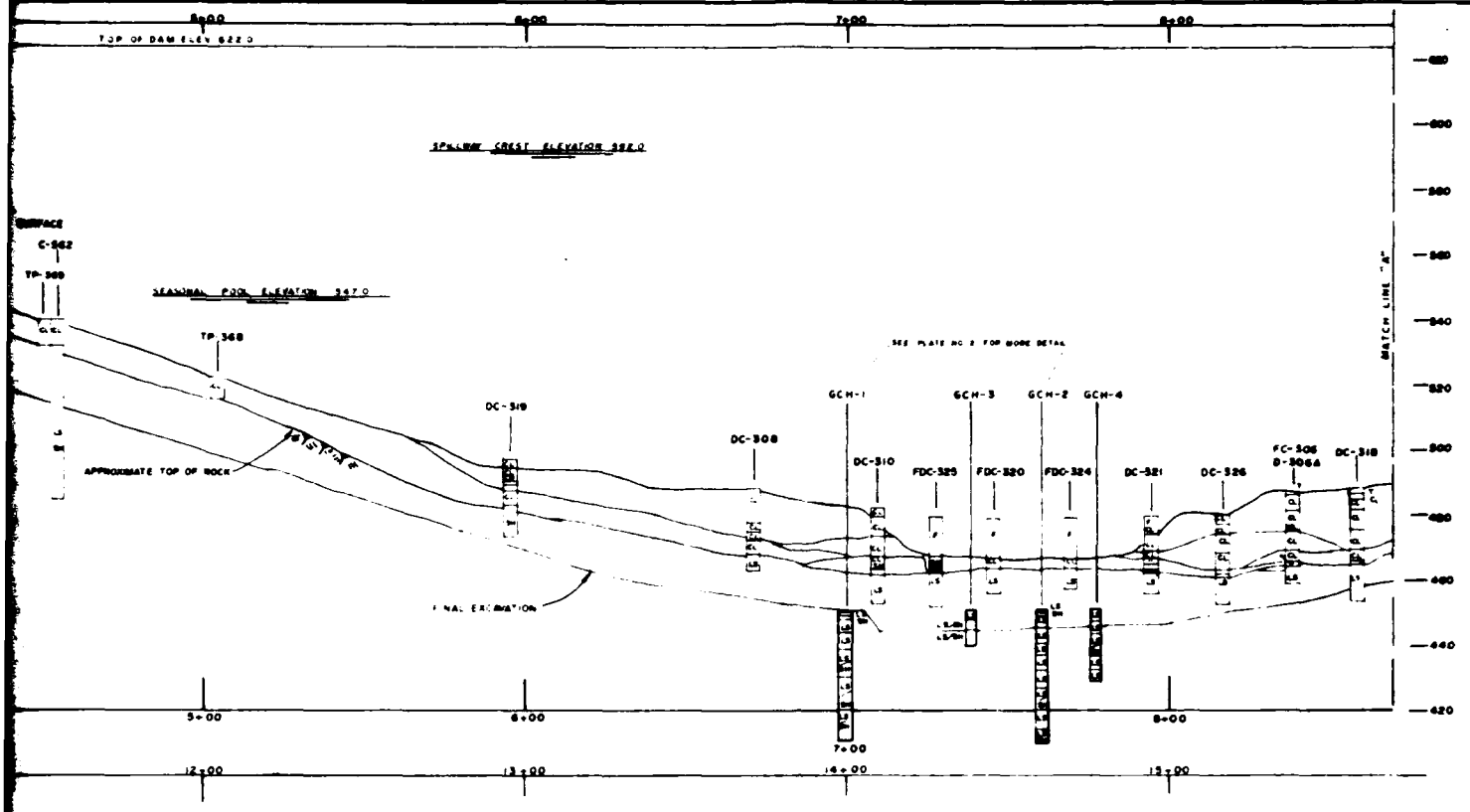
PLATE NO. 11

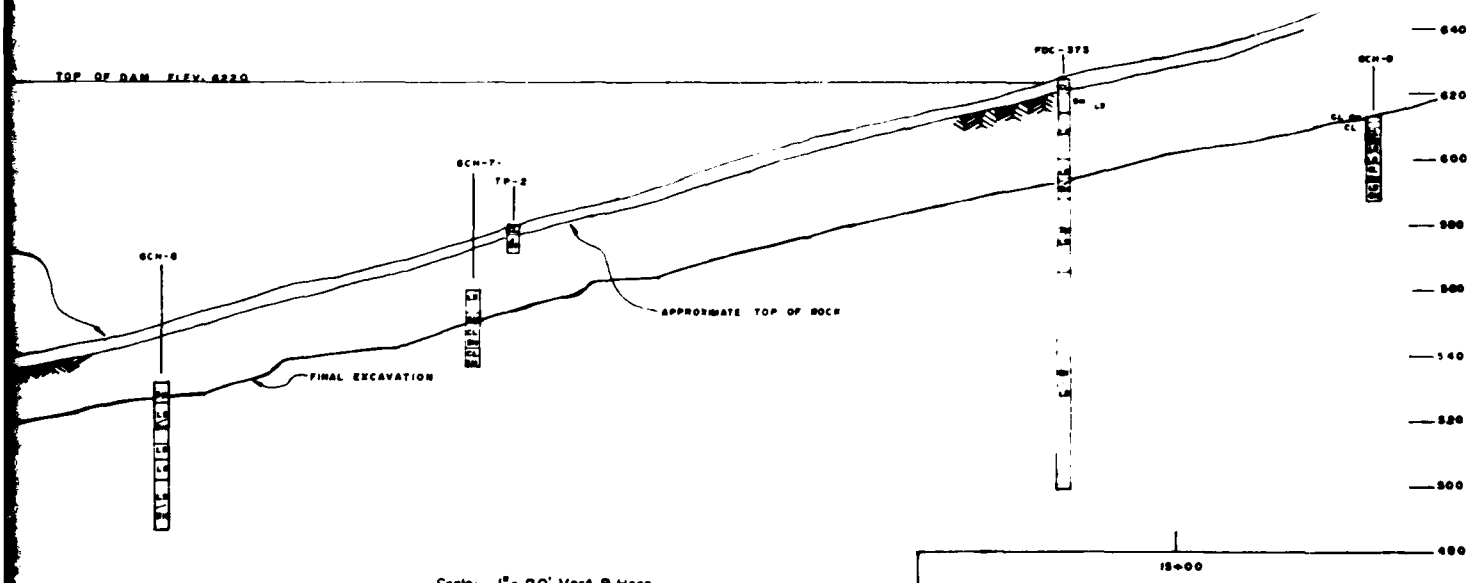
CORPS OF ENGINEERS





U. S. ARMY





Scale: 1" = 20' Vert & Horz.

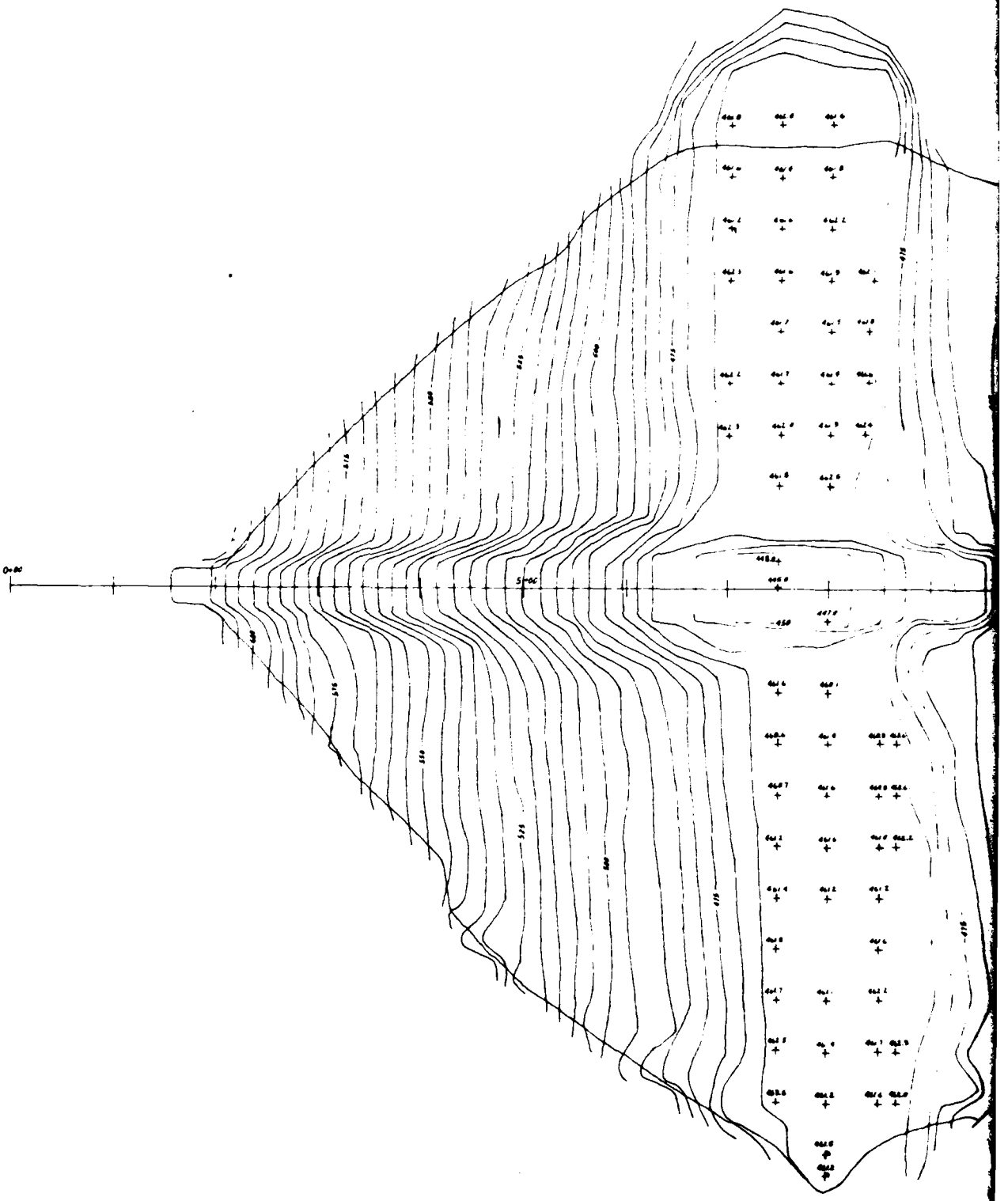
REVISION	DATE	DESCRIPTION	BY	APP'D

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

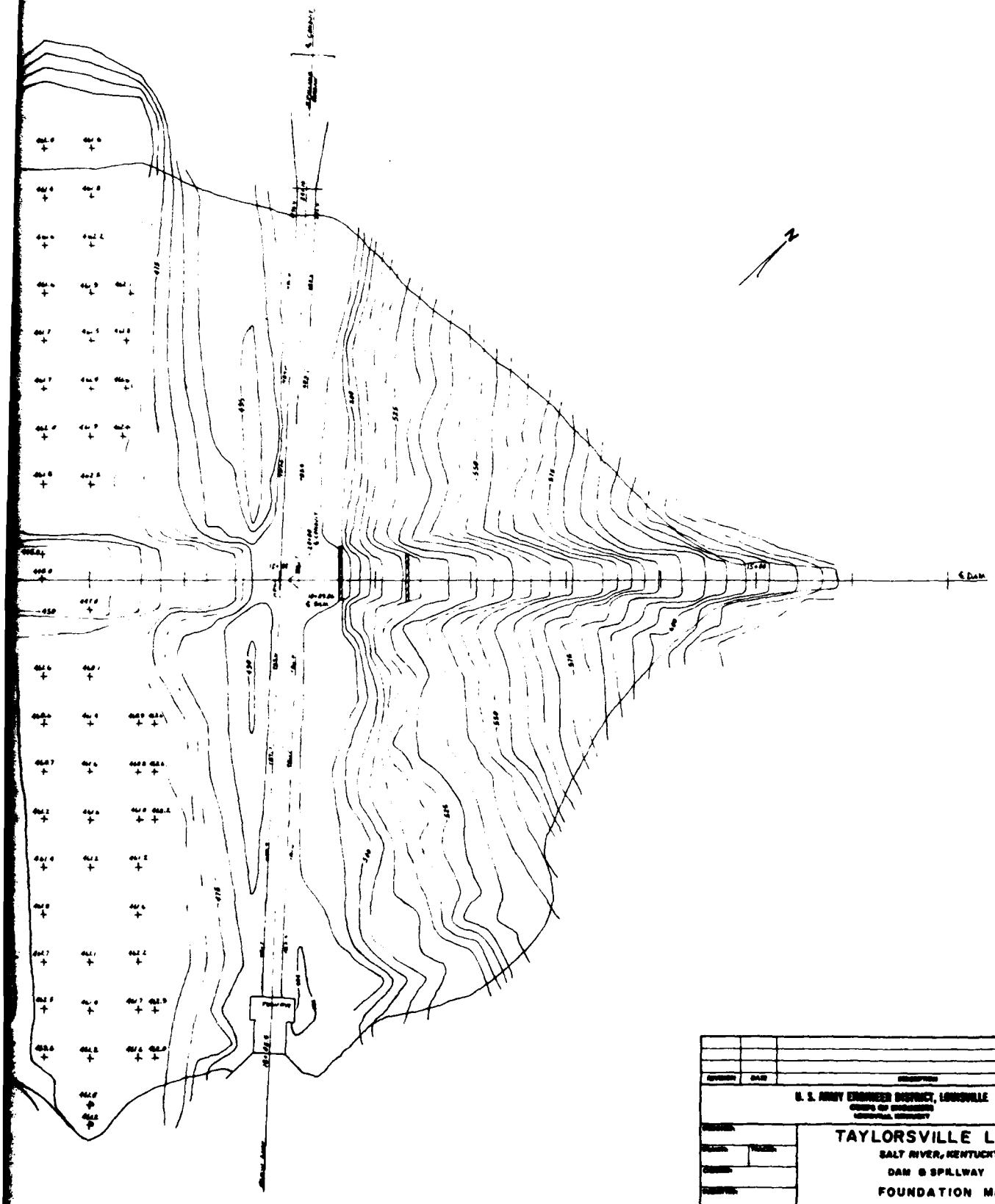
TAYLORSVILLE LAKE
SALT RIVER, KENTUCKY
DAM & SPILLWAY
GEOLOGIC PROFILE ℄ DAM

DRAWING NUMBER
PLATE NO. 12

CORPS OF ENGINEERS



U. S. ARMY



U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

TAYLORSVILLE LAKE

SALT RIVER, KENTUCKY

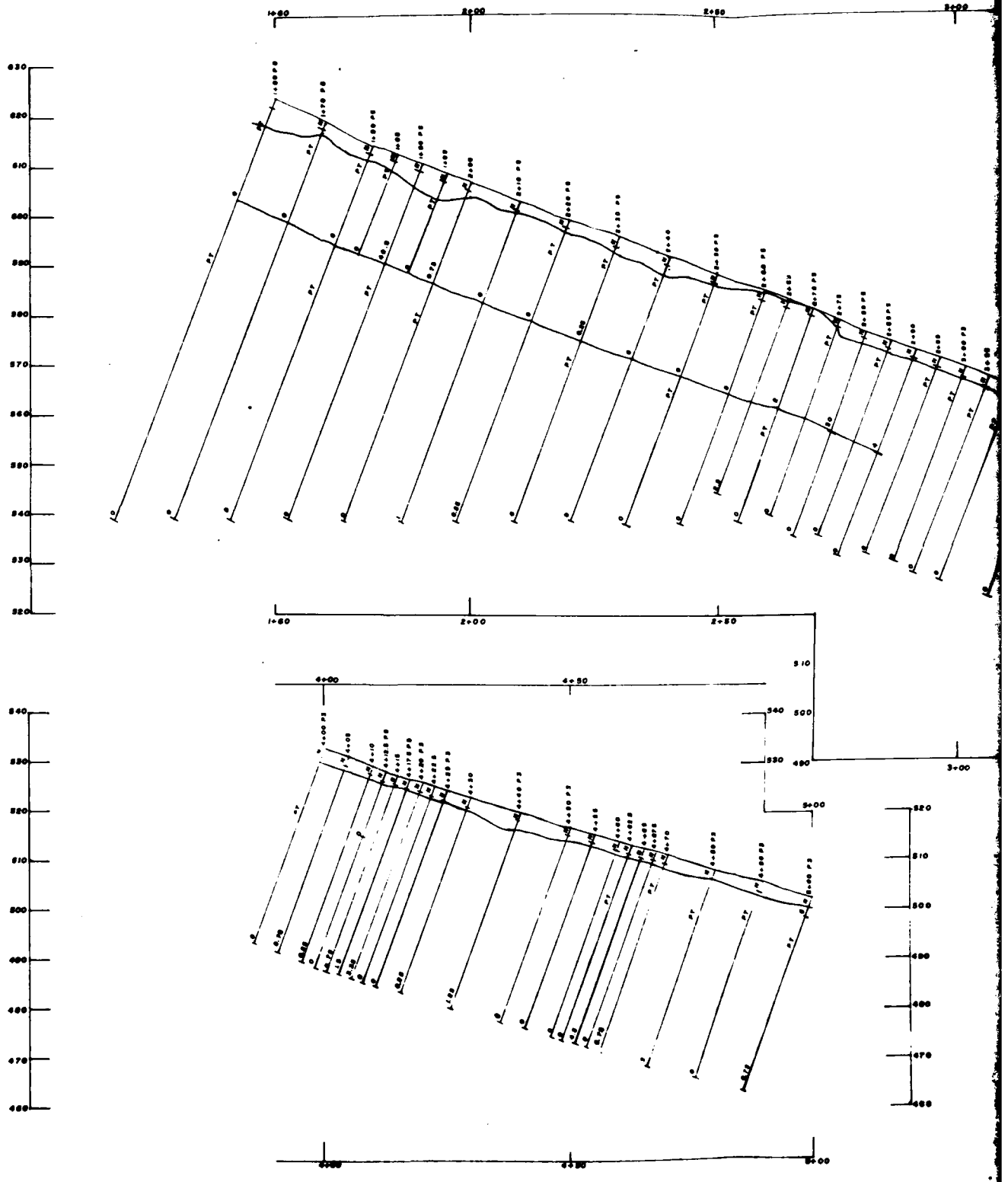
DAM & SPILLWAY

FOUNDATION MAP

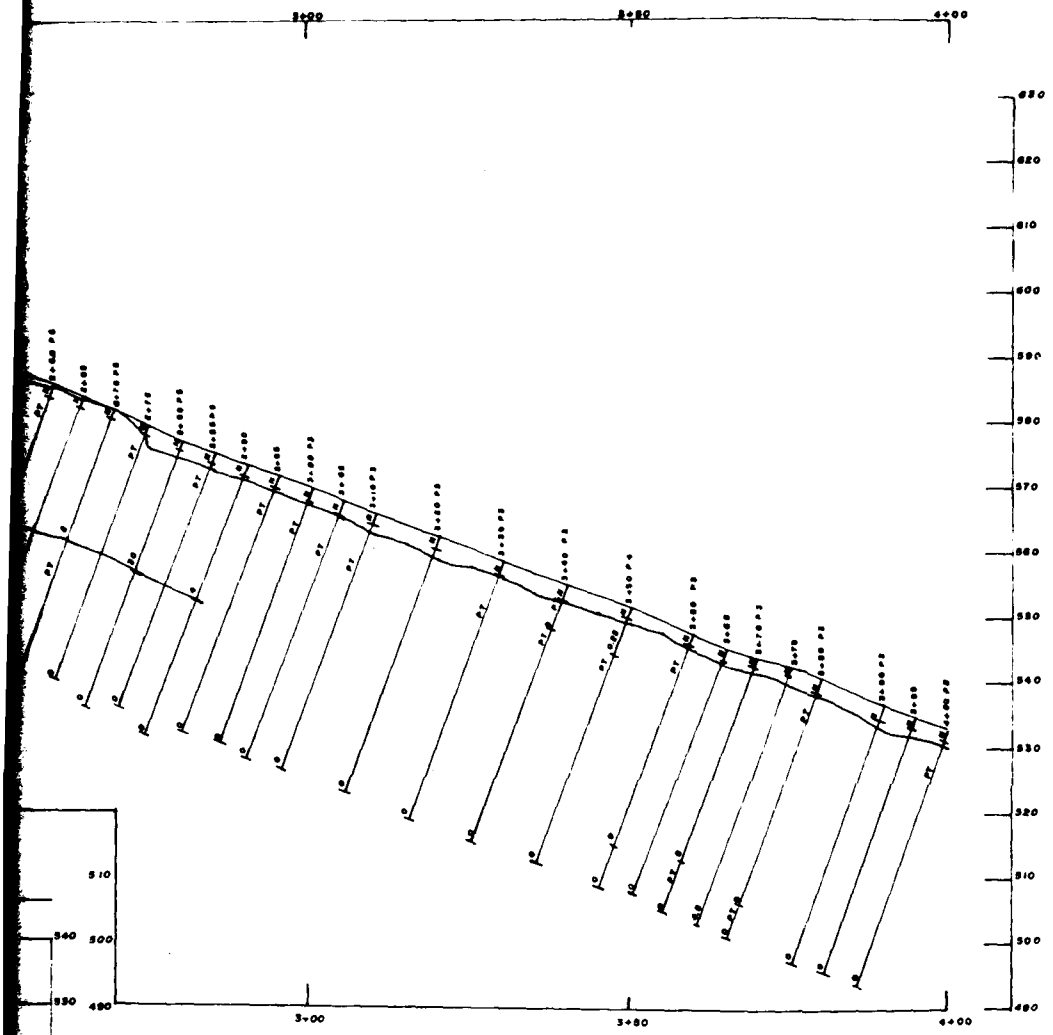
1" = 80'

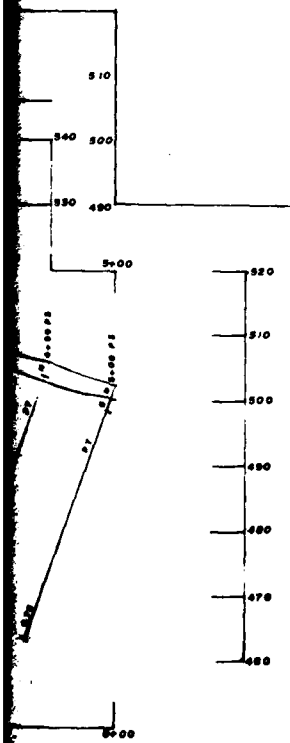
PLATE NO. 13

CORPS OF ENGINEERS



U. S. ARMY





REVISION	DATE	DESCRIPTION	BY	APP'D

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

DESIGNED
DRAWN
CHECKED
SUBMITTED
SCALE
DATE

TAYLORSVILLE LAKE

SALT RIVER, KENTUCKY

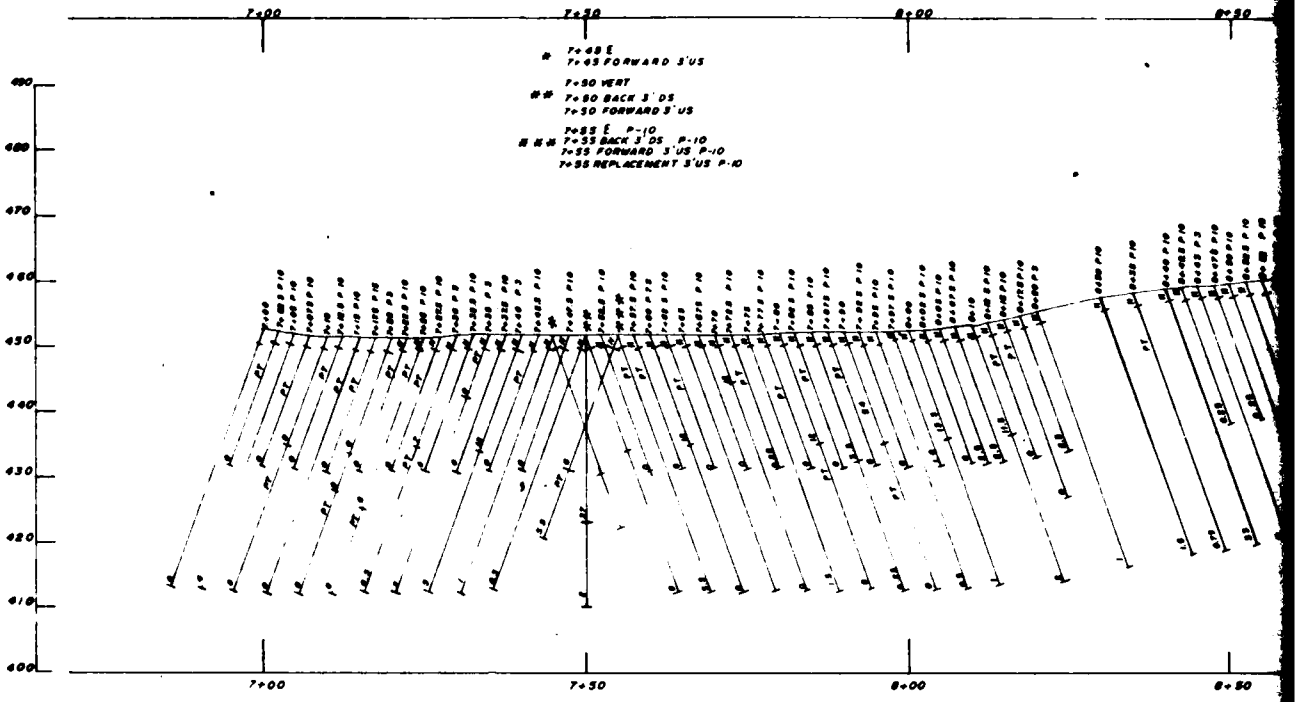
DAM & SPILLWAY

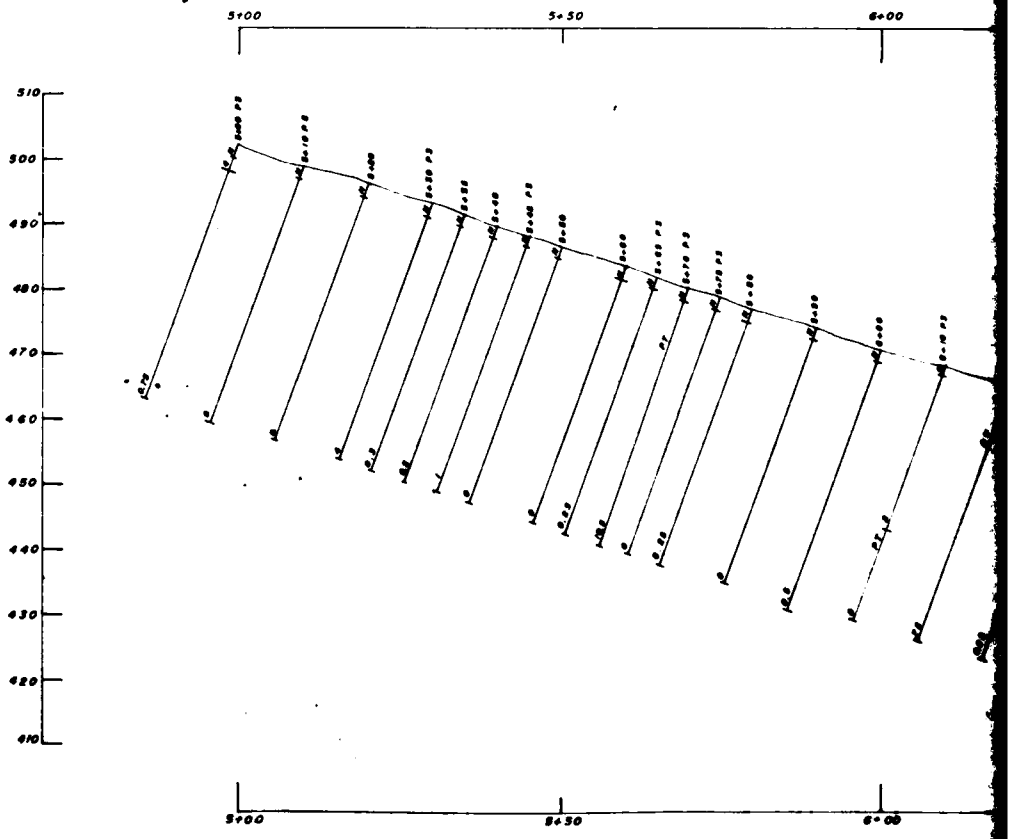
GROUT CURTAIN

DRAWING NUMBER

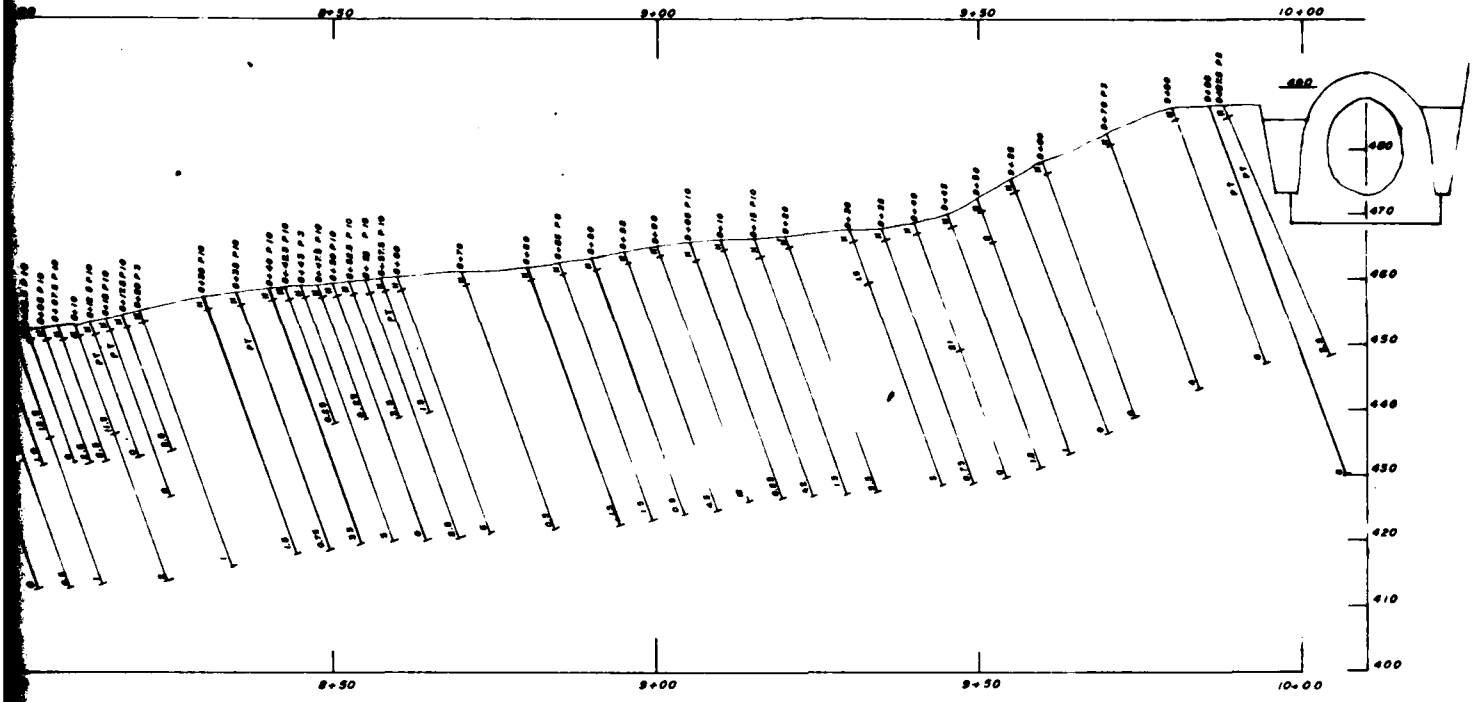
PLATE NO. 14

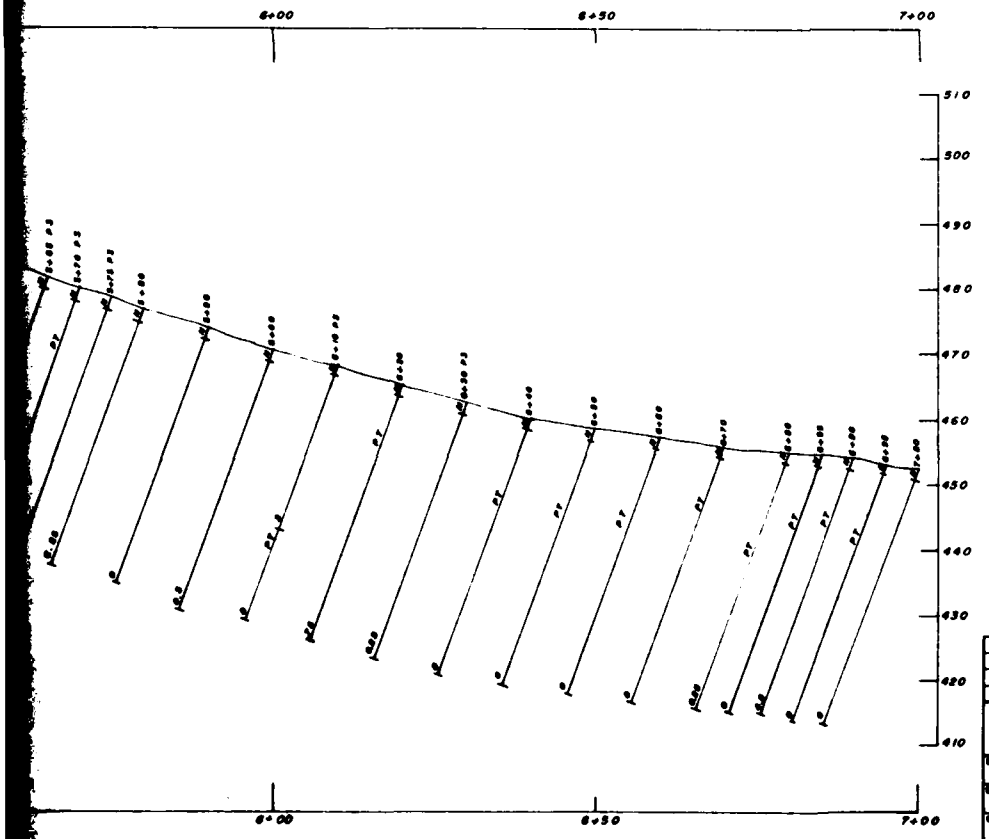
1 2


7+00
7+50
8+00
8+50
* 7+48 E
7+65 FORWARD 3'US
** 7+50 VERT
7+50 BACK 3' DS
7+50 FORWARD 3' US
*** 7+55 E P-10
7+55 BACK 3' DS P-10
7+55 FORWARD 3' US P-10
7+55 REPLACEMENT 3' US P-10
490
480
470
460
450
440
430
420
410
400


5+00
5+50
6+00
510
500
490
480
470
460
450
440
430
420
410

U. S. ARMY





REVISIONS				
NO.	DATE	DESCRIPTION	BY	APP'D

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

DESIGNED
DRAWN
CHECKED
SUBMITTED
SCALE
DATE

TAYLORSVILLE LAKE

SALT RIVER, KENTUCKY

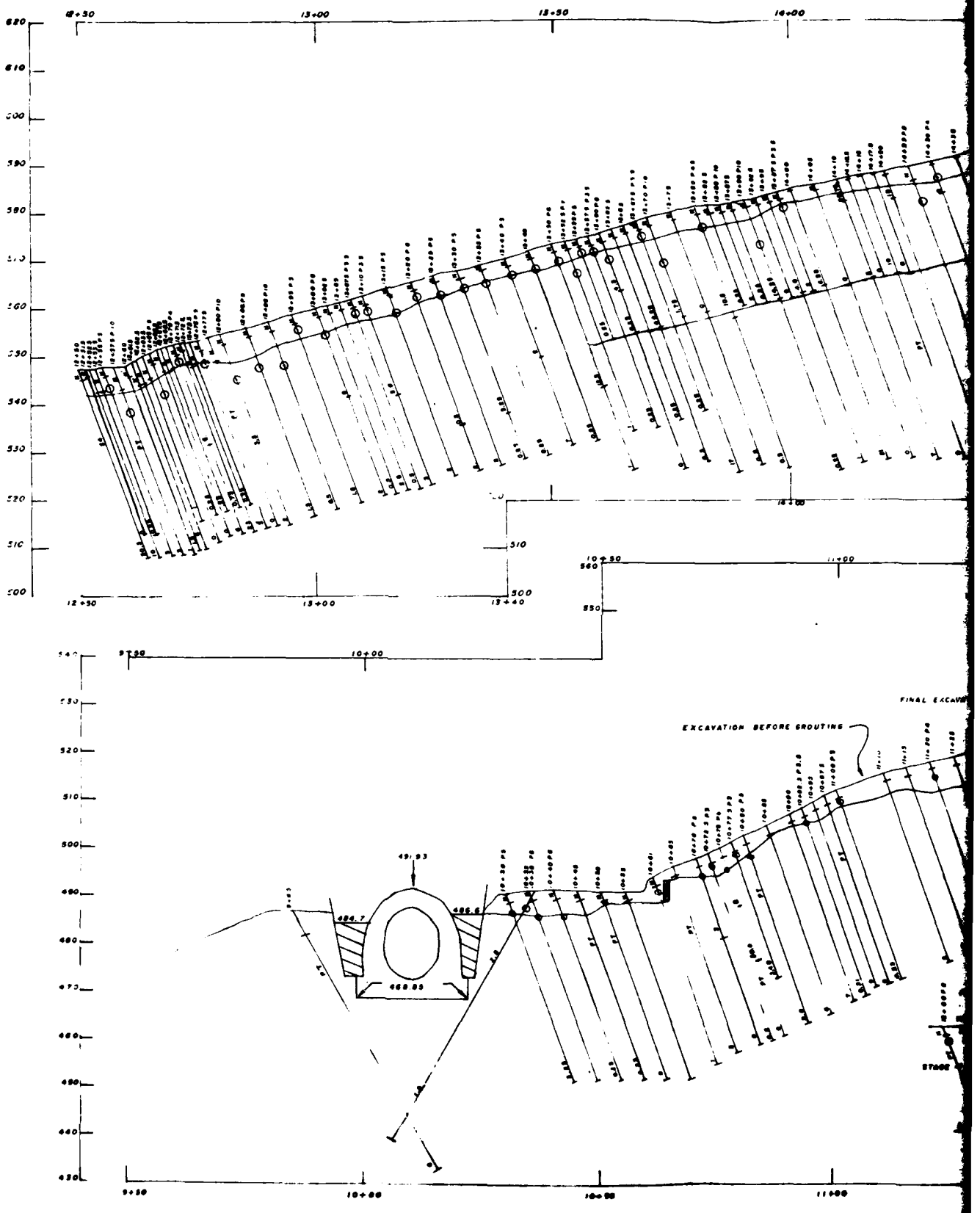
DAM & SPILLWAY

GROUT CURTAIN

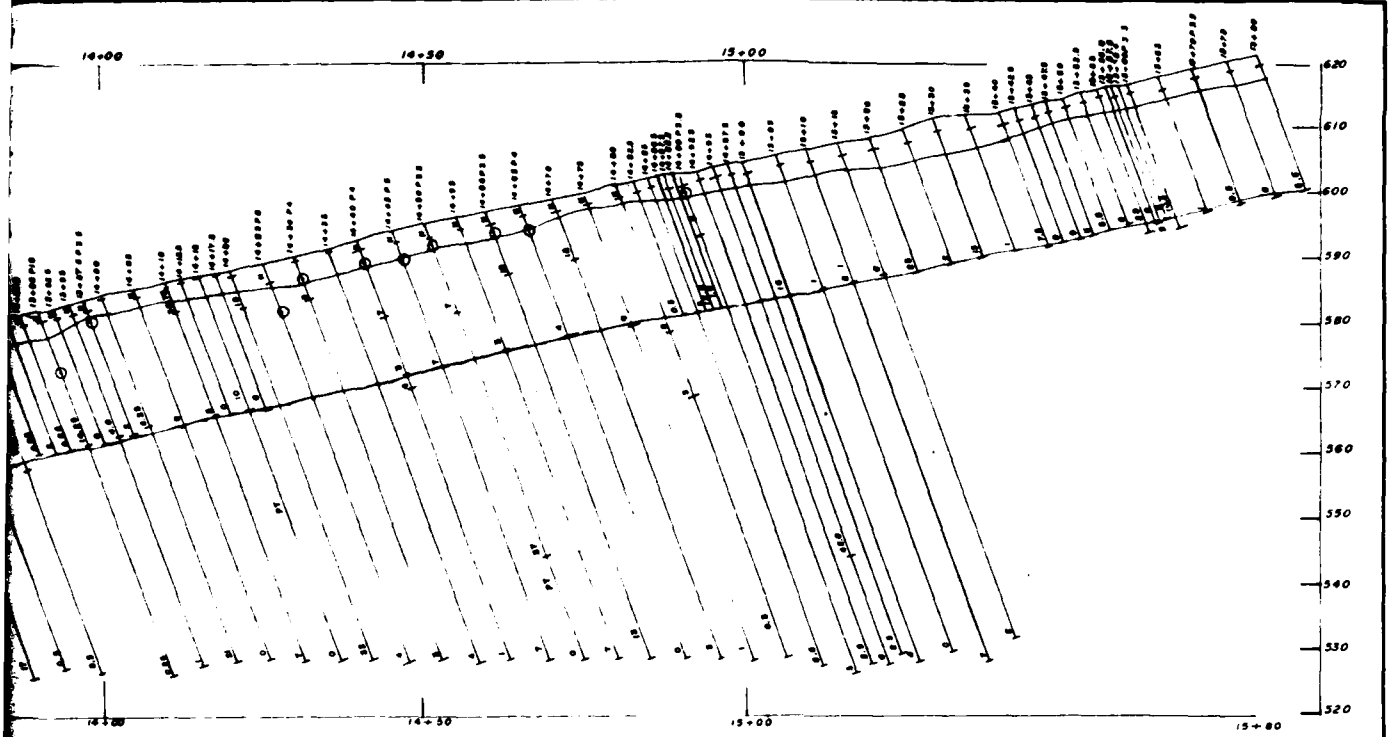
DRAWING NUMBER

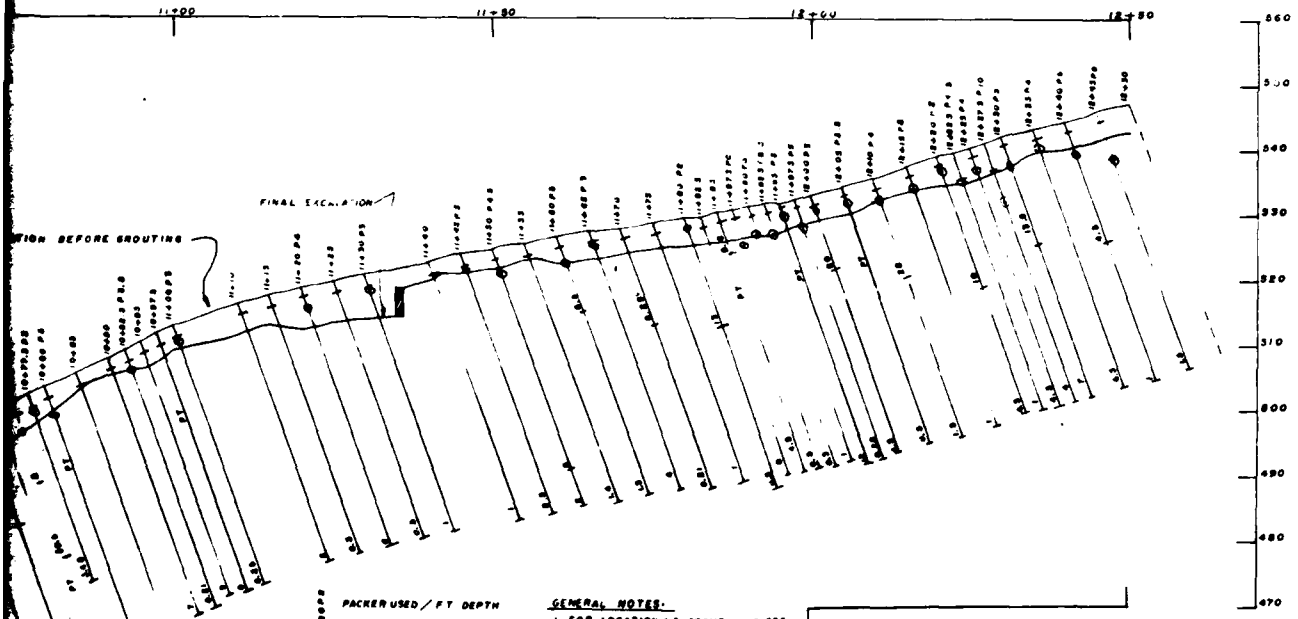
PLATE NO. 15

2


12+50
13+00
13+50
14+00
680
610
600
590
580
570
560
550
540
530
520
510
500
12+50
13+00
13+40
510
500
10+50
11+00
560
550
9+50
10+00
540
530
520
510
500
490
480
470
460
450
EXCAVATION BEFORE GROUTING
49.93
486.7
486.6
468.85
9+50
10+00
10+50
11+00

U. S. ARMY



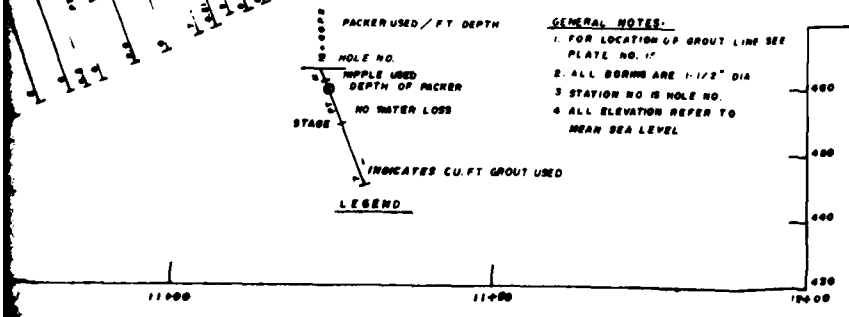


PACKER USED / FT DEPTH
HOLE NO.
NIPPLE USED
DEPTH OF PACKER
NO WATER LOSS
STAGE
INDICATES CU.FT GROUT USED

LEGEND

GENERAL NOTES:

1. FOR LOCATION OF GROUT LINE SEE PLATE NO. 17
2. ALL BORING ARE 1-1/2" DIA
3. STATION NO IS HOLE NO.
4. ALL ELEVATION REFER TO MEAN SEA LEVEL



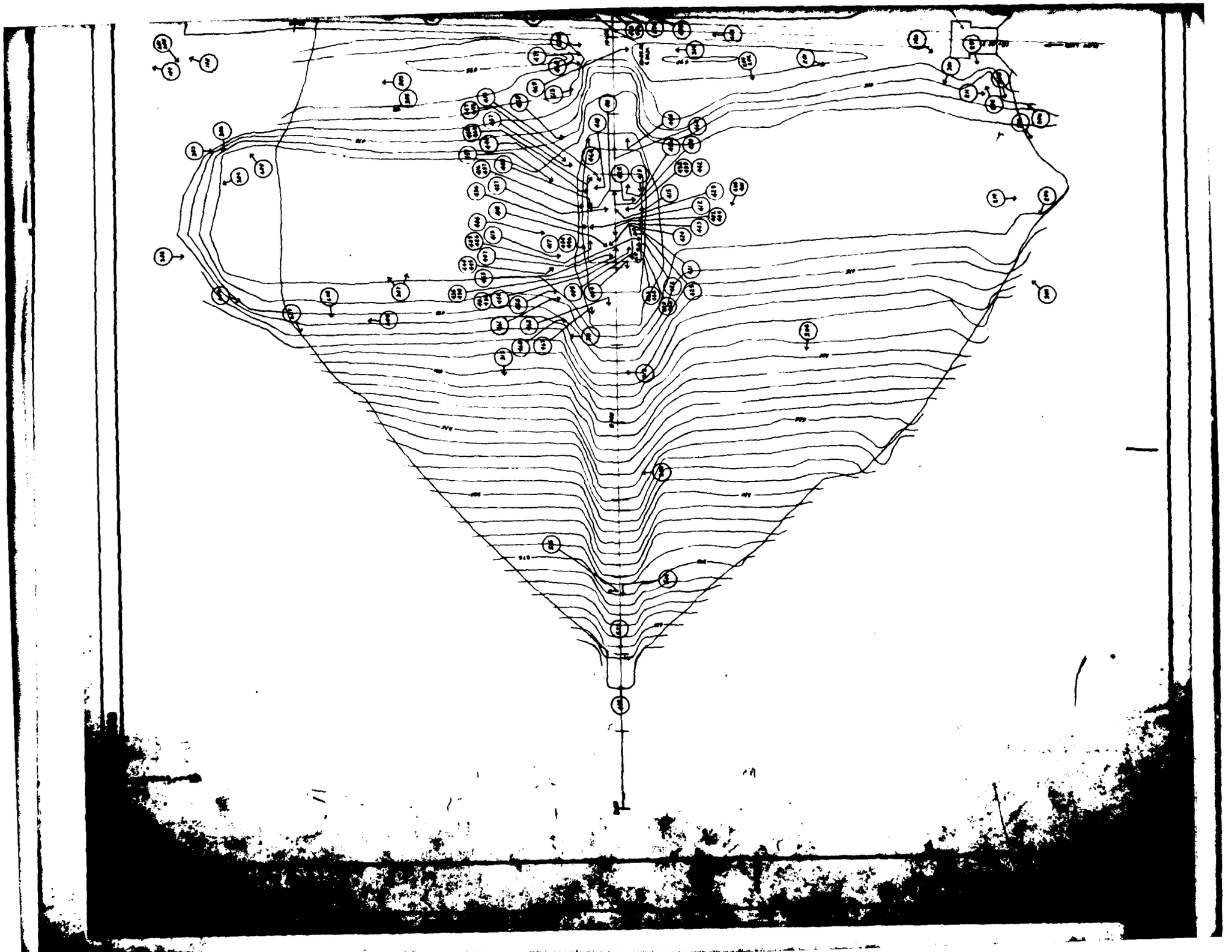
REVISION	DATE	DESCRIPTION	BY	APP'D

U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

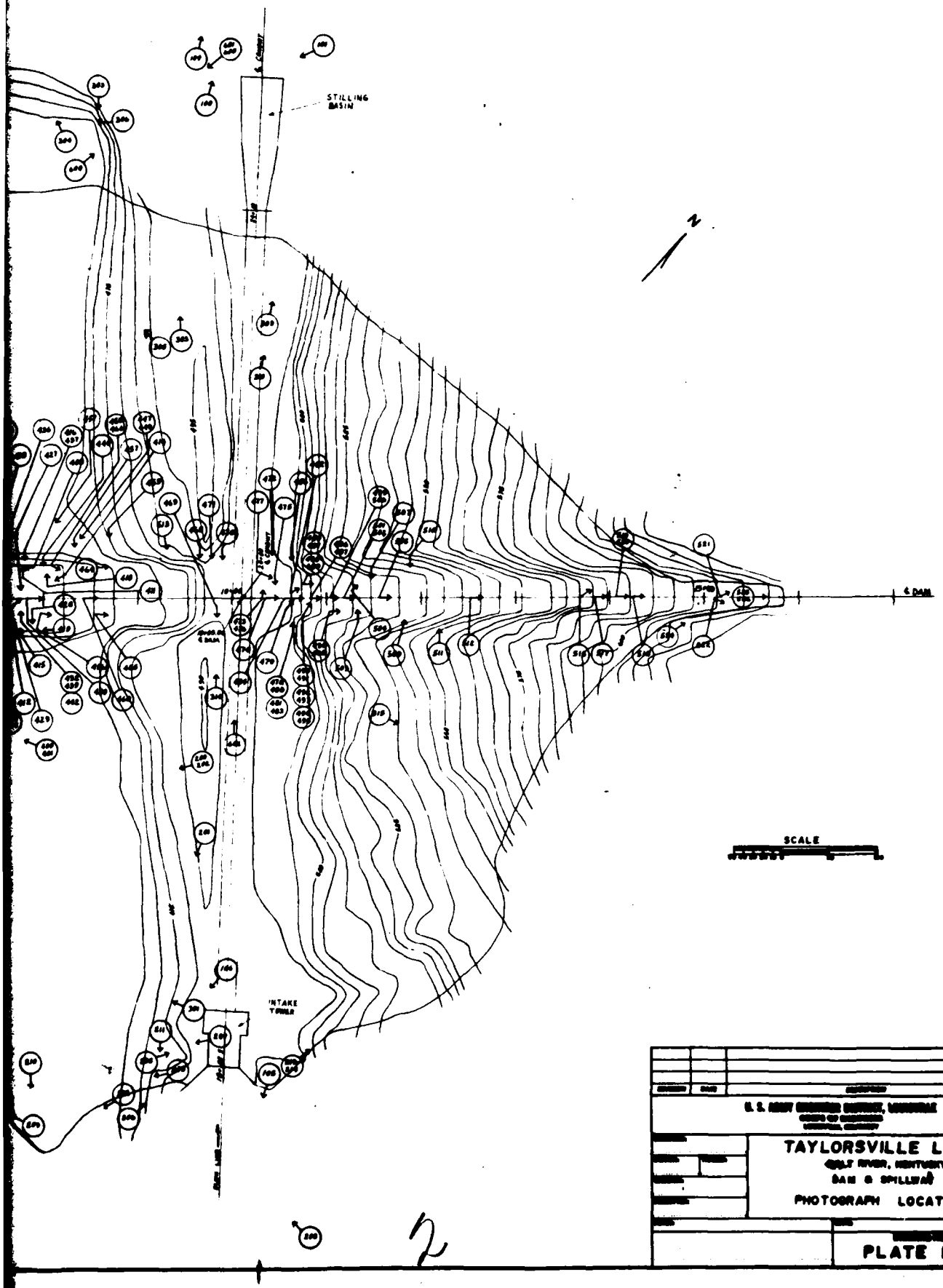
DESIGNED
DRAWN
CHECKED
QUANTITIES
SCALE

TAYLORSVILLE LAKE
SALT RIVER, KENTUCKY
DAM & SPILLWAY
GROUT CURTAIN

DRAWING NUMBER
PLATE NO. 16



U. S. ARMY



U. S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

TAYLORSVILLE LAKE
SALT RIVER, KENTUCKY
DAM & SPILLWAY
PHOTOGRAPH LOCATOR

PLATE NO. 17

AERIAL VIEW OF DAM AND SPILLWAY
22 DECEMBER 1982

PHOTO NO. 100
RETREAT CHANNEL, LOOKING DOWNSTREAM
7 JULY 1979

PHOTO NO. 101
FOUNDATION FOR CONCRETE PAVING AT STILLING BASIN
7 JULY 1979

PHOTO NO. 102
RETREAT CHANNEL EXCAVATION,
LEFT ABUTMENT OF DAM IN BACKGROUND
7 JULY 1979

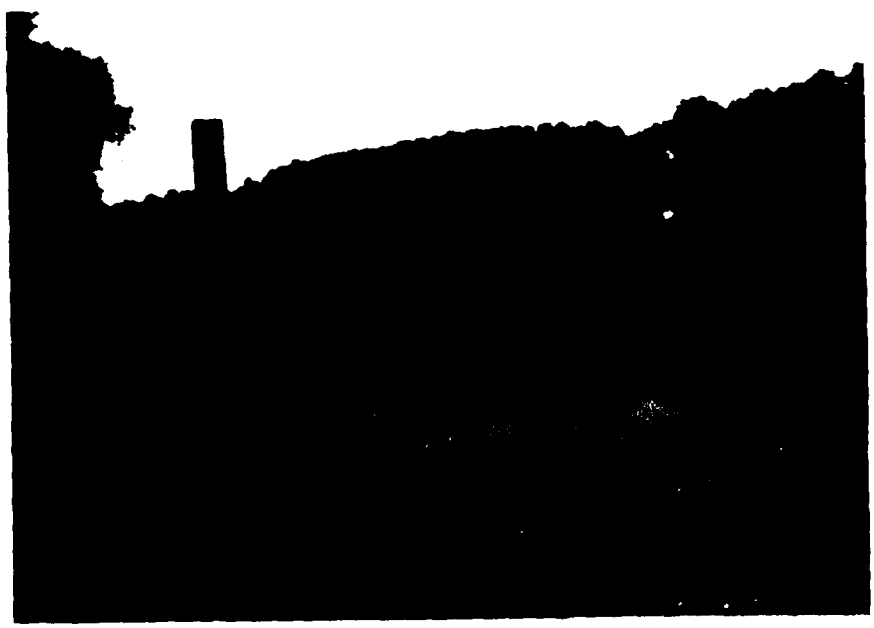


PHOTO NO. 103
RETREAT CHANNEL AND STILLING BASIN FROM
DOWNSTREAM SHOWING FLOOD CONDITIONS
27 JULY 1979

PHOTO NO. 104
RETREAT CHANNEL, LOOKING DOWNSTREAM
REMOVING MUD DEPOSITED BY FLOOD
4 AUGUST 1979

FLOOD NO. 105
EXCAVATING UPSTREAM APPROACH CHANNEL
11 SEPTEMBER 1979

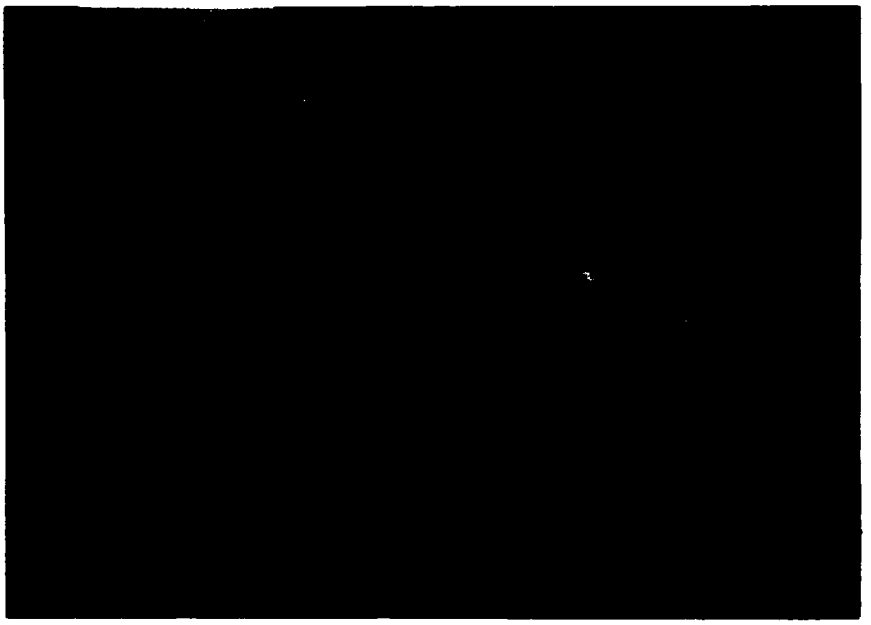


PHOTO NO. 106
OVERTOPPING OF UPSTREAM DIVERSION
COFFERDAM AND TOWER TIE IN
28 SPETEMBER 1979

PHOTO NO. 200
STRIPPING LEFT ABUTMENT
FOR COFFERDAM
7 JULY 1979

PHOTO NO. 201
STRIPPING FOR COFFERDAM NEAR OLD RIVER CHANNEL,
LOOKING UPSTREAM
7 JULY 1979

PHOTO NO. 202
LOOKING TOWARDS LEFT ABUTMENT FROM
RIGHT ABUTMENT SHOWING STRIPPING METHODS
25 AUGUST 1979

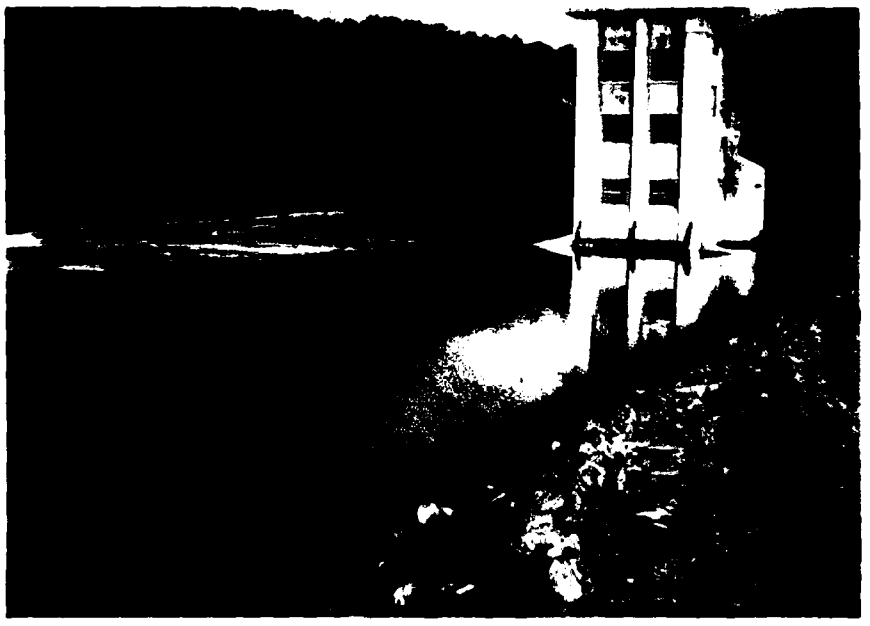


PHOTO NO. 203
OVERTOPPING OF UPSTREAM DIVERSION COFFERDAM
10 OCTOBER 1979

PHOTO NO. 204
STAGE I AND II COFFERDAM
LOOKING TOWARDS LEFT ABUTMENT
6 NOVEMBER 1979

PHOTO NO. 205
IMPERVIOUS TIE IN AT TOWER LEFT SIDE
25 JUNE 1979

PHOTO NO. 206
CLEANING FOUNDATION OF TOWER TIE IN, LEFT SIDE
25 JUNE 1979

PHOTO NO. 207
STAGE I COFFERDAM UPSTREAM CUT OFF TRENCH EXCAVATION
LOOKING RIGHT TO LEFT ABUTMENT
22 OCTOBER 1979

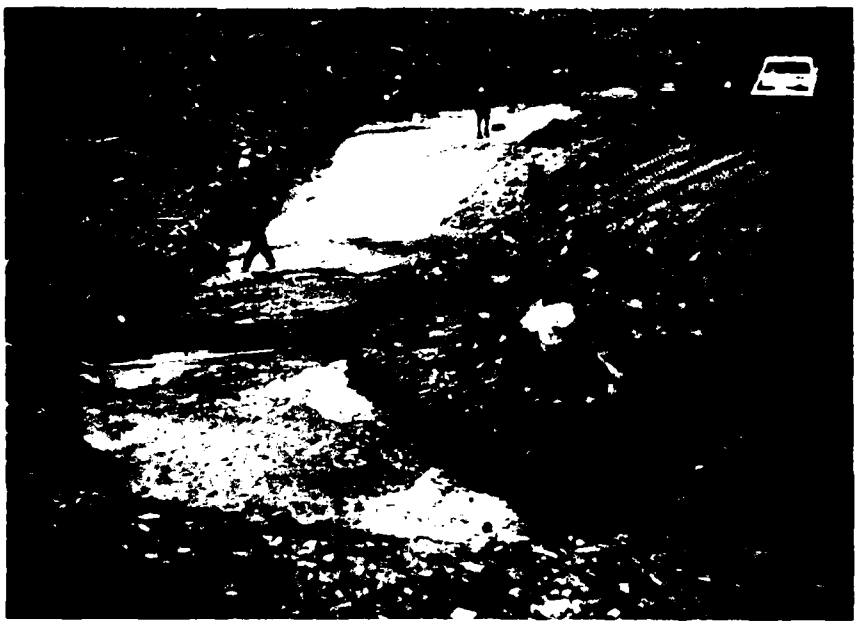


PHOTO NO. 208
STAGE I COFFERDAM UPSTREAM CUT OFF TRENCH FOUNDATION
LOOKING RIGHT TO LEFT ABUTMENT
23 OCTOBER 1979

PHOTO NO. 209
STAGE I COFFERDAM CUT OFF TRENCH LOOKING BACK STATION UP LEFT ABUTMENT
NOTE VERY DISTINCT CONTACT AT THIS POINT NO WEATHERED ROCK
23 OCTOBER 1979

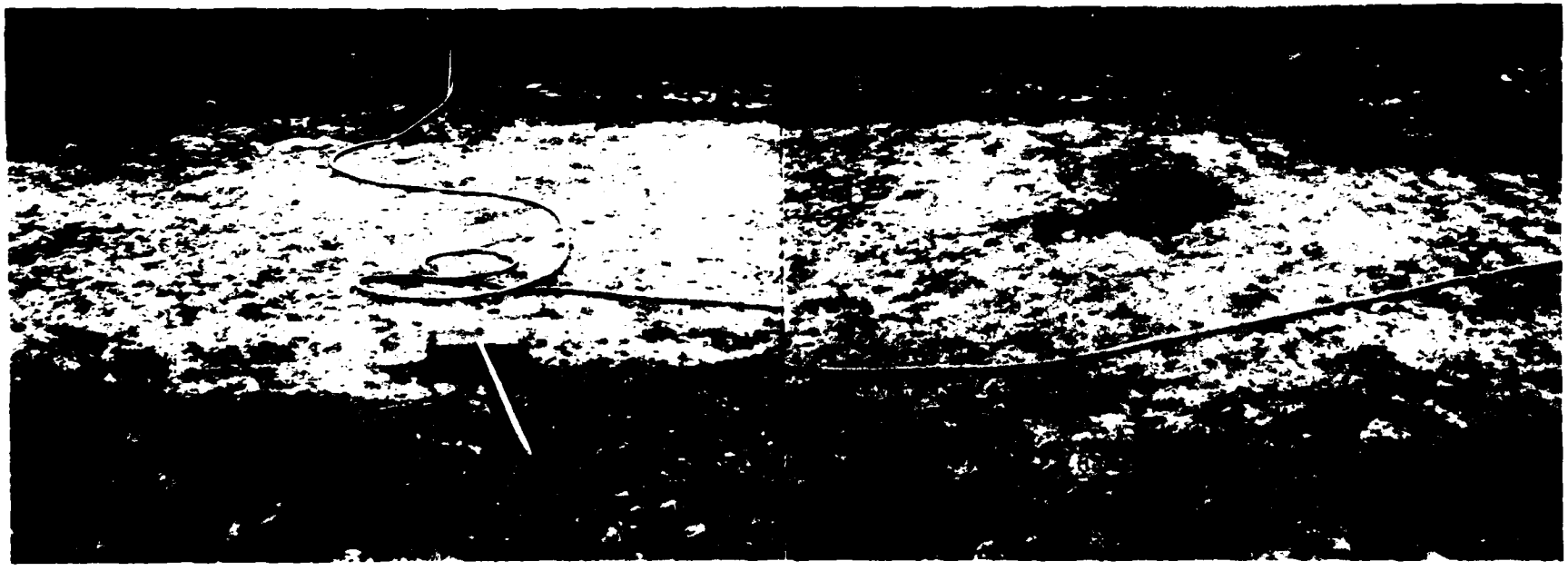


PHOTO NO. 210
UPSTREAM IMPERVIOUS CUT OFF FOR COFFERDAM. VIEW UPSTREAM ACROSS CUT OFF STATION 7+80.
SHALE WITH THIN LIMESTONE INTERBEDDS. NOTE NX CORE HOLE, LOCATION 565 FT. UPSTREAM.
23 OCTOBER 1979

PHOTO NO. 211
SEEP ENCOUNTERED IN COFFERDAM FOUNDATION
453' RIGHT STATION 9+32
24 OCTOBER 1979

PHOTO NO. 212
GENERAL VIEW OF COFFERDAM CUT OFF, LOOKING BACK STATION
TREATMENT OF SPRING IN ROCK AT LOWER RIGHT CORNER OF PHOTO
24 OCTOBER 1979

PHOTO NO. 213
CUT OFF TRENCH FOR STAGE I COFFERDAM UP RIGHT ABUTMENT
24 OCTOBER 1979

PHOTO NO. 214
IMPERVIOUS CUT OFF FOR COFFERDAM, RIGHT ABUTMENT STATION 10+75
6 NOVEMBER 1979

PHOTO NO. 300
STAGE I AND II COFFERDAM FOUNDATION EXCAVATION
LOOKING DOWNSTREAM FROM LEFT BANK
22 OCTOBER 1979

PHOTO NO. 301
STAGE I AND II COFFERDAM FOUNDATION EXCAVATION
LOOKING DOWNSTREAM FROM RIGHT BANK. PREDOMINANTLY SHALE.
23 OCTOBER 1979

PHOTO NO. 302
VIEW UPSTREAM FROM DOWNSTREAM DIVERSION COFFERDAM
ALONG OLD RIVER BED
25 AUGUST 1980

PHOTO NO. 303
REMOVAL OF EXISTING TEST TRENCH. LT GREY SLABS OF SHALE UNCOVERED
AT BOTTOM OF TRENCH. VIEW DOWNSTREAM TOWARD DIVERSION COFFERDAM.
28 AUGUST 1980

PHOTO NO. 304
DEWATERING SUMP, DOWNSTREAM TOE OF DAM IN OLD RIVER CHANNEL.
SUMP LOCATED IN GRAVEL ZONE, 3 FT DEEP, PUMPED 3 TIMES EACH SHIFT
28 AUGUST 1980

PHOTO NO. 305
STRIPPED FOUNDATION DOWNSTREAM OF CORE TRENCH
LOOKING TOWARDS DIVERSION COFFERDAM
5 SEPTEMBER 1980

PHOTO NO. 306
OLD RIVER CHANNEL EXCAVATION
VIEW ACROSS DOWNSTREAM TOE RIGHT TO LEFT
NOTICE SUMP
3 SEPTEMBER 1980

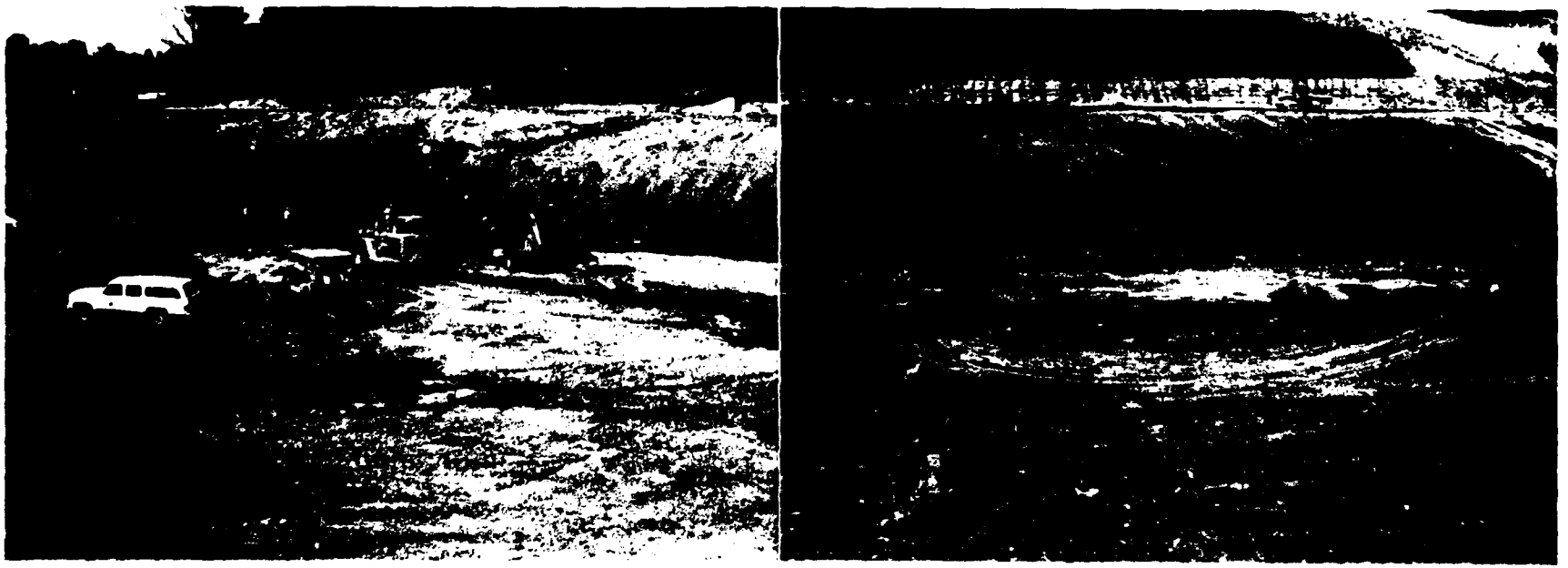


PHOTO NO. 307
STRIPPED FOUNDATION DOWNSTREAM OF CORE TRENCH
VIEW FROM LEFT ABUTMENT TO RIGHT END OF DIVERSION COFFERDAM
5 SEPTMEBER 1980

PHOTO NO. 308
STRIPPED FOUNDATION DOWNSTREAM OF CORE TRENCH
VIEW UPSTREAM ALONG RIGHT BANK
8 SEPTEMBER 1980

PHOTO NO. 309
RIGHT SIDE OF CONDUIT STATION 23 TO 24+50
CLEANING UP ROCK LEDGE IN PREPARATION FOR
PLACING BLANKET DRAIN AND RANDOM ROCK
18 MARCH 1981

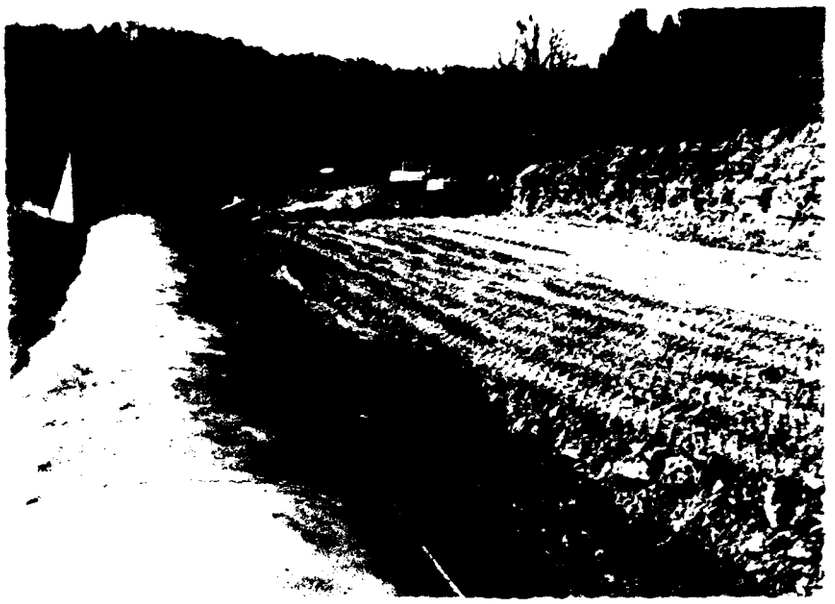


PHOTO NO. 310
RIGHT SIDE OF CONDUIT STATION 22+50 TO 24+20
RECENTLY PLACED RANDOM ROCK
25 MARCH 1981

PHOTO NO. 311
DOWNSTREAM DEWATERING DITCH, LEFT ABUTMENT
VIEW DOWNSTREAM SHOWING CLEANED DRAINAGE DITCH
PRIOR TO PLACING BLANKET DRAIN
24 JUNE 1981

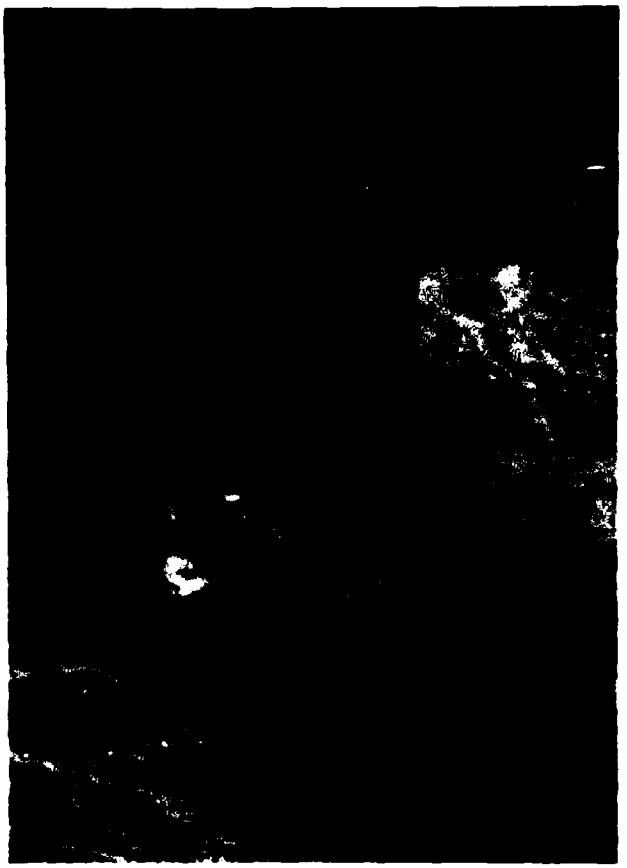


PHOTO NO. 312
LEFT ABUTMENT BLANKET DRAIN DOWNSTREAM OF CORE TRENCH
NOTE EXCAVATION OF ABUTMENT DRAIN
24 JULY 1981

PHOTO NO. 313
ABUTMENT DRAIN, LEFT ABUTMENT UPSTREAM DRAIN
24 JULY 1981

PHOTO NO. 314
MAIN DAM EMBANKMENT FROM COFFERDAM LOOKING
DOWNSTREAM RT SIDE, ELEVATION 540±
19 AUGUST 1981

PHOTO NO. 315
HAUL ROAD OFF BORROW AREA NO. 1 ADJACENT TO
RT ABUTMENT ONTO COFFERDAM
11 SEPTEMBER 1981

PHOTO NO. 400
DRILLING BLAST HOLES IN CORE TRENCH
LT ABUTMENT
2 APRIL 1980

PHOTO NO. 401
EXCAVATION SHOT ROCK IN CORE TRENCH
LT ABUTMENT TO WITHIN 2 FEET OF GRADE
3 APRIL 1980

PHOTO NO. 402
EXCAVATING CORE TRENCH LT ABUTMENT
8 AUGUST 1980

PHOTO NO. 403
EXCAVATING OVERBURDEN RT ABUTMENT CORE TRENCH
8 AUGUST 1980

PHOTO NO. 404
EXCAVATING ROCK LT ABUTMENT CORE TRENCH
8 AUGUST 1980

PHOTO NO. 405
CORE TRENCH, FINAL CLEANUP OF U/S FILTERS AGAINST ROCK
STA 7+15 TO 7+25 (RED ARROW) CUT OUT AREA IS 3 FT WIDE
25 NOVEMBER 1980

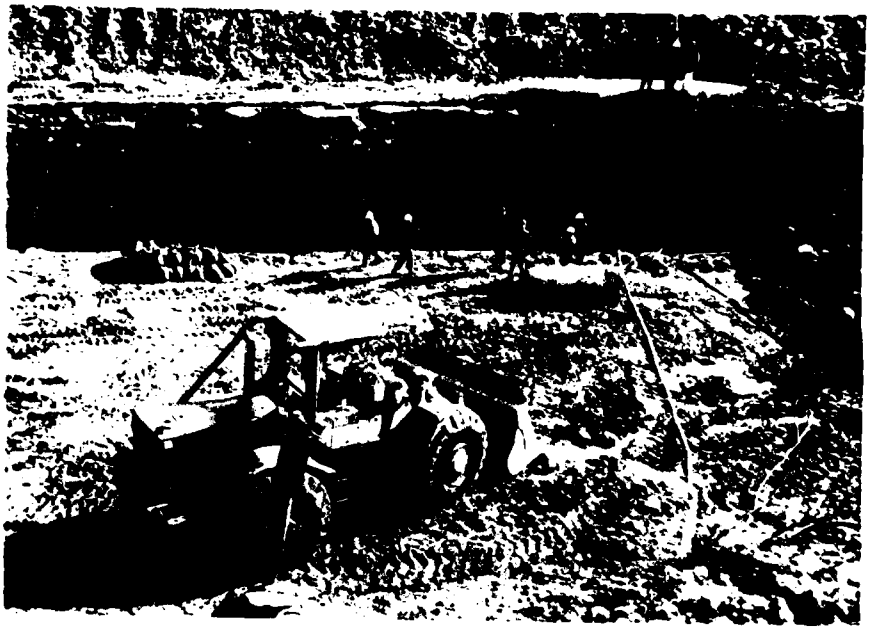


PHOTO NO. 406
VIEW U/S FROM D/S TOP OF SLOPE SHOWING CLEANUP OF U/S
FILTER ZONE STA 7+10 TO 7+75 RIGHT TO LEFT OF PHOTO
25 NOVEMBER 1980

PHOTO NO. 407
STATION 7+25 DAM CORE TRENCH. FINAL CLEANUP
OF U/S FILTER ZONE AGAINST ROCK. CLEANUP NOT COMPLETE.
25 NOVEMBER 1980

PHOTO NO. 408
DAM CORE TRENCH. FINAL CLEANUP OF D/S 3' FILTER ZONE FOUNDATION. VIEW BACK STATION TOWARDS LEFT ABUTMENT FROM STA 8+00
26 NOVEMBER 1980

PHOTO NO. 409
DAM CORE TRENCH. FINAL CLEANUP IN PROGRESS OF D/S 3' GRAVEL FILTER ZONE FOUNDATION. VIEW U/STA ALONG CLEANED AREA BETWEEN STA 7+15 AND 8+00
26 NOVEMBER 1980

PHOTO NO. 410
DAM CORE TRENCH. D/S 3' GRAVEL FILTER ZONE AT TRENCH FOUNDATION. STA 7+95 TO 8+00. FINAL CLEANUP IN PROGRESS
26 NOVEMBER 1980

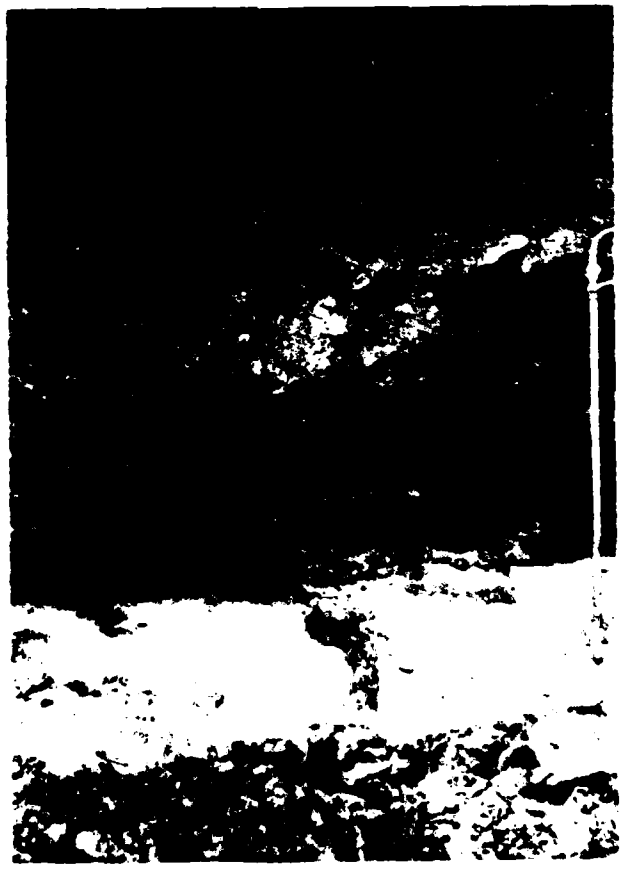


PHOTO NO. 411
DAM CORE TRENCH STA 7+75. FINAL CLEANUP OF D/S 3' GRAVEL FILTER ZONE IN PROGRESS
26 NOVEMBER 1980

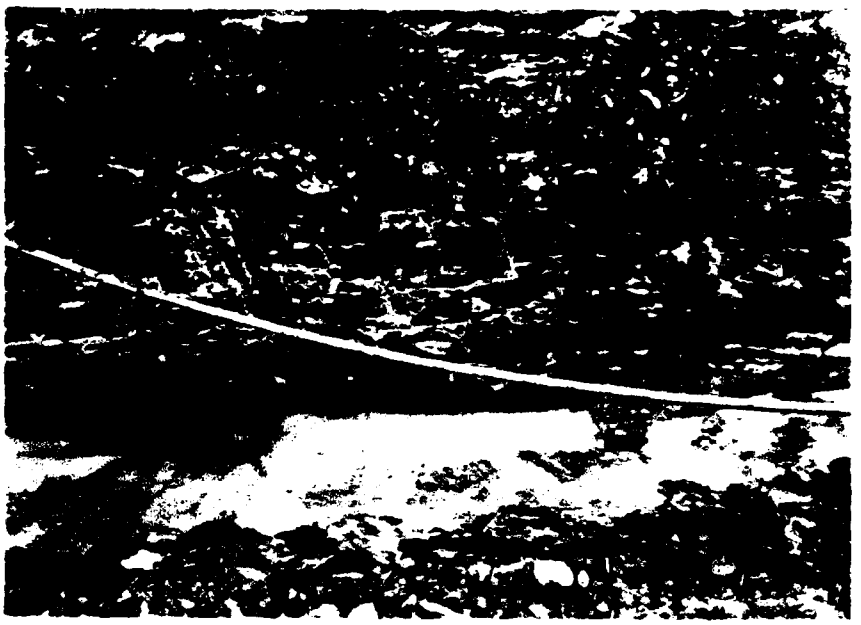


PHOTO NO. 412
CORE TRENCH STA 7+40 TO 7+50 D/S BACKSLOPE. FINAL CLEANUP OF
D/S FILTER ZONE FOUNDATION IN PROGRESS
26 NOVEMBER 1980

PHOTO NO. 413
DAM CORE TRENCH. REMOVAL OF LAST FOOT OF ROCK TO
FOUNDING ELEVATION WITH BACKHOE. FOUNDATION EXPOSED STA 7+10 TO 7+25
4 DECEMBER 1980

PHOTO NO. 414
DAM CORE TRENCH FOUNDATION, VIEW BACK STATION.
GCH #2 IN FOREGROUND
5 DECEMBER 1980

PHOTO NO. 415
DAM CORE TRENCH FOUNDATION, VIEW DOWNSTREAM FROM 25'
RT 7+60 TO 7+75 (STAKE IN UPPER TR CORNER) TO CENTERLINE
5 DECEMBER 1980

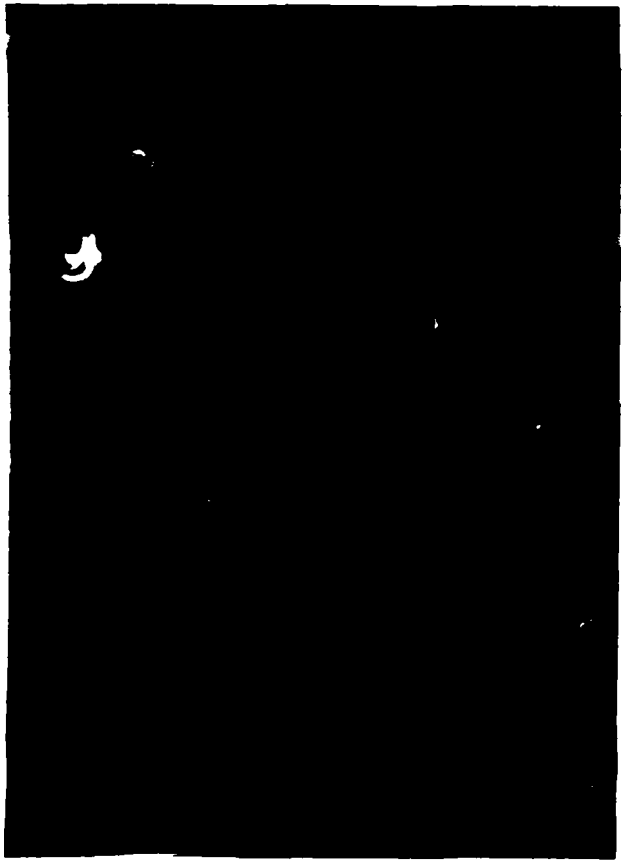


PHOTO NO. 416
DAM CORE TRENCH FOUNDATION. VIEW UPSTREAM FROM 25' LT 7+75 TO 7+85 TO CENTERLINE
5 DECEMBER 1980

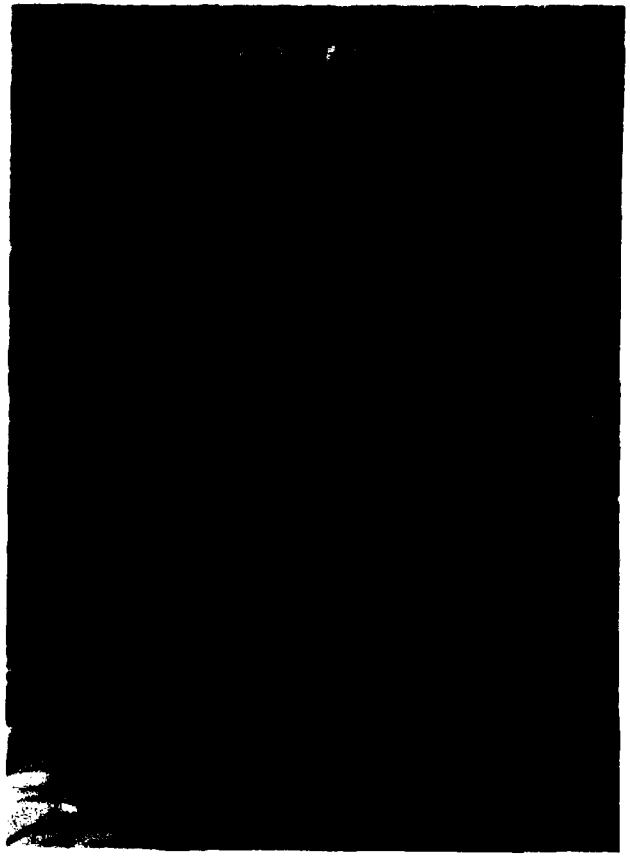


PHOTO NO. 417
DAM CORE TRENCH FOUNDATION. VIEW UPSTREAM FROM 20' LT 7+12 TO 7+25 TO CENTERLINE
5 DECEMBER 1980

PHOTO NO. 418
DAM CORE TRENCH FOUNDATION DETAIL OF ROCK SURFACE
STA 7+25, 10'LT
5 DECEMBER 1980

PHOTO NO. 419
DAM CORE TRENCH FOUNDATION, VIEW STA 8+00
BACK ALONG UPSTREAM SLOPE
5 DECEMBER 1980

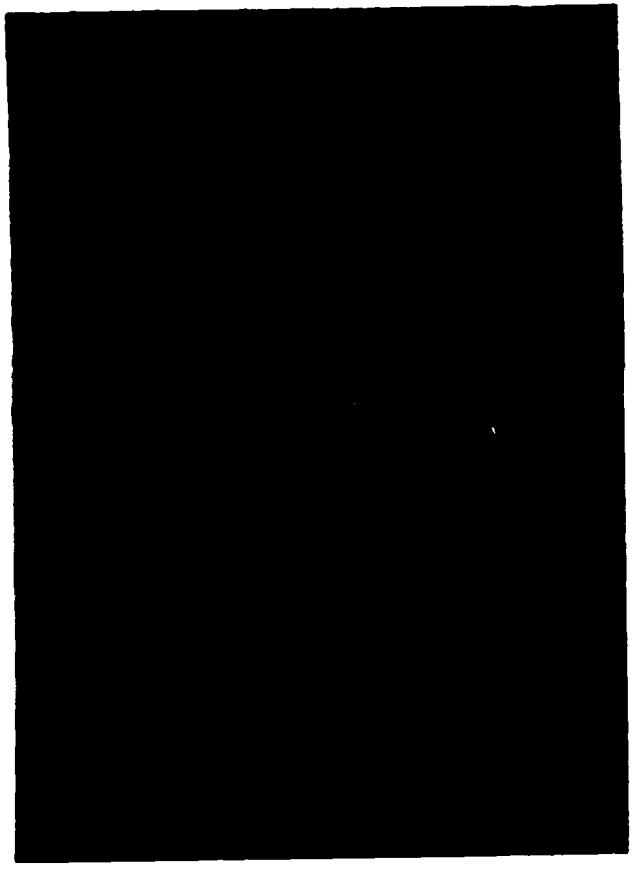


PHOTO NO. 420
DAM CORE TRENCH FOUNDATION. VIEW FROM 7+12,
20'-25' RT TO 7+25, 20'25' RT
5 DECEMBER 1980

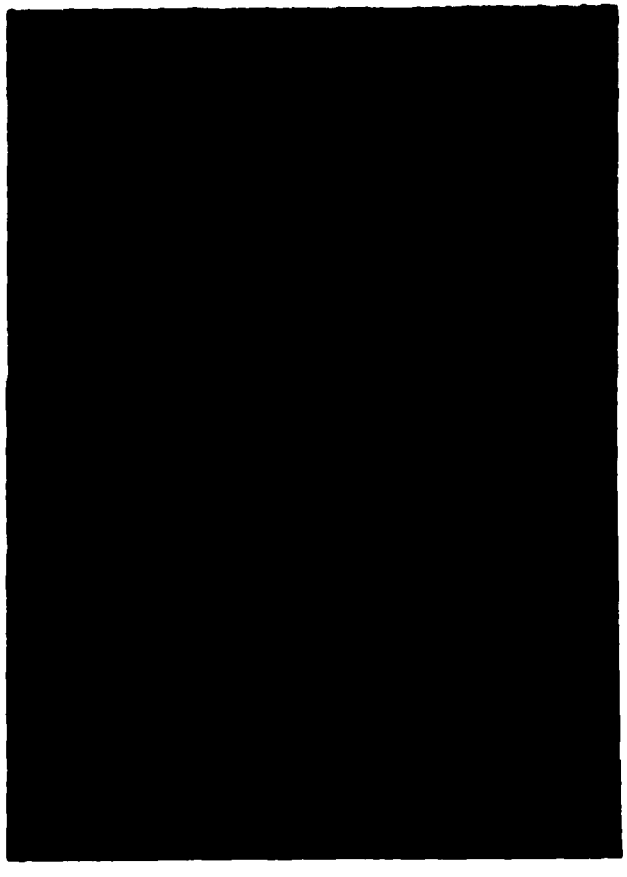


PHOTO NO. 421
DAM CORE TRENCH FOUNDATION. VIEW 25' RT 7+50
TO CENTERLINE 7+50
5 DECEMBER 1980

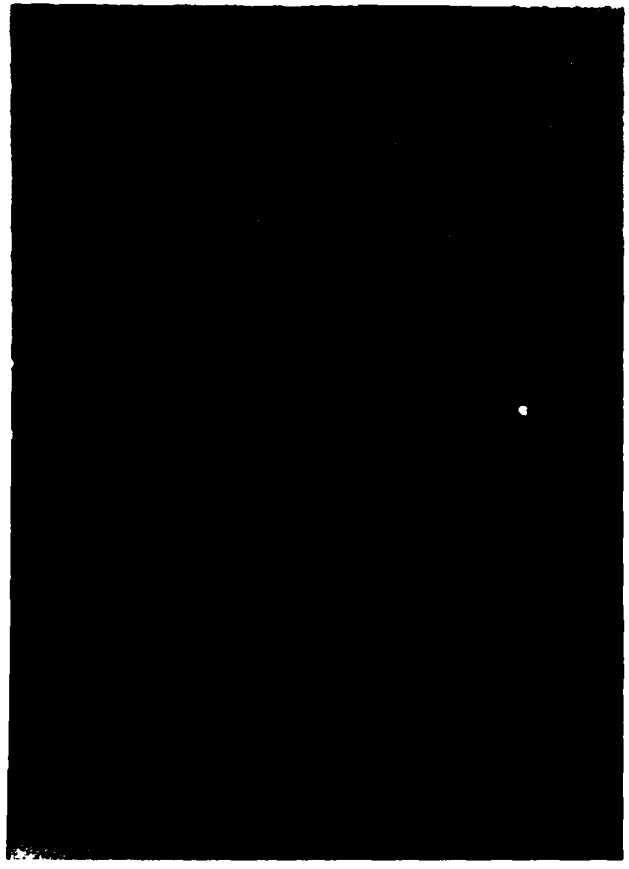


PHOTO NO. 422
DAM CORE TRENCH FOUNDATION
VIEW 25' RT 7+25 TO CENTERLINE 7+25
5 DECEMBER 1980

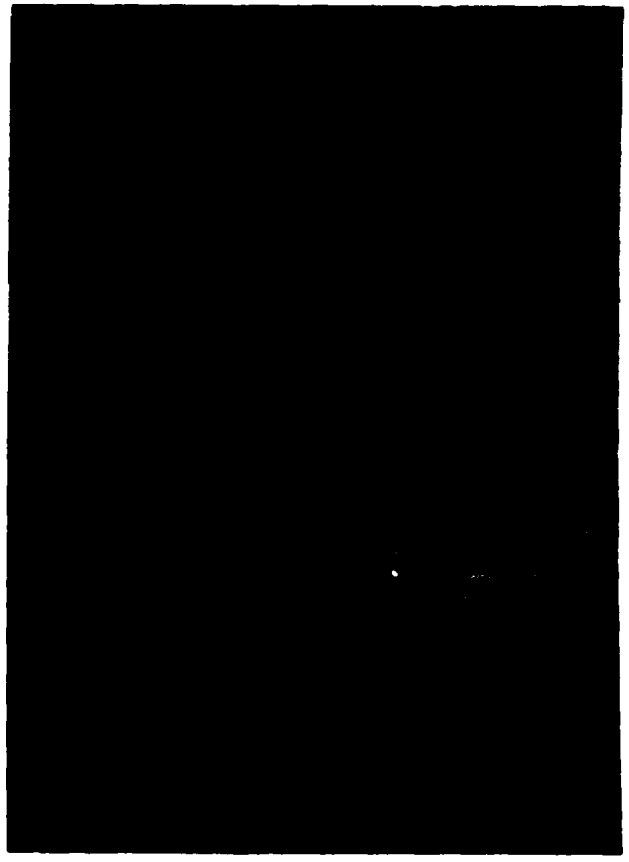


PHOTO NO. 423
DAM CORE TRENCH FOUNDATION
VIEW 25' RT 7+14 TO 7+14 CENTERLINE
5 DECEMBER 1980

PHOTO NO. 424
DAM CORE TRENCH FOUNDATION. VIEW BACK 18' RT 7+14
5 DECEMBER 1980

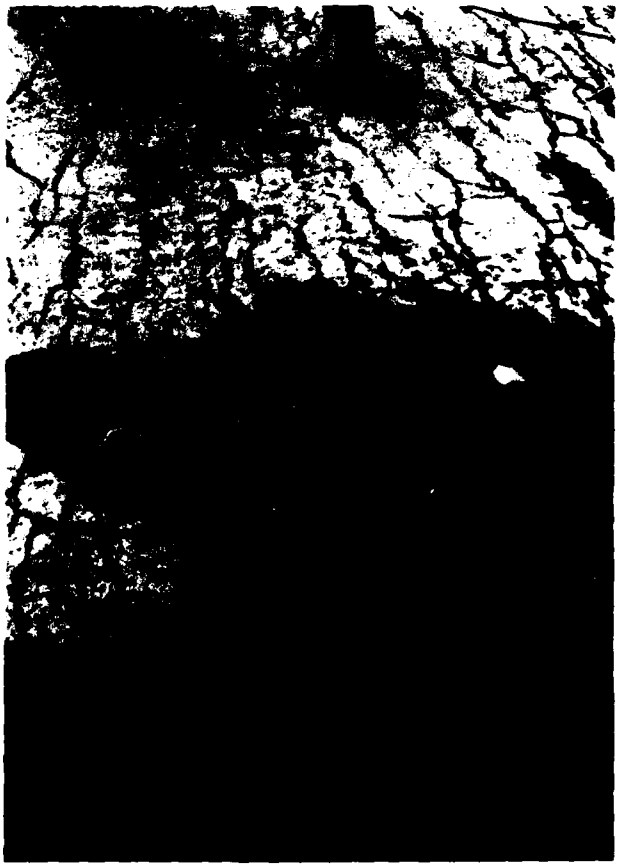


PHOTO NO. 425
DAM CORE TRENCH FOUNDATION. VIEW FROM 25' RT
7+35 + 7+45 TO DAM CENTERLINE
5 DECEMBER 1980

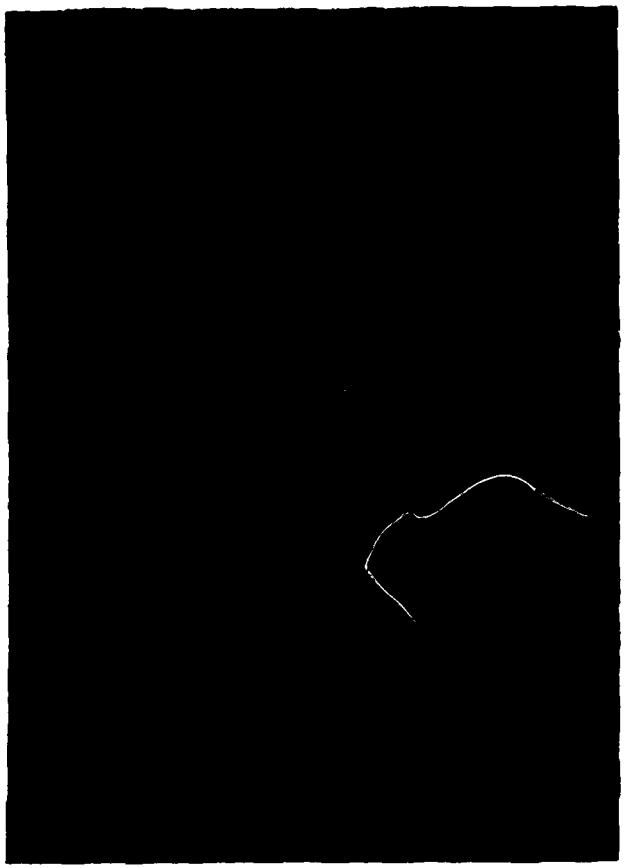


PHOTO NO. 426
DAM CORE TRENCH FOUNDATION. VIEW FROM 7+75
ALONG D/S TOE OF TRENCH
6 DECEMBER 1980

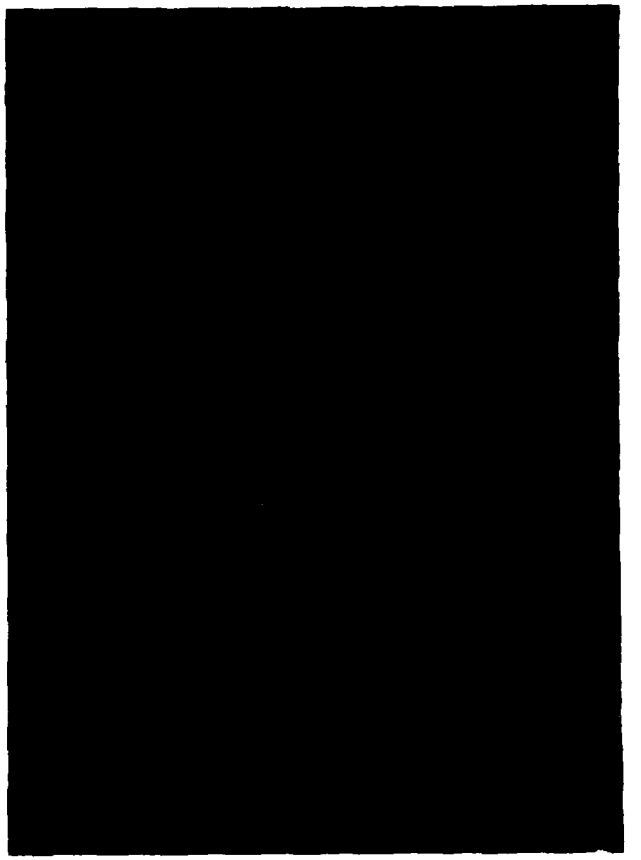


PHOTO NO. 427
DAM CORE TRENCH FOUNDATION. DETAIL VIEW OF
TREATMENT 5' D/S 7+68
5 DECEMBER 1980

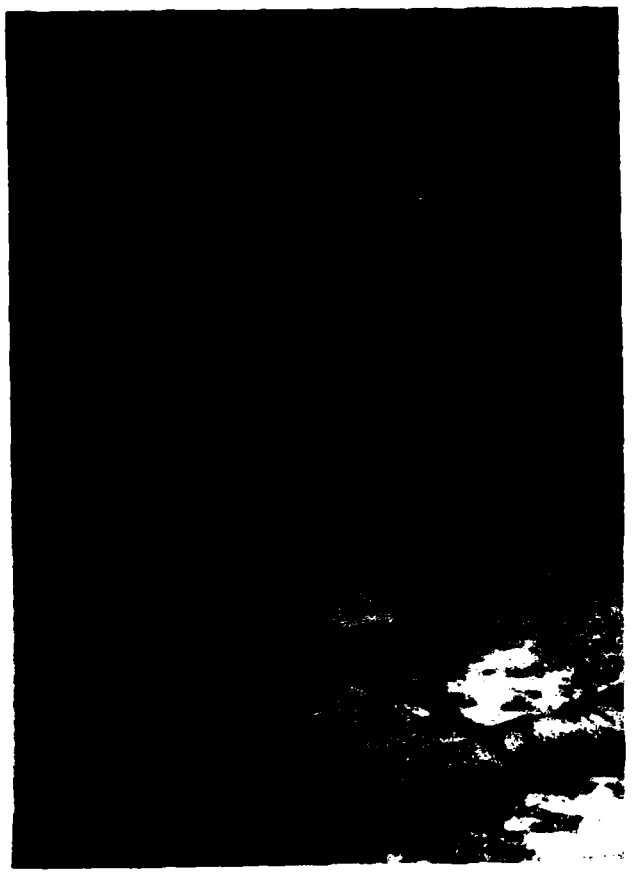


PHOTO NO. 428
DAM CORE TRENCH FOUNDATION. DETAIL OF U/S ROCK SLOPE 7+85
5 DECEMBER 1980

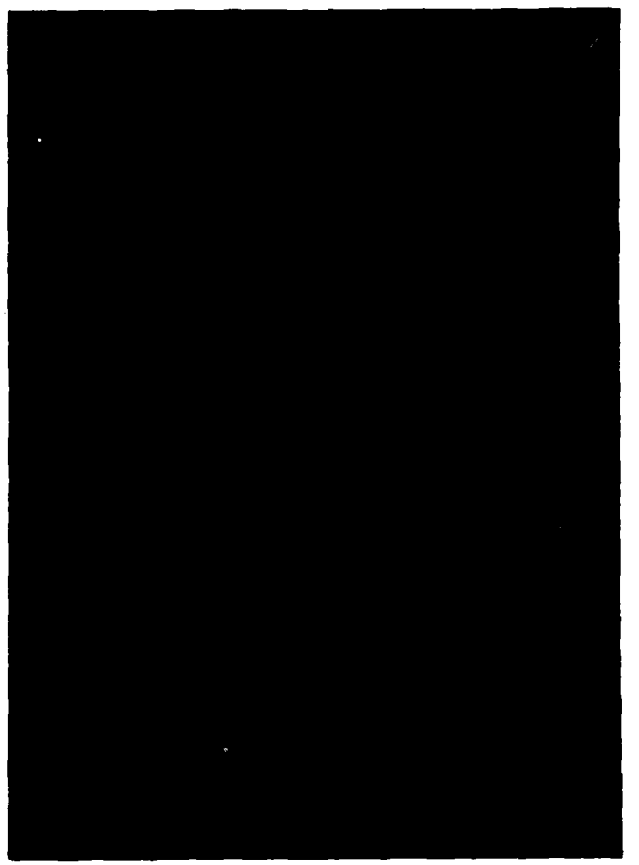


PHOTO NO. 429
DAM CORE TRENCH FOUNDATION. DETAIL OF 7+75 CENTERLINE
5 DECEMBER 1980

PHOTO NO. 430
DAM CORE TRENCH FOUNDATION. DETAIL OF ROCK SLOPE
STA 8+00 CENTERLINE
5 DECEMBER 1980

PHOTO NO. 431
DAM CORE TRENCH FOUNDATION. DETAIL OF 25' RT 7+25
5 DECEMBER 1980

PHOTO NO. 432
DAM CORE TRENCH FOUNDATION, VIEW D/S FROM 25' RT
7+75 TO 7+90 CENTERLINE
5 DECEMBER 1980

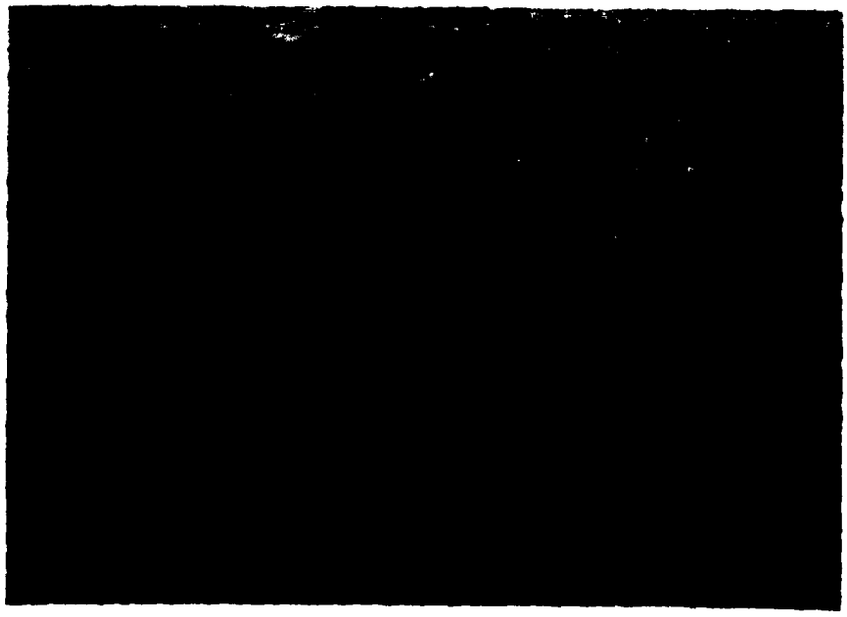


PHOTO NO. 433
DAM CORE TRENCH FOUNDATION, DETAIL OF AREA 10 TO 20'
U/S OF 7+12 TO 7+25
5 DECEMBER 1980

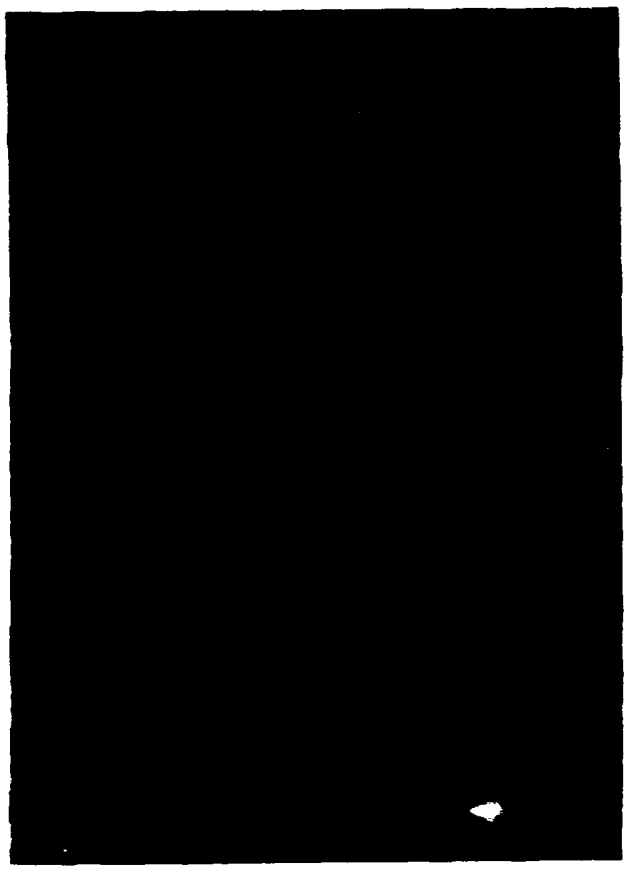


PHOTO NO. 434
DAM CORE TRENCH FOUNDATION. VIEW U/S
FROM 25' D/S OF 7+12 TO 7+25
5 DECEMBER 1980

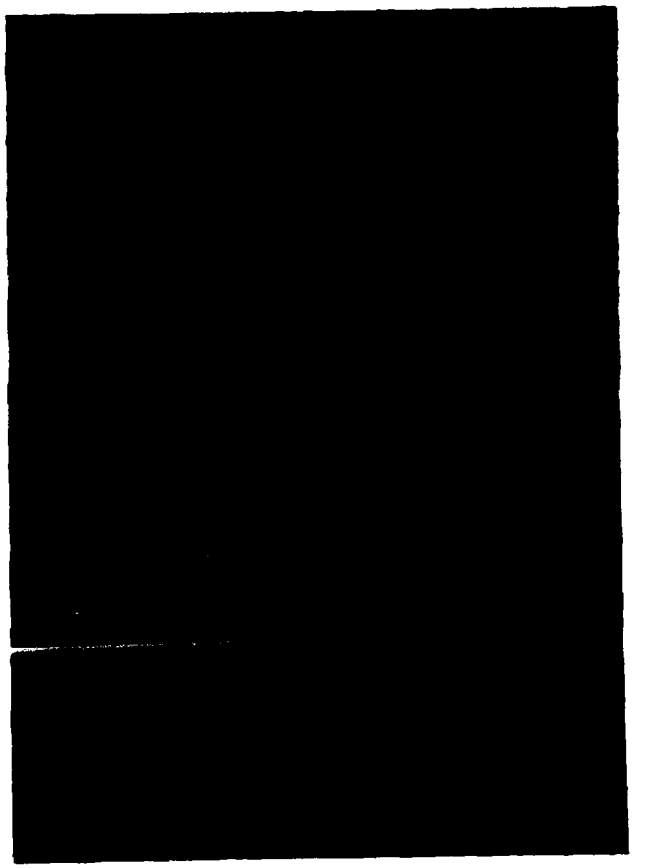


PHOTO NO. 435
DAM CORE TRENCH FOUNDATION. VIEW 7+12
TO 7+25 CENTERLINE
5 DECEMBER 1980

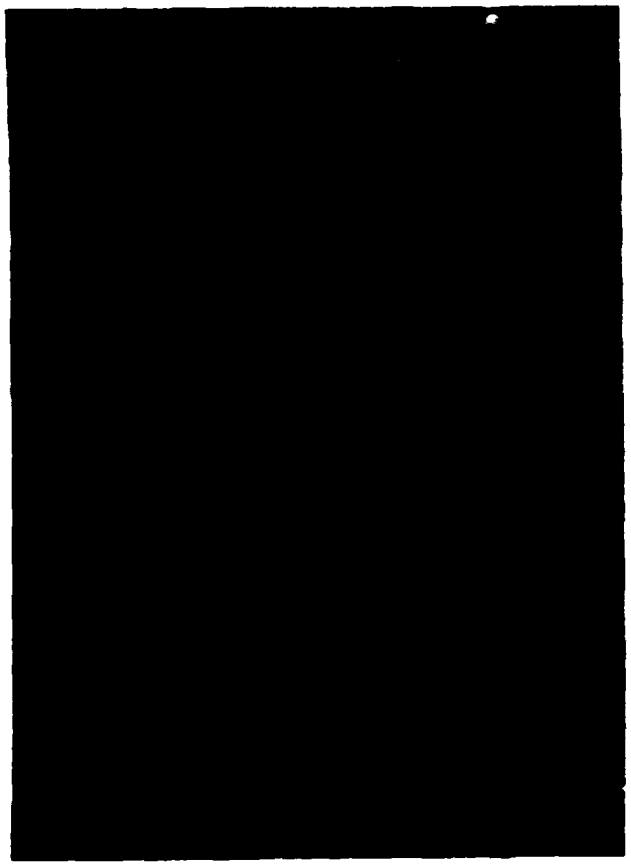


PHOTO NO. 436
DAM CORE TRENCH FOUNDATION. VIEW U/S
FROM 25' D/S OF 7+35 AND 7+50 TO CENTERLINE
5 DECEMBER 1980

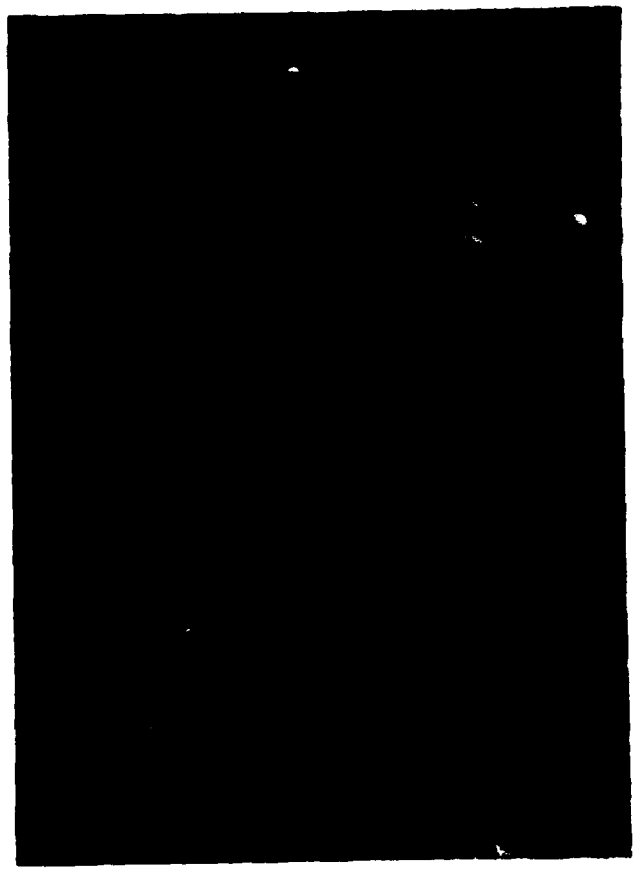


PHOTO NO. 437
DAM CORE TRENCH FOUNDATION. VIEW U/S
FROM 25' D/S OF 7+55 AND 7+75 TO CENTERLINE
5 DECEMBER 1980

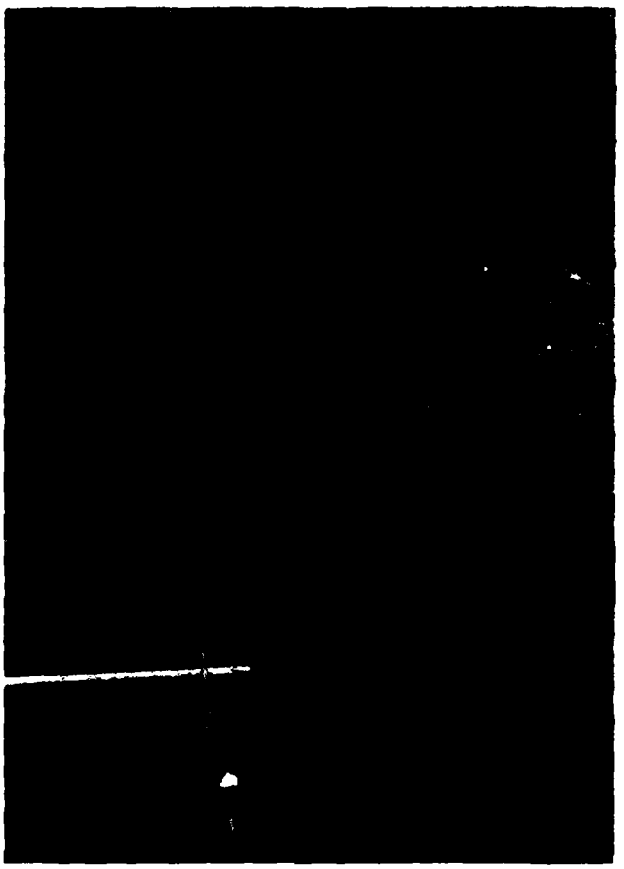


PHOTO NO. 438
DAM CORE TRENCH FOUNDATION, DETAIL 7+12 TO 7+25 CENTERLINE
5 DECEMBER 1980

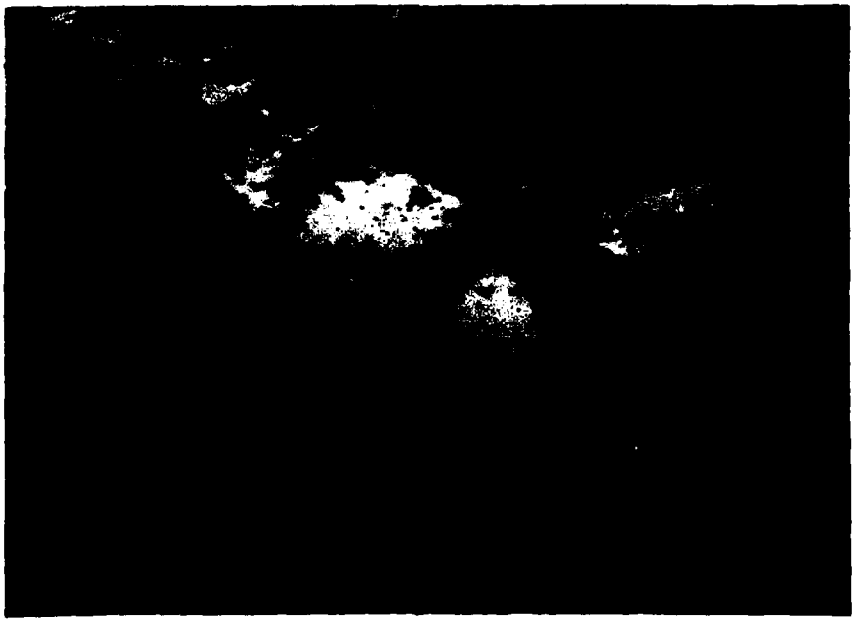


PHOTO NO. 439
DAM CORE TRENCH FOUNDATION, VIEW D/S FROM 25' U/S
STA 7+75 AND 8+00 TO 5' U/S
5 DECEMBER 1980

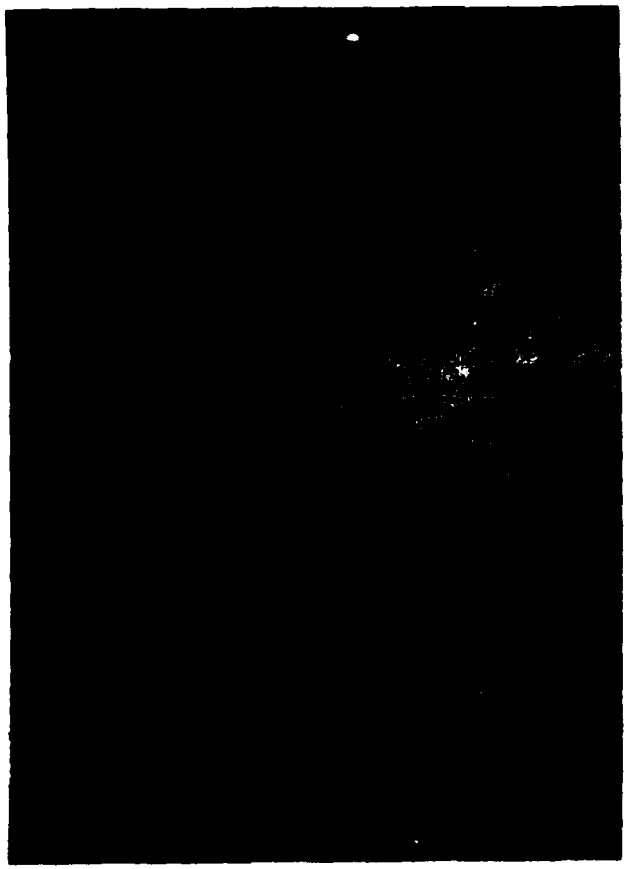


PHOTO NO. 440
DAM CORE TRENCH FOUNDATION. VIEW U/S
FROM 25' LT 7+85 AND 8+00 TO CENTERLINE
5 DECEMBER 1980

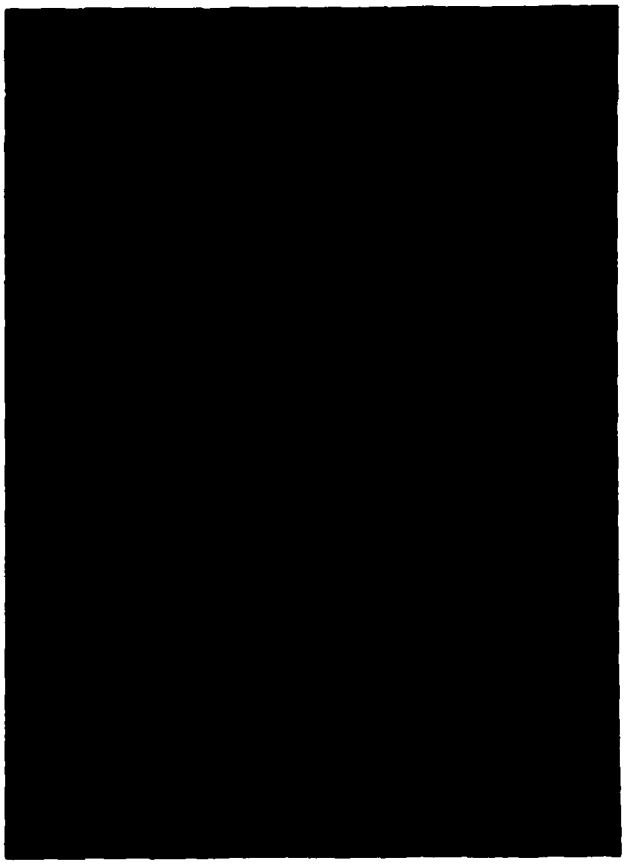


PHOTO NO. 441
DAM CORE TRENCH. DETAIL OF FRACTURES
IN LS FOUNDATION BED
6 DECEMBER 1980

PHOTO NO. 442
DAM CORE TRENCH TREATMENT 15' U/S 7+78
6 DECEMBER 1980

PHOTO NO.443
DAM CORE TRENCH TREATMENT STA 7+25, 10' D/S
TOWARDS D/S LEFT ABUTMENT CORNER
6 DECEMBER 1980

PHOTO NO. 444
DAM CORE TRENCH BOILS IN INITIAL FILL
7 DECEMBER 1980

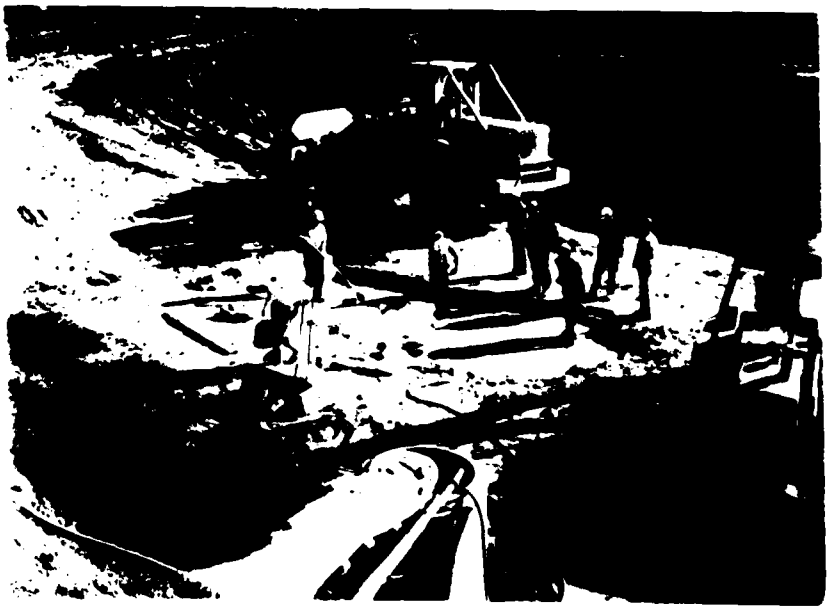


PHOTO NO. 445
DAM CORE TRENCH TREATMENT OF BOILS IN INITIAL FILL
7 DECEMBER 1980

PHOTO NO. 446
DAM CORE TRENCH TREATMENT OF BOILS STA 7+25
7 DECEMBER 1980

PHOTO NO. 447
DAM CORE TRENCH SAND BAG RINGS AROUND BOILS
7 DECEMBER 1980

PHOTO NO. 448
DAM CORE TRENCH BOIL TREATMENT
7 DECEMBER 1980

PHOTO NO. 449
DAM CORE TRENCH BOIL TREATMENT
7 DECEMBER 1980

PHOTO NO. 450
DAM CORE TRENCH ALONG U/S SLOPE AFTER
REMOVING WINTER SHUTDOWN PROTECTIVE FILL
2 APRIL 1981

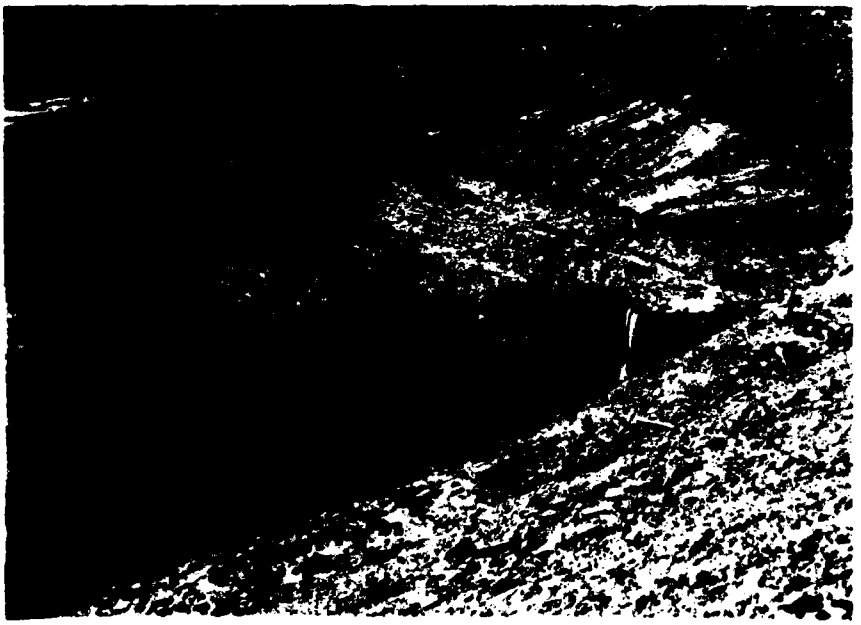


PHOTO NO. 451
DAM CORE TRENCH CLEANED TO TOP OF IMPERVIOUS FILL
COVERED FOR WINTER SHUTDOWN
2 APRIL 1981

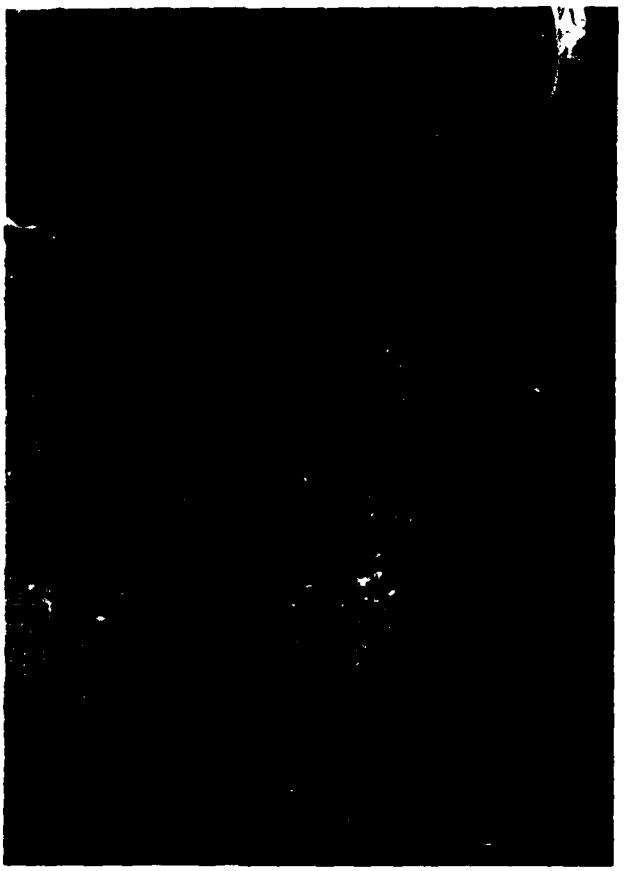


PHOTO NO. 452
DAM CORE TRENCH VIEW D/S ALONG ROCK SLOPE STA 7+00 TO 7+10.
ROCK BEING CLEANED IN PREPARATION FOR RESUMPTION OF
IMPERVIOUS FILL PLACEMENT
2 APRIL 1981

PHOTO NO. 453
DAM CORE TRENCH, VIEW FROM CENTERLINE 7+00 LOOKING U/S
FINAL CLEANING IN PROGRESS
15 APRIL 1981

PHOTO NO. 454
DAM CORE TRENCH. STA 7+00 TO 6+75 U/S OF CENTERLINE
15 APRIL 1981

PHOTO NO. 455
DAM CORE TRENCH. STA 8+00 TO 8+25 D/S HALF OF TRENCH
VIEW U/S TOWARDS CONDUIT FROM TOP OF TRENCH
16 APRIL 1981

PHOTO NO. 456
DAM CORE TRENCH. STA 8+00 TO 8+25 D/S HALF OF TRENCH
16 APRIL 1981

PHOTO NO. 457
DAM CORE TRENCH STA 8+25 TO 8+50, D/S HALF OF TRENCH
FROM TOP OF TRENCH
28 APRIL 1981

PHOTO NO. 458
DAM CORE TRENCH STA 6+75 TO 6+65, VIEW U/S
FROM TOP D/S TRENCH SLOPE
29 APRIL 1981

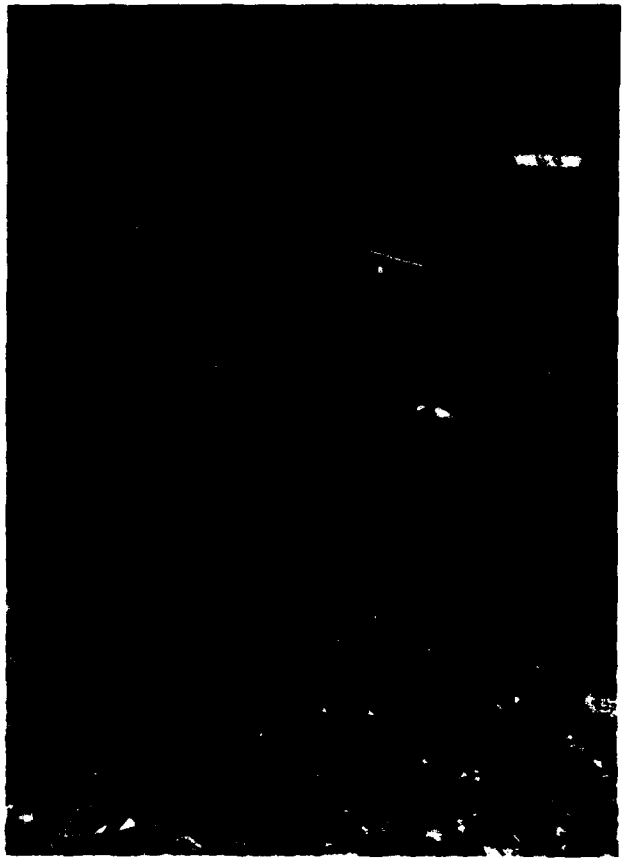


PHOTO NO. 459
DAM CORE TRENCH STA 8+50 TO 8+60
VIEW U/S FROM D/S SLOPE
1 MAY 1981

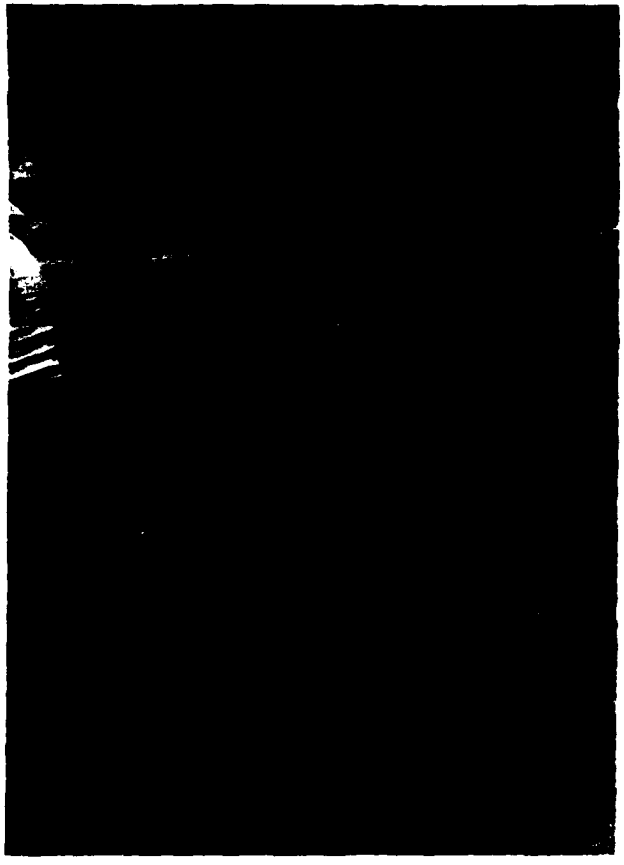


PHOTO NO. 460
DAM CORE TRENCH STA 8+50 TO 8+60 CENTERLINE
1 MAY 1981

PHOTO NO. 461
DAM CORE TRENCH STA 6+65 TO 6+50
VIEW U/S FROM TOP D/S SLOPE
4 MAY 1981

PHOTO NO. 462
DAM CORE TRENCH. STA 6+65 TO 6+50. VIEW INTO LEFT ABUTMENT JUST D/S OF CENTERLINE
4 MAY 1981

PHOTO NO. 463
DAM CORE TRENCH. STA 6+50 TO 6+35
VIEW U/S FROM TOP D/S SLOPE
5 MAY 1981

PHOTO NO. 464
DAM CORE TRENCH STA 8+60 TO 8+70
VIEW AT D/S FILTER ZONE
5 MAY 1981

PHOTO NO. 465
DAM CORE TRENCH STA 8+60 TO 8+70
VIEW AHEAD U/S OF CENTERLINE
5 MAY 1981

PHOTO NO. 466
DAM CORE TRENCH STA 8+60 TO 8+70
VIEW U/S FROM TOP D/S SLOPE
5 MAY 1981

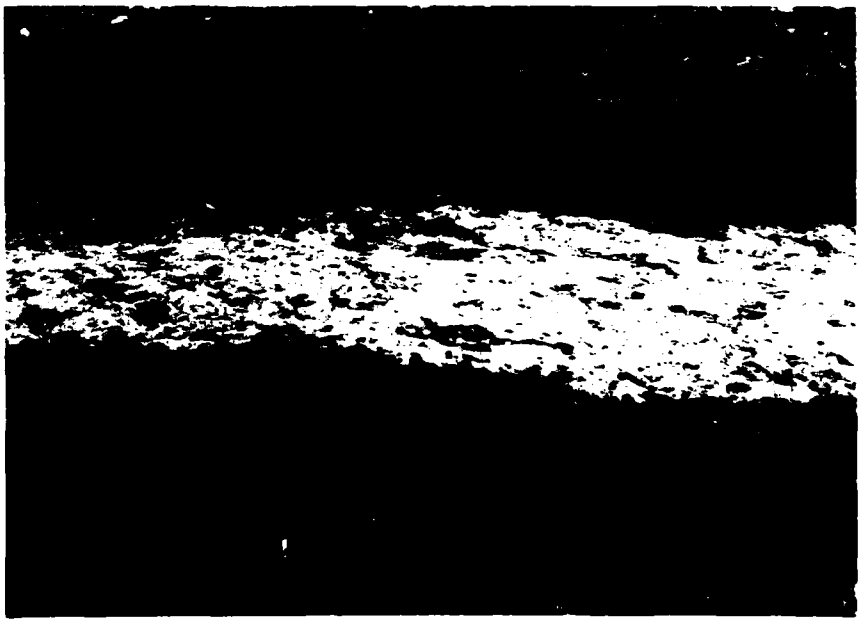


PHOTO NO. 467
DAM CORE TRENCH STA 6+50 TO 6+35
VIEW BACK JUST U/S OF D/S FILTER ZONE
5 MAY 1981

PHOTO NO. 468
DAM CORE TRENCH STA 9+50 TO 9+70, VIEW U/S
NOTE SL STAINED LS BEDS (THIN) 9+65 TO 9+70
17 JUNE 1981

PHOTO NO. 469
DAM CORE TRENCH. ROCK CONCRETE CONTACT DETAIL VIEW
ELEV 484.4, AT CONDUIT PLUG. STA 9+70
22 JUNE 1981

PHOTO NO. 470
DAM CORE TRENCH, ROCK CONCRETE CONTACT DETAIL VIEW,
ELEV 484.4, LOOKING U/S ALONG STA 9+95
22 JUNE 1981

PHOTO NO. 471
DAM CORE TRENCH, VIEW UPSTREAM 9+70 TO 10+00. (NITE SHIFT)
22 JUNE 1981

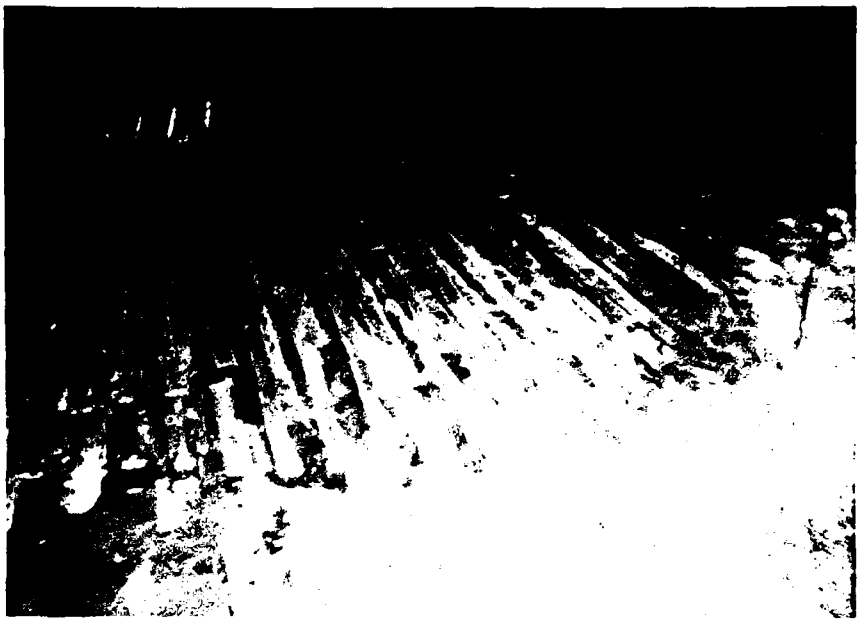


PHOTO NO. 472
DAM CORE TRENCH, STA 10+25 TO 10+40, VIEW U/S SHOWS
CONDUIT PLUG-ROCK CONTACT
8 JULY 1981

PHOTO NO. 473
DAM CORE TRENCH, STA 10+25 TO 10+45, D/S HALF OF TRENCH
VIEW U/S
8 JULY 1981

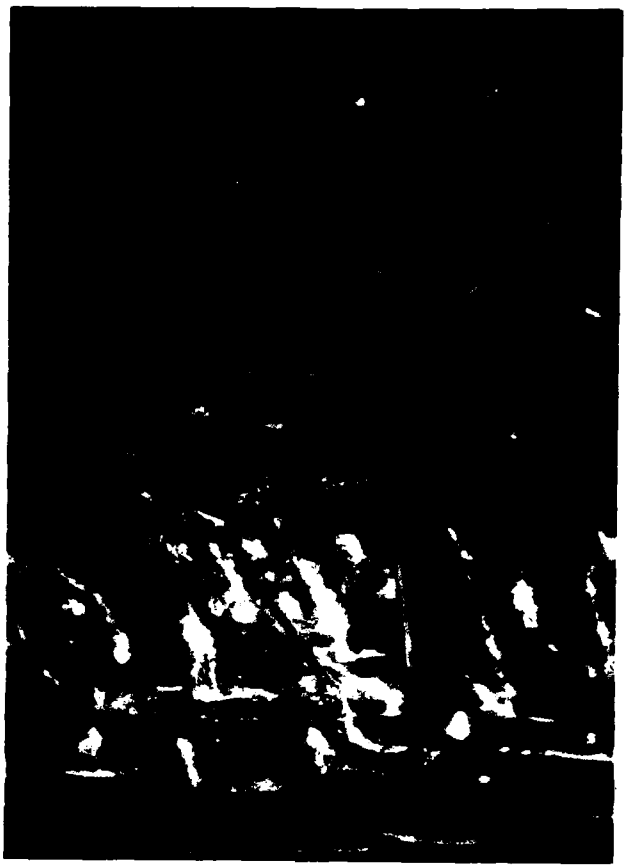


PHOTO NO. 474
DAM CORE TRENCH. RT ABUT SLOPE STA 10+45 NEAR CENTERLINE
NOTE HIGHLY (W) LS BDS. ADDITIONAL EXCAVATION AND CLEANING
TO BE PERFORMED
8 JULY 1981

PHOTO NO. 475
DAM CORE TRENCH. STA 10+25 TO 10+45, VIEW U/S
CLEANUP NOT COMPLETE
9 JULY 1981

PHOTO NO. 476
DAM CORE TRENCH, STA 10+25 TO 10+45, D/S HALF OF TRENCH
9 JULY 1981

PHOTO NO. 477
DAM CORE TRENCH, STA 10+45 TO 10+65, D/S HALF OF TRENCH
10 JULY 1981

PHOTO NO. 478
DAM CORE TRENCH. STA 10+65 EXCAVATION FOR DENTAL
WALL VIEW D/S FROM U/S TOE OF TRENCH
14 JULY 1981

PHOTO NO. 479
DAM CORE TRENCH. STA 10+65 DETAIL OF
DENTAL WALL EXCAVATION
14 JULY 1981

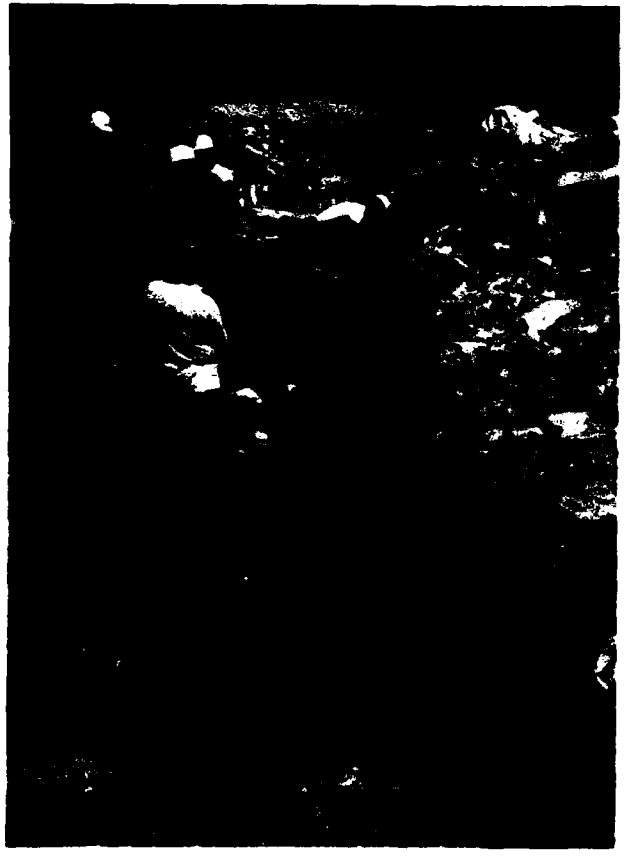


PHOTO NO. 480
DAM CORE TRENCH STA 10+65
PLACING DENTAL WALL
14 JULY 1981

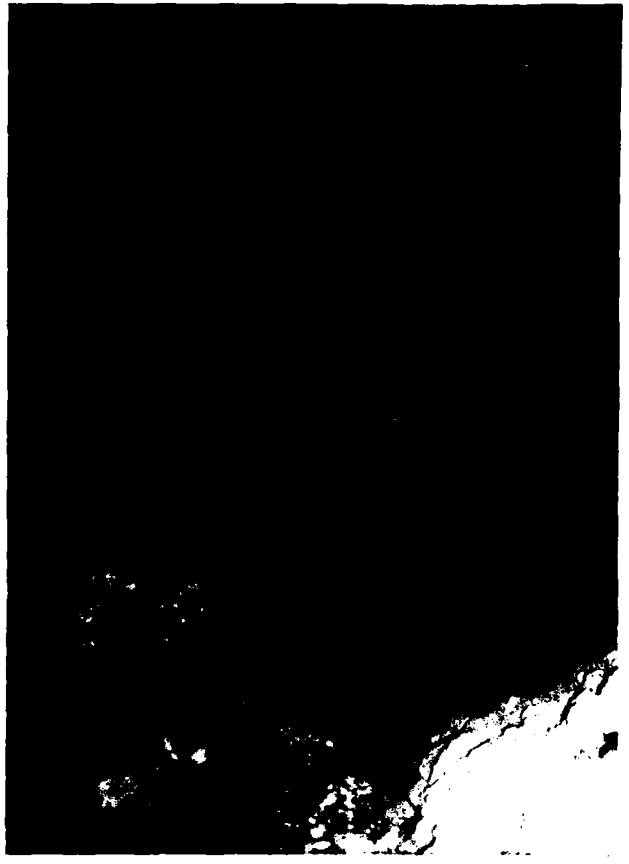


PHOTO NO. 481
DAM CORE TRENCH STA 10+60 TO 10+75,
VIEW D/S AT DENTAL WALL CONTACT 10+65
22 JULY 1981

PHOTO NO. 482
DAM CORE TRENCH STA 10+60 TO 10+75 VIEW D/S AT 10+70
22 JULY 1981

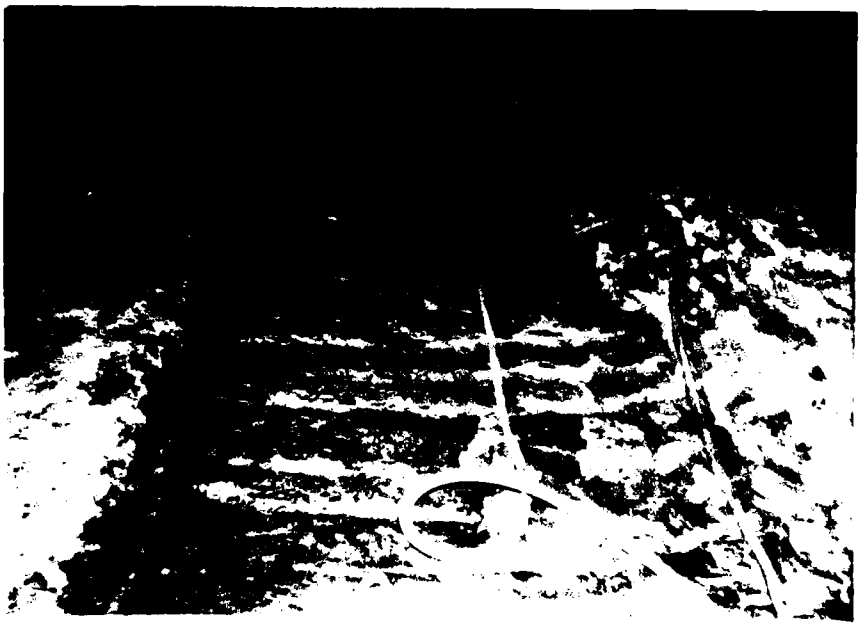


PHOTO NO. 483
DAM CORE TRENCH STA 10+65 VIEW D/S ADJACENT TO DENTAL WALL
22 JULY 1981

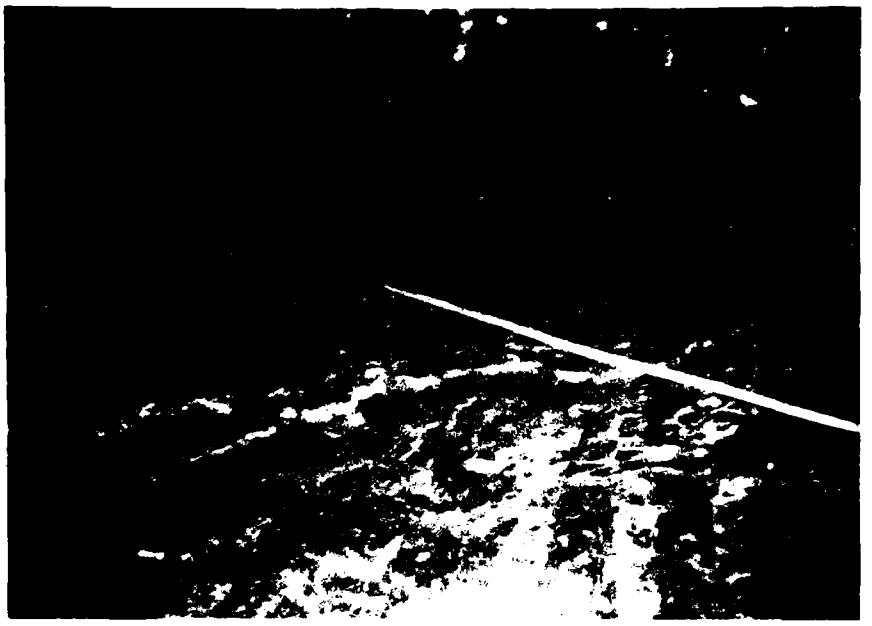


PHOTO NO. 484
DAM CORE TRENCH, STA 10+60 TO 10+75, VIEW INTO RIGHT ABUTMENT
22 JULY 1981

PHOTO NO. 485
DAM CORE TRENCH STA 10+80 (W) & STAINED VERTICAL JOINT
OUTLINED IN RED TO BE DENTAL TREATED
23 JULY 1981

PHOTO NO. 486
DAM CORE TRENCH, VIEW U/S ALONG STA 10+65
DENTAL WALL
23 JULY 1981

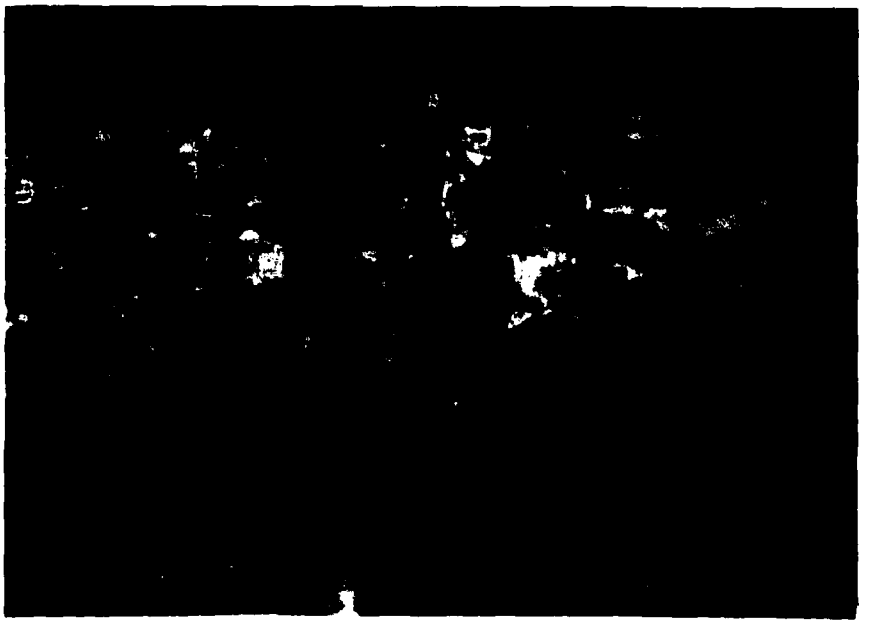


PHOTO NO. 487
DAM CORE TRENCH STA 10+75 RED OUTLINED FOR GROUT DENTAL TREATMENT
23 JULY 1981

PHOTO NO. 488
DAM CORE TRENCH STA 10+75 RED OUTLINED AREA FOR DENTAL TREATMENT
23 JULY 1981

PHOTO NO. 489
DAM CORE TRENCH STA 10+75 RED OUTLINED AREA FOR DENTAL TREATMENT
23 JULY 1981

PHOTO NO. 490
DAM CORE TRENCH STA 10+75 RED OUTLINED AREAS FOR
DENTAL TREATMENT
23 JULY 1981

PHOTO NO. 491
DAM CORE TRENCH STA 10+75 DENTAL TREATMENT AREAS IN RED
23 JULY 1981

PHOTO NO. 492
DAM CORE TRENCH STA 10+75 TO 10+80
DENTAL TREATMENT AREAS
23 JULY 1981

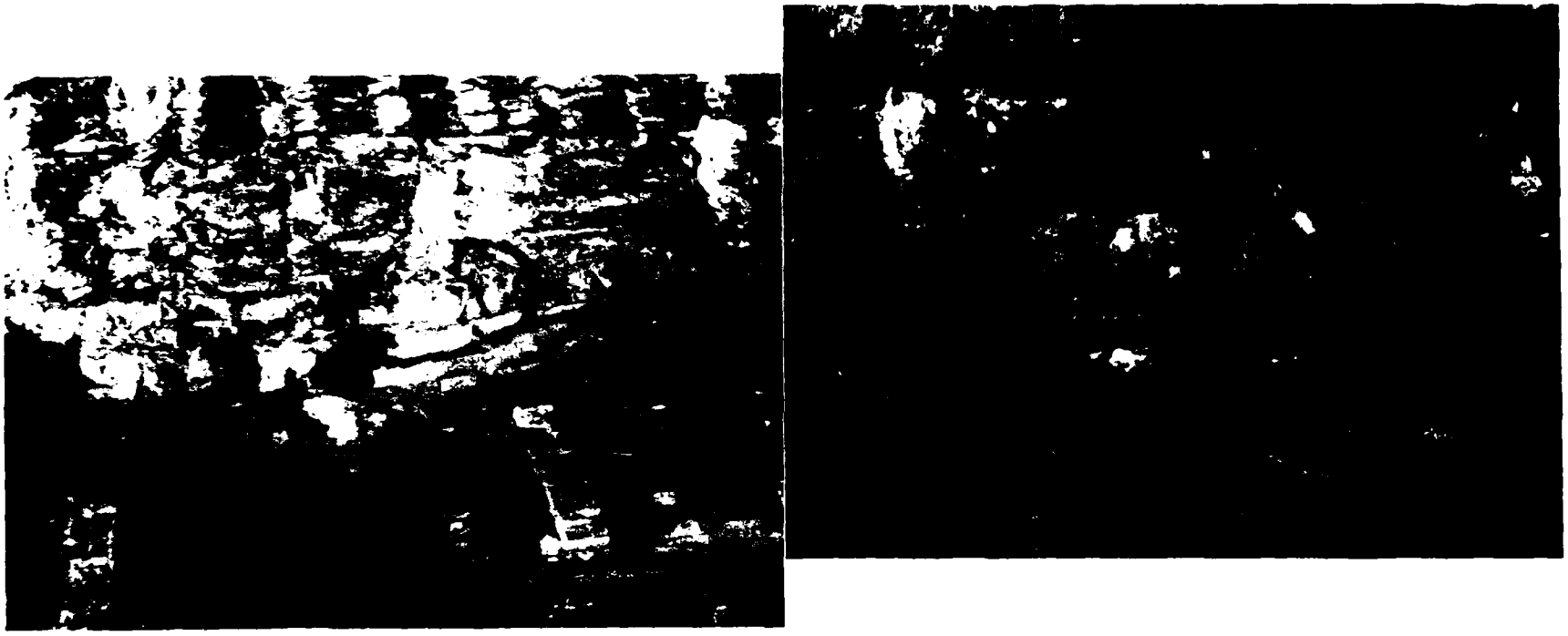


PHOTO NO. 493
DAM CORE TRENCH STA 10+80 DENTAL TREATMENT AREAS IN RED
23 JULY 1981

PHOTO NO. 494
DAM CORE TRENCH STA 10+80 CENTERLINE
DENTAL TREATMENT AREAS
23 JULY 1981

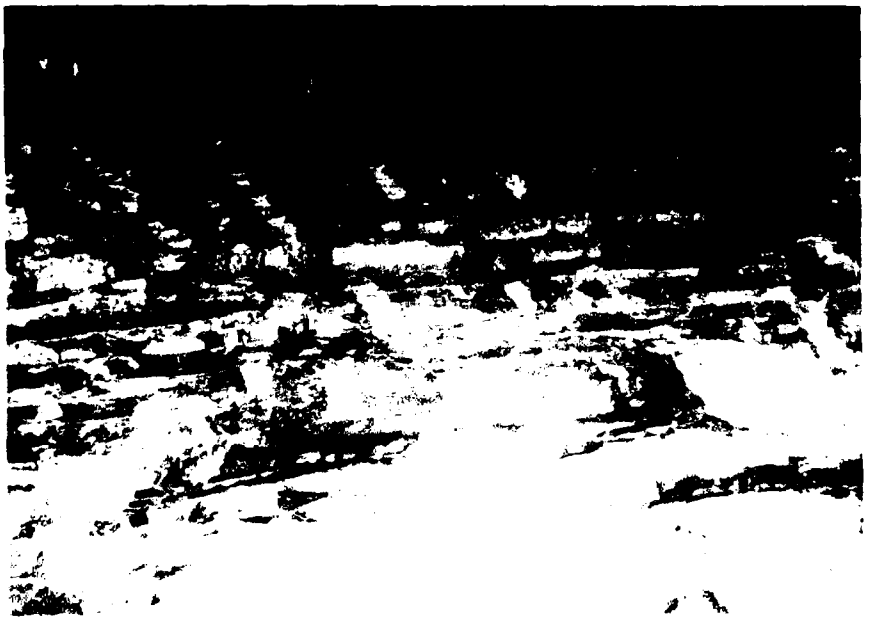


PHOTO NO. 495
DAM CORE TRENCH STA 10+85 NEAR D/S LIMITS OF TRENCH
NOTE CONDITION OF V. SL. (W) LS BEDS
27 JULY 1981

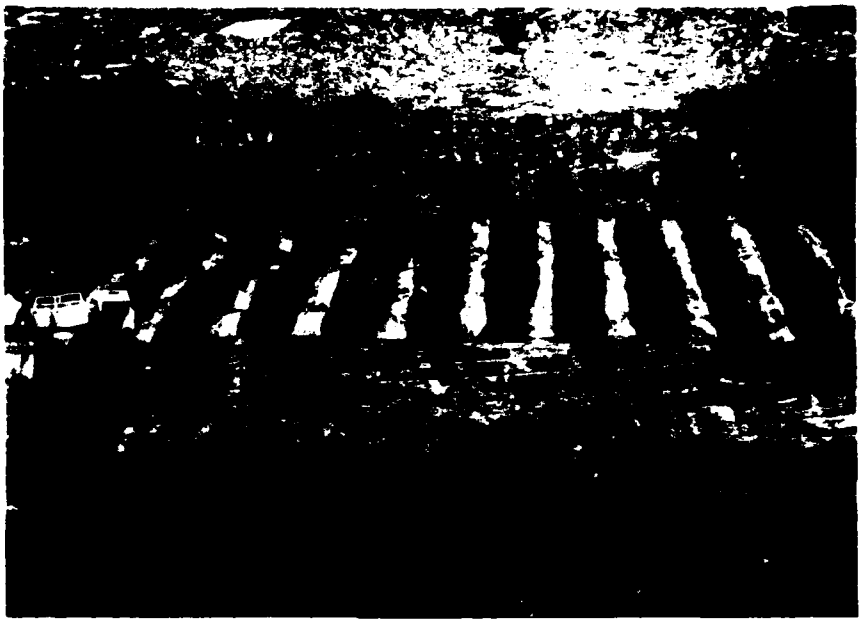


PHOTO NO. 496
DAM CORE TRENCH STA 10+80 TO 10+95
PLASTIC COVERING 10+85 TO 10+95
28 JULY 1981

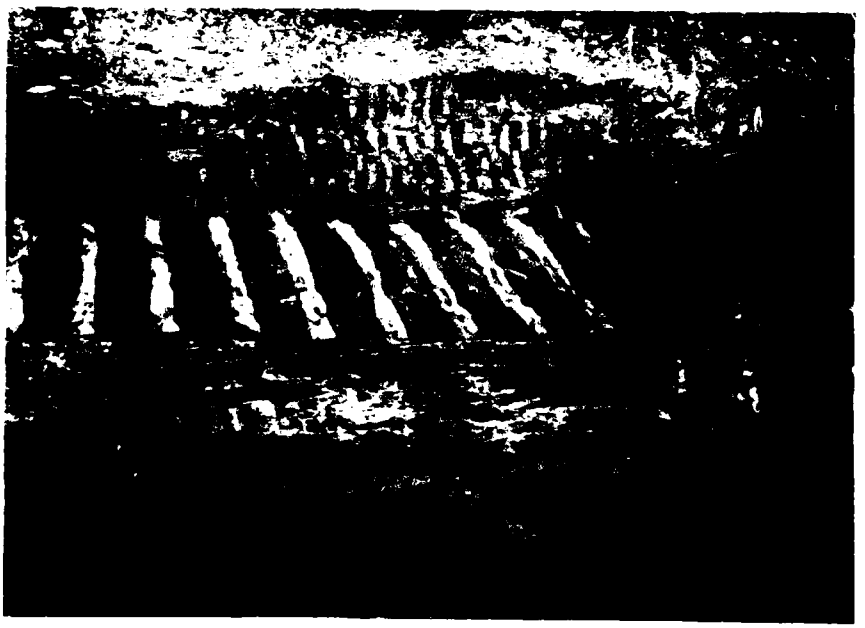
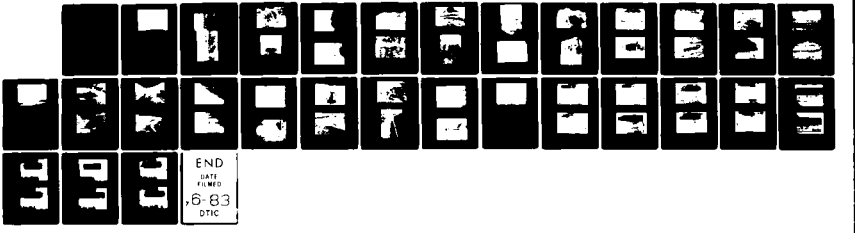


PHOTO NO. 497
DAM CORE TRENCH STA 10+80 TO 10+95, U/S CENTERLINE
28 JULY 1981

AD-A128 092 FOUNDATION REPORT DAM & SPILLWAY TAYLORSVILLE LAKE OHIO 3/3
RIVER BASIN SALT RIVER KENTUCKY(U) ARMY ENGINEER
DISTRICT LOUISVILLE KY S BARTLETT ET AL. APR 83

UNCLASSIFIED F/G 13/13 NL



END
DATE FILMED
6-83
DTIC

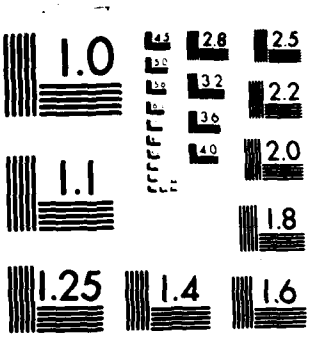


PHOTO NO. 498
DAM CORE TRENCH STA 11+00 TO 11+15,
U/S LIMITS OF TRENCH
3 AUGUST 1981

PHOTO NO. 499
DAM CORE TRENCH STA 11+00 TO 11+15
CENTERLINE
3 AUGUST 1981

PHOTO NO. 500
DAM CORE TRENCH CLEANING STA 4+55 TO 4+40, VIEW D/S
4 AUGUST 1981

PHOTO NO. 501
DAM CORE TRENCH STA 11+15 TO 11+35, CENTERLINE
10 AUGUST 1981

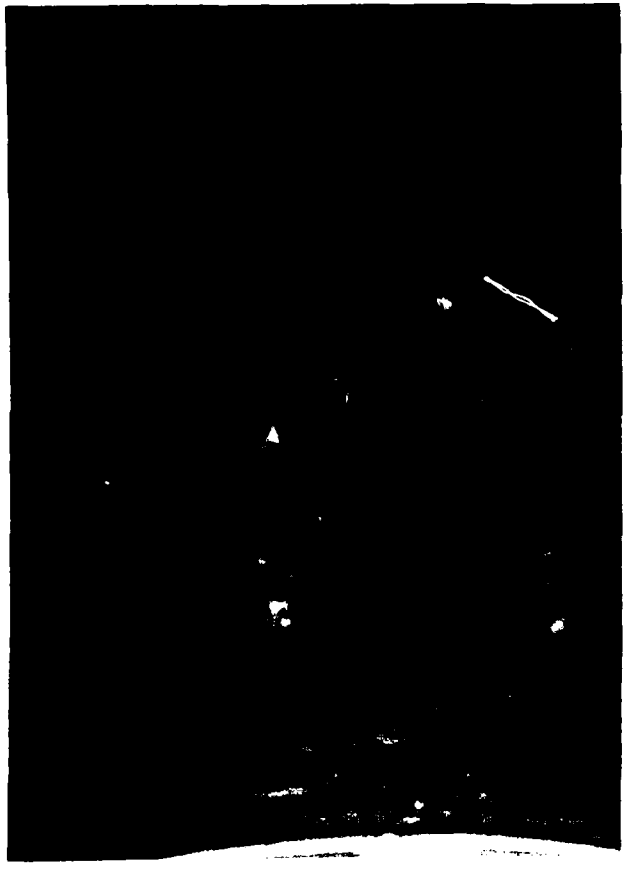


PHOTO NO. 502
DAM CORE TRENCH STA 11+35. MARKER INDICATES
ORIGINAL FOUNDING ELEVATION
DENTAL WALL TO BE CONSTRUCTED
10 AUGUST 1981

PHOTO NO. 503
DAM CORE TRENCH VIEW D/S ALONG 11+30
10 AUGUST 1981

PHOTO NO. 504
DAM CORE TRENCH FOUNDATION CONCRETE WALL 11+35
12 AUGUST 1981

PHOTO NO. 505
DAM CORE TRENCH STA 11+57 GEOTECHNICAL INSPECTION OF
FOUNDING ROCK
17 AUGUST 1981

PHOTO NO. 506
DAM CORE TRENCH STA 11+35 TO 11+55
17 AUGUST 1981

PHOTO NO. 507
DAM CORE TRENCH STA 11+35 TO 11+55 VIEW U/S
17 AUGUST 1981

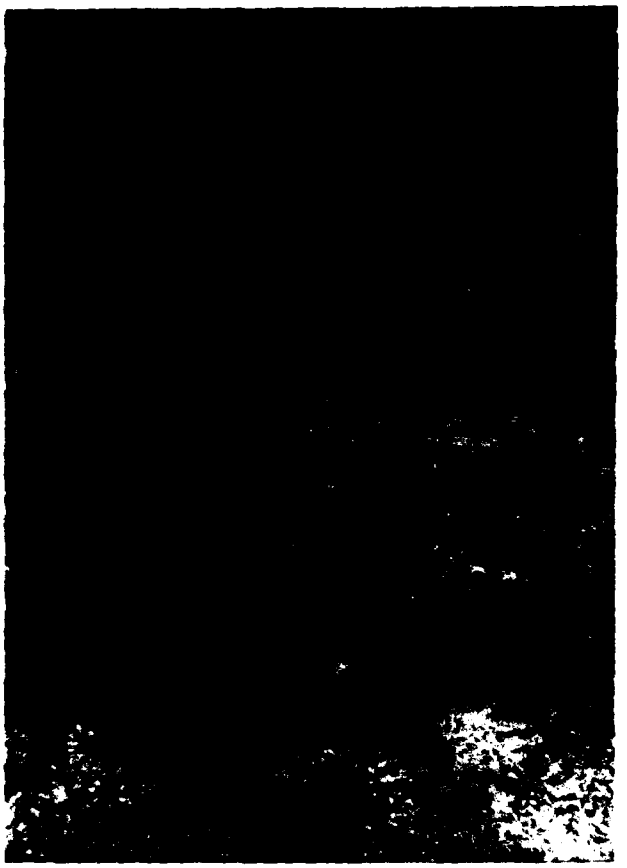


PHOTO NO. 508
DAM CORE TRENCH STA 11+35 TO 11+55
U/S OF CENTERLINE
17 AUGUST 1981

PHOTO NO. 509
DAM CORE TRENCH STA 11+80 TO 11+95, VIEW D/S
24 AUGUST 1981

PHOTO NO. 510
DAM CORE TRENCH 11+80 TO 11+95, VIEW U/S
24 AUGUST 1981

PHOTO NO. 511
DAM CORE TRENCH 11+95 TO 12+15, VIEW D/S
25 AUGUST 1981

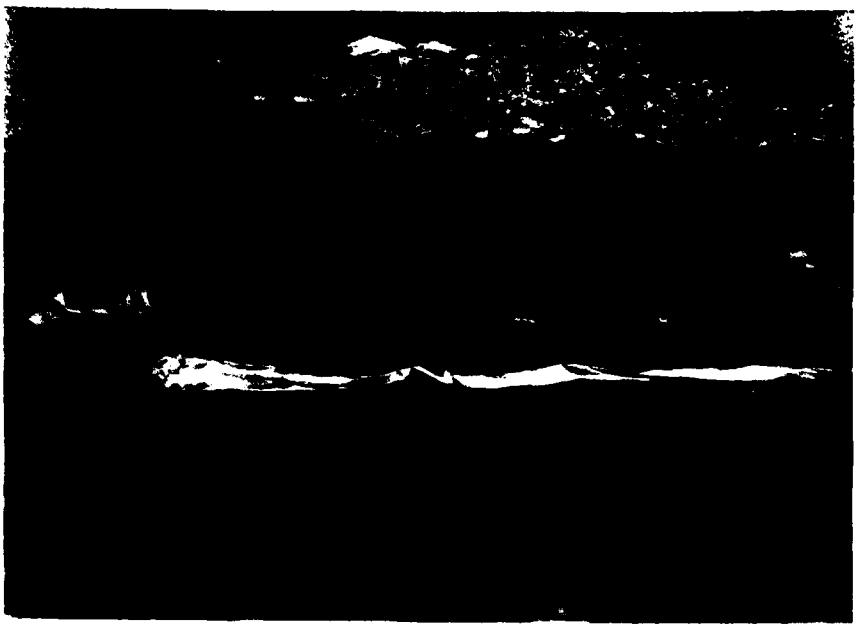


PHOTO NO. 512
DAM CORE TRENCH STA 12+60 TO 12+75
21 SEPTEMBER 1981

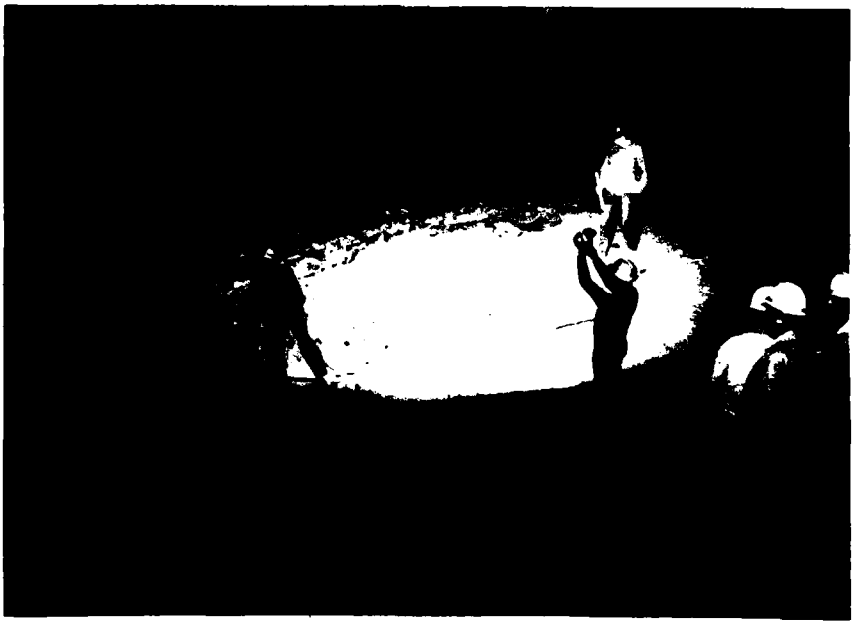


PHOTO NO. 513
DAM CORE TRENCH STA 9+42 ATTEMPTING TO PHOTOGRAPH
FOUNDATION WORK PERFORMED AT NIGHT
21 MAY 1981

PHOTO NO. 514
DAM CORE TRENCH STA 2+55 - 2+60
OCTOBER 1981

PHOTO NO. 515
DAM CORE TRENCH STA 2+80 TO 2+75
CENTERLINE TO D/S ELEV 475.7
OCTOBER 1981

PHOTO NO. 516
DAM CORE TRENCH STA 13+85 TO 13+80
FROM CENTERLINE TO D/S SLOPE
OCTOBER 1981

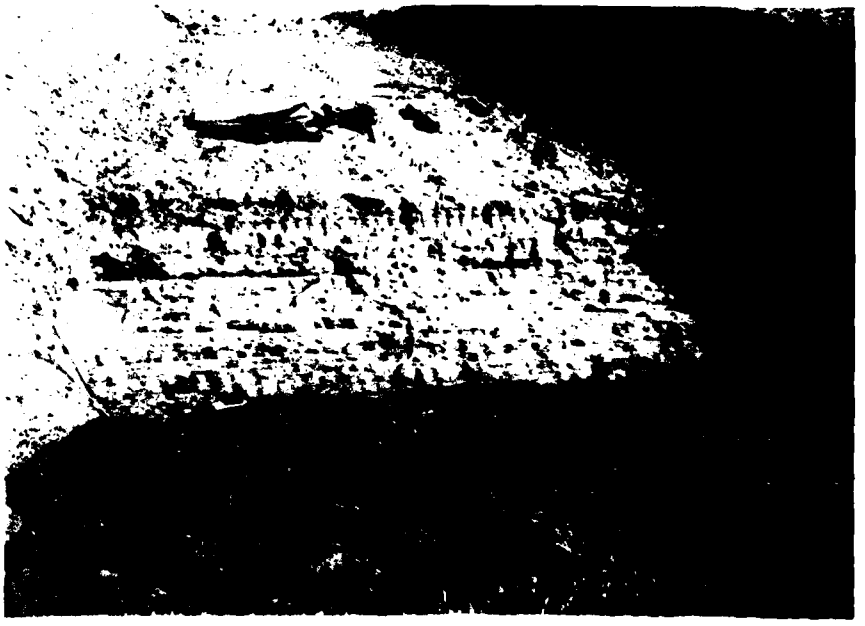


PHOTO NO. 517
DAM CORE TRENCH STA 13+85 TO 14+10
NOVEMBER 1981

PHOTO NO. 518
DAM CORE TRENCH STA 14+40 TO 14+55, CENTERLINE
9 DECEMBER 1981

PHOTO NO. 519
DAM CORE TRENCH STA 14+30 TO 14+40
9 DECEMBER 1981

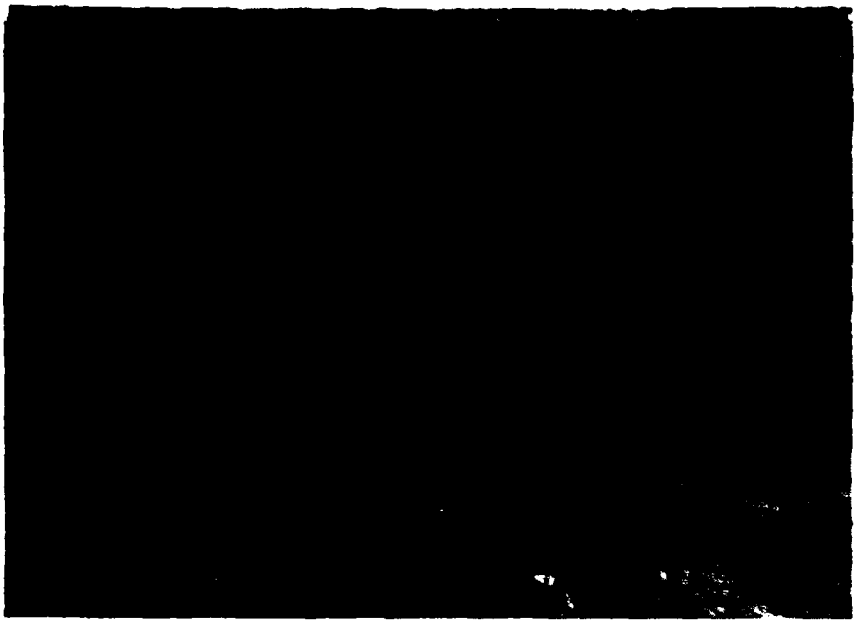


PHOTO NO. 520
DAM CORE TRENCH STA 14+10 TO 14+30
NOVEMBER 1981

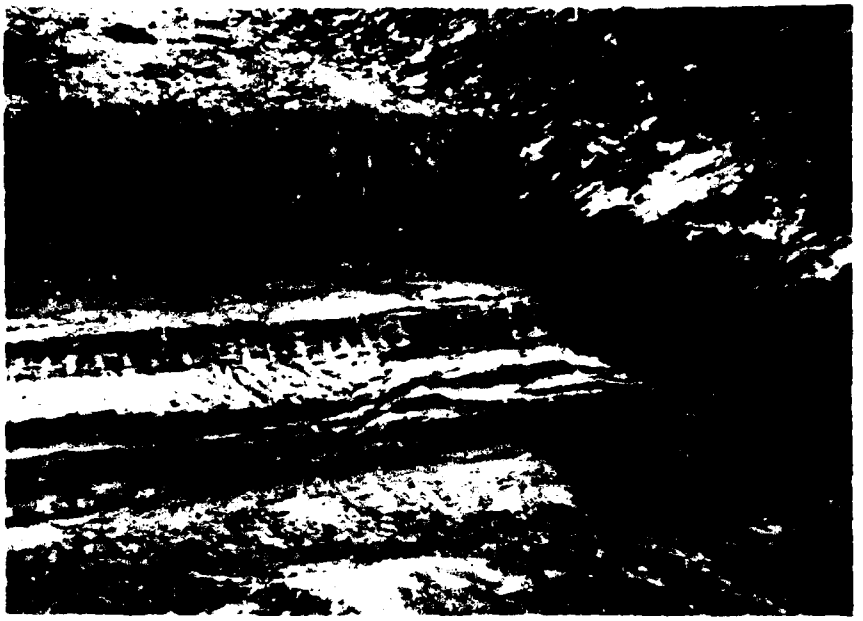


PHOTO NO. 521
SHOWING CORE TRENCH FOUNDATION 15+35 TO 15+45
DOWNSTREAM OF CENTERLINE
26 MAY 1982

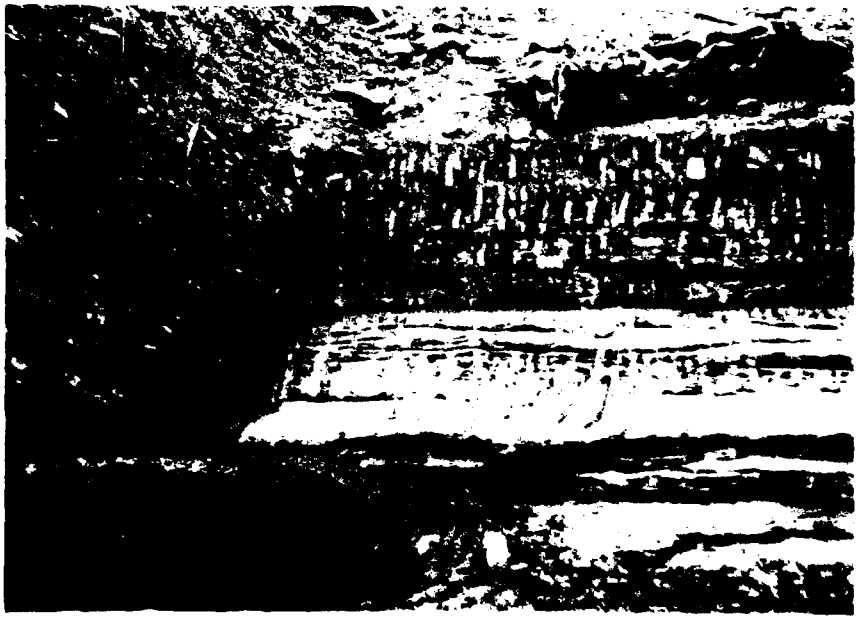


PHOTO NO. 522
SHOWING CORE TRENCH FOUNDATION 15+35 TO 15+45
UPSTREAM OF CENTERLINE
26 MAY 1982

PHOTO NO. 523
CORE TRENCH EXCAVATION LEFT ABUTMENT
EMBANKMENT AT ELEVATION 608
28 MAY 1982

PHOTO NO. 524
CORE TRENCH EXCAVATION RIGHT ABUTMENT
LOOKING ACROSS CENTERLINE DOWNSTREAM
28 MAY 1982

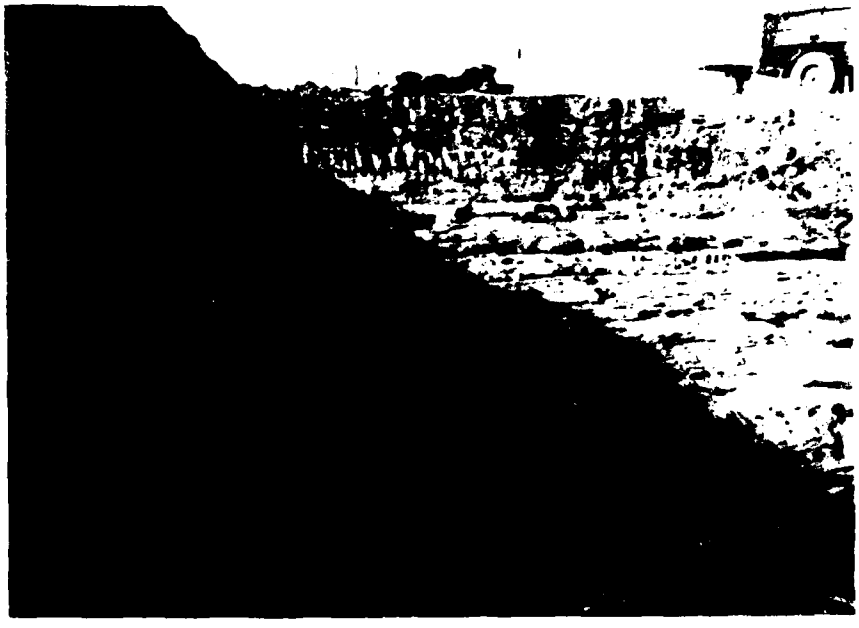


PHOTO NO. 525
CORE TRENCH FOUNDATION STA 15+50 - 15+80
3 JUNE 1982

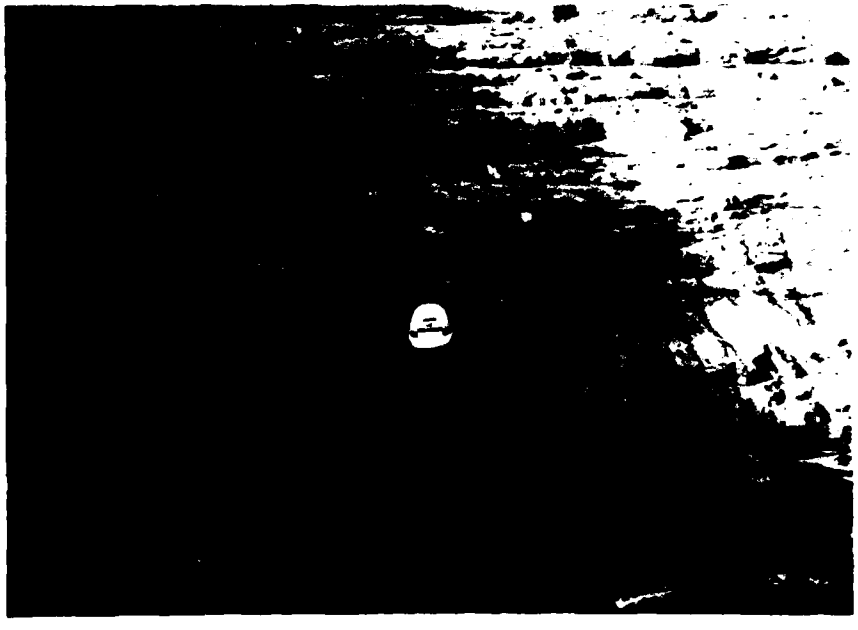


PHOTO NO. 526
CORE TRENCH FOUNDATION STA 15+50 - 15+80
3 JUNE 1982

PHOTO NO. 600
TOE DRAIN SYSTEM. VIEW TOWARD STILLING
BASIN AT MH #2 LOCATION
24 JUNE 1981

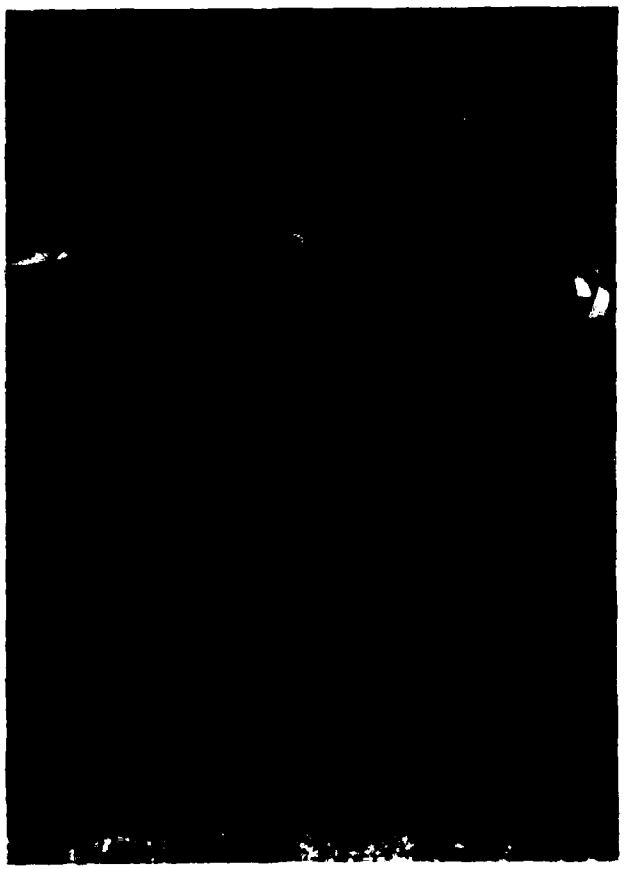


PHOTO NO. 601
TOE DRAIN SYSTEM. VIEW FROM STILLING
BASIN TOWARD MH #2
19 JUNE 1981

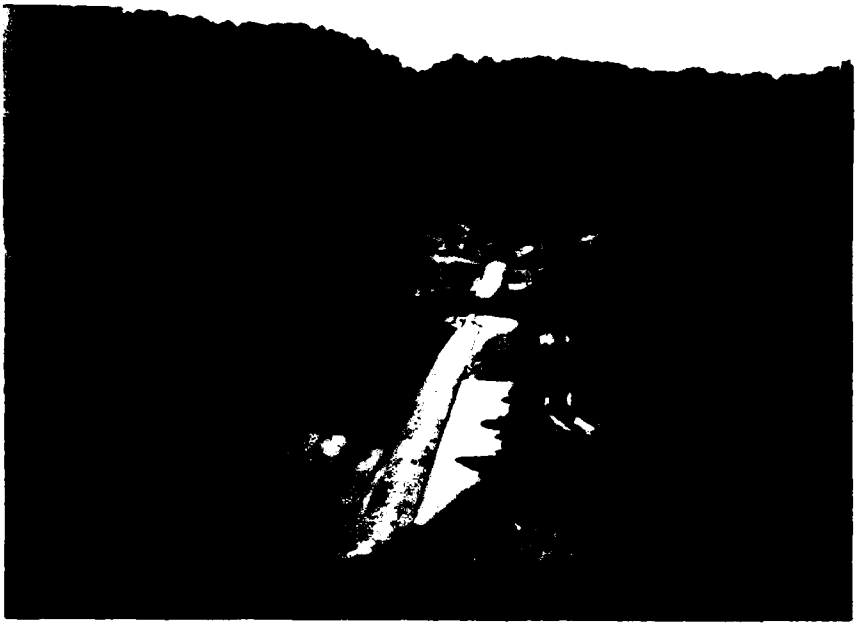


PHOTO NO. 602
VIEW DOWNSTREAM ALONG CONDUIT AFTER A HEAVY RAINFALL
12 JUNE 1981

PHOTO NO. 603
RETREAT CHANNEL LEFT SLOPE DOWNSTREAM OF RIPRAP.
EROSION CORRECTED BY CHANGE ORDER.
25 MARCH 1981

PHOTO NO. 604
SLIDE IN LEFT ABUTMENT BELOW CONTRACTOR'S TEMPORARY DRAINAGE DITCH 390' LT 6+25. VIEW DOWNSTREAM ALONG SCARP AND SLIDE PLANES
25 MARCH 1981

PHOTO NO. 605
TOE DRAIN INSTALLATION. VIEW BACK STA ALONG OUTLET SECTION OF DRAIN TOWARD MH #2. SAND OVER OUTLET PORTION OF TOE DRAIN IS IN PLACE
24 JUNE 1981

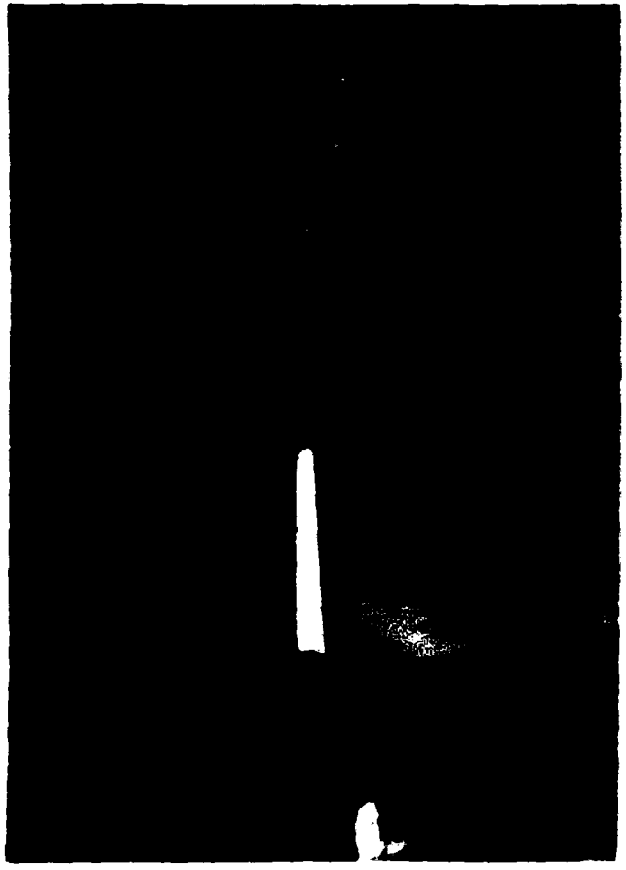


PHOTO NO. 606
VIEW FROM MANHOLE NO. 1 U/S ALONG LEFT ABUT
DRAIN CONSTRUCTED TO DRAIN SPRING INTO
TOE DRAIN SYSTEM. STA 6+15, 404' LEFT
8 APRIL 1981

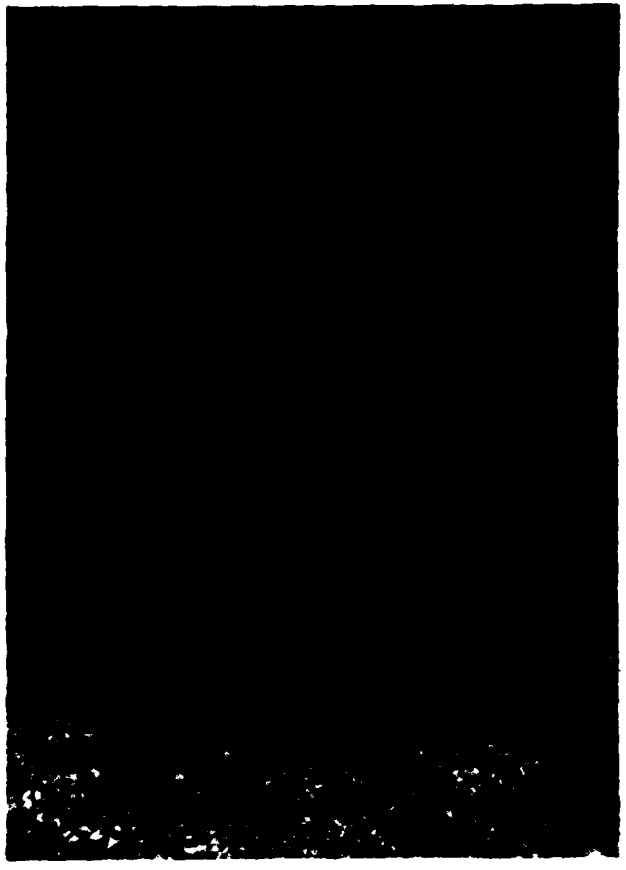


PHOTO NO. 607
SPRING TREATMENT STA 6+15, 404 FT
DOWNSTREAM, ELEV 484.5
8 APRIL 1981

PHOTO NO. 608
SLIDE IN LEFT ABUTMENT FOUNDATION STA 6+25,
390' D/S, CAUSED BY SPRING
25 MARCH 1981

PHOTO NO. 609
GCH #1 STA 7+10, 3 FT D/S GR ELEV 450.85
BOTTOM ELEV 410.45

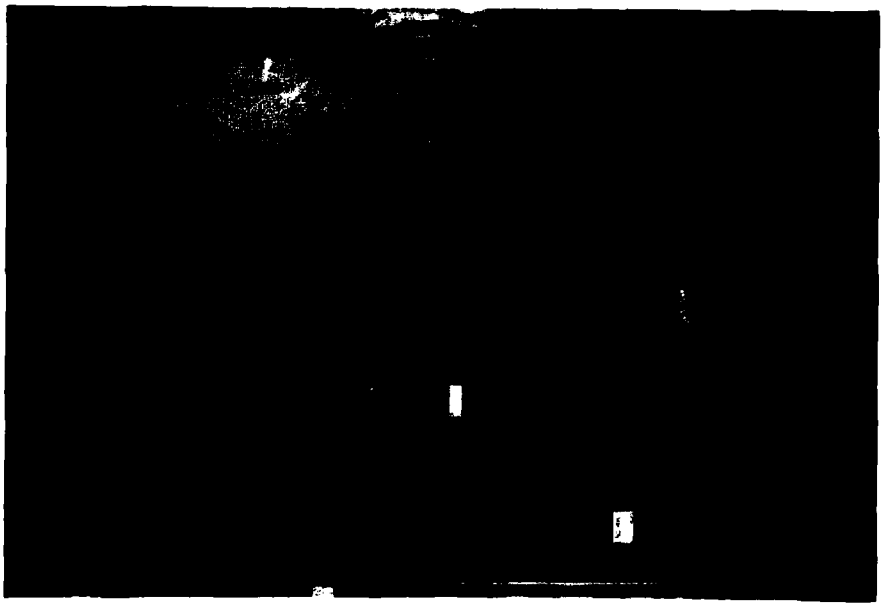


PHOTO NO. 610
GCH #1A GR ELEV 450.85 BOTTOM ELEV 438.05

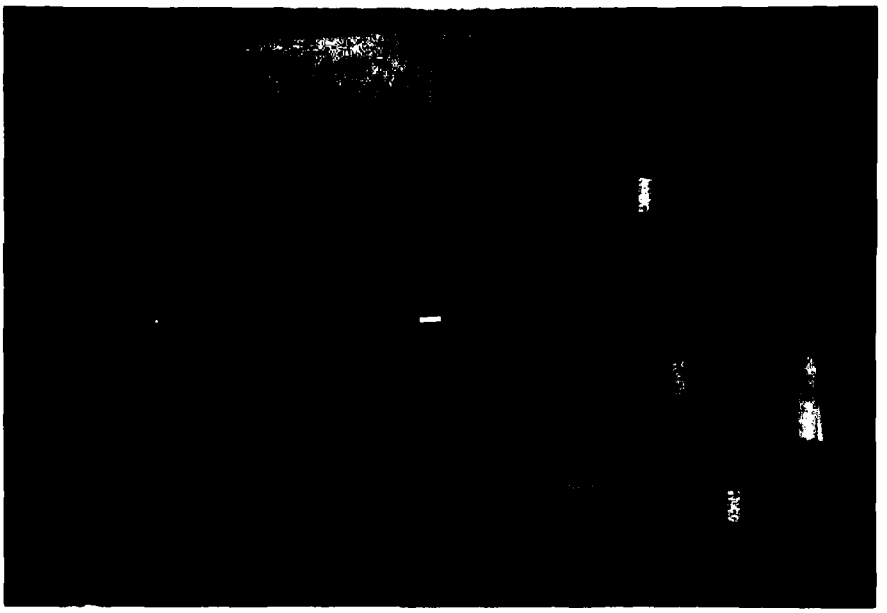


PHOTO NO. 611
GCH #2 GR ELEV 451.35
BOTTOM ELEV 410.95

PHOTO NO. 612
GCH #4 GR ELEV 451.8
BOTTOM ELEV 428.6

PHOTO NO. 613
GCH #5 GR ELEV 621.5
BOTTOM ELEV 533.95 BOX 1 AND 2 OF 7

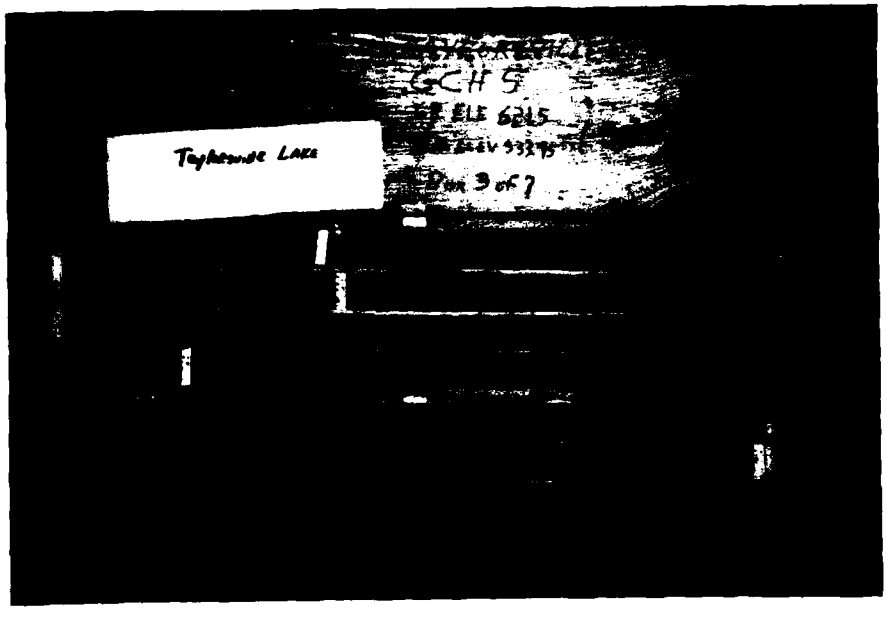


PHOTO NO. 614
GCH #5 GR ELEV 621.5
BOTTOM ELEV 533.95 BOX 3 AND 4 OF 7

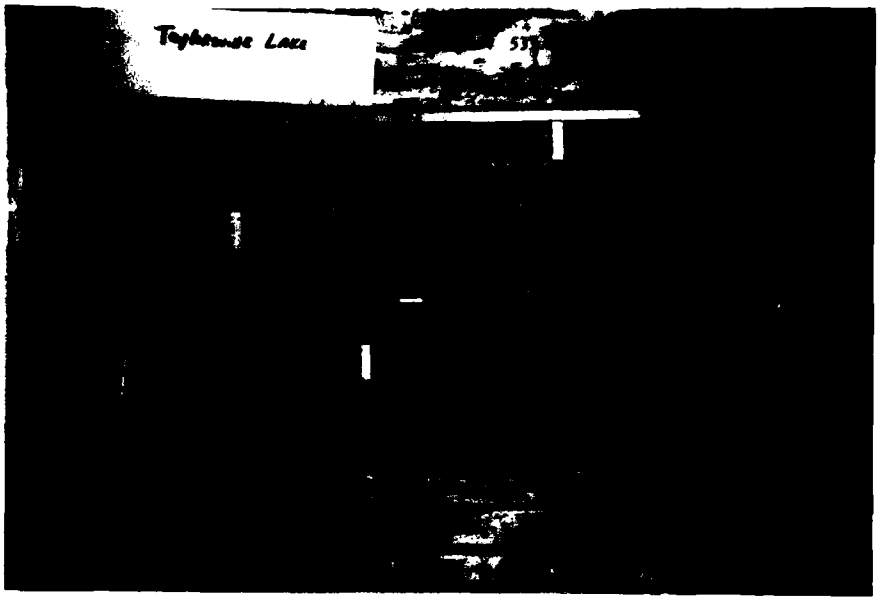


PHOTO NO. 615
GCH #5 GR ELEV 621.5 BOTTOM ELEV 533.95
BOX 5, 6 AND 7 OF 7

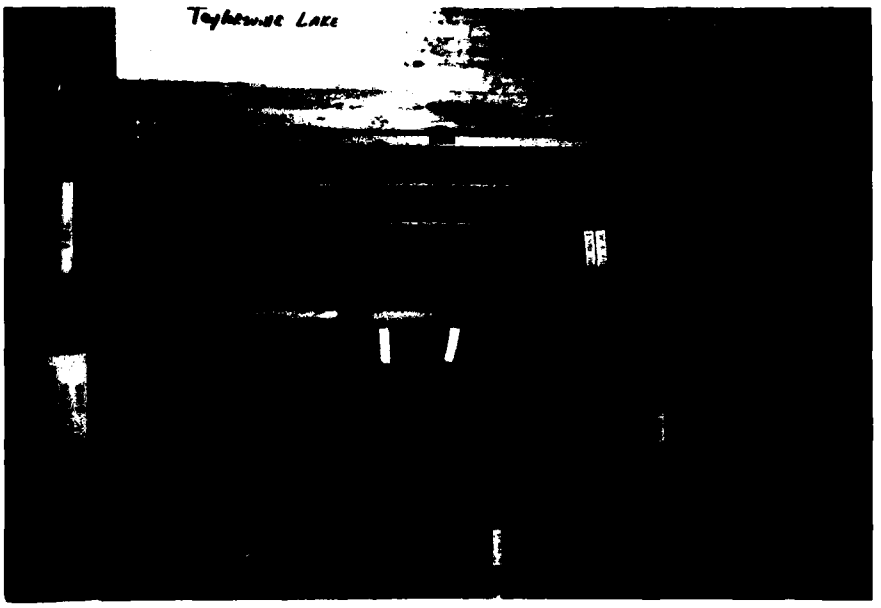


PHOTO NO. 616
PZ 33 GROUND 494.02 TUR 485.25
BOTTOM ELEV 444.25 BOX 1, 2 AND 3 OF 3

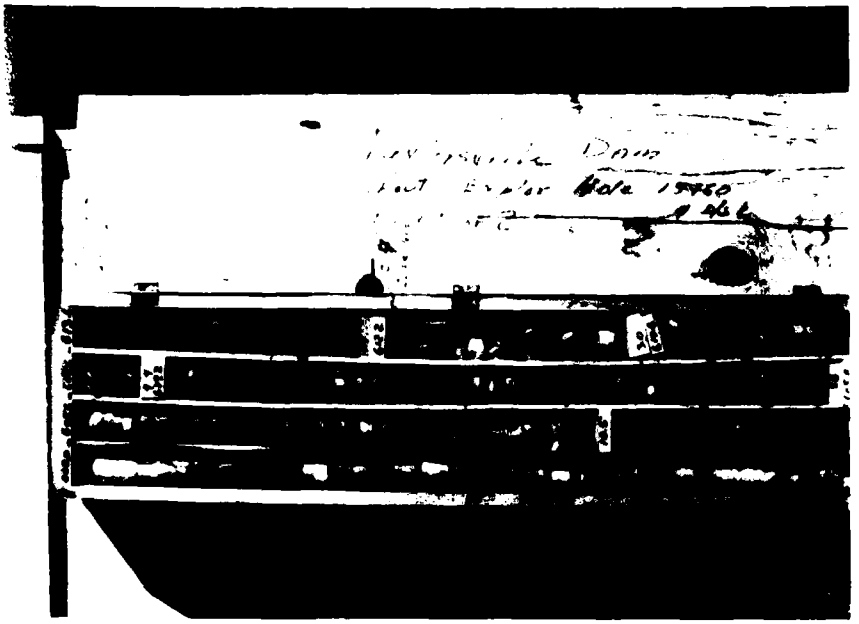


PHOTO NO. 617
GROUT EXPLOR HOLE 15+60
BOX 1 OF 2, 4 FT D/S CENTERLINE
14 OCTOBER 1981

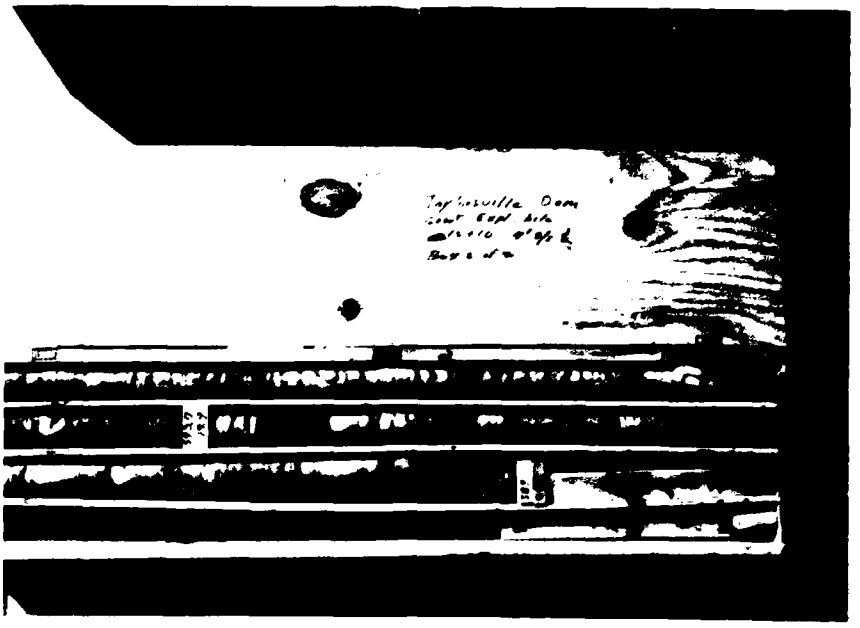


PHOTO NO. 618
GROUT EXPLOR HOLE 15+60
BOX 2 OF 2, 4 FT D/S CENTERLINE
14 OCTOBER 1981

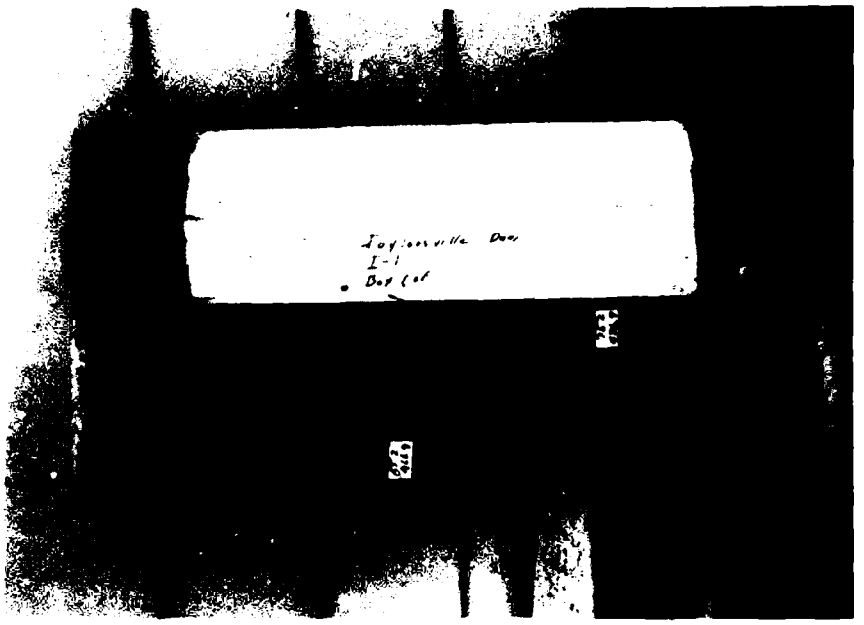


PHOTO NO. 619
I-1 STA 6+05 280 FT U/S CENTERLINE
BOX 1 OF 4
10 OCTOBER 1981

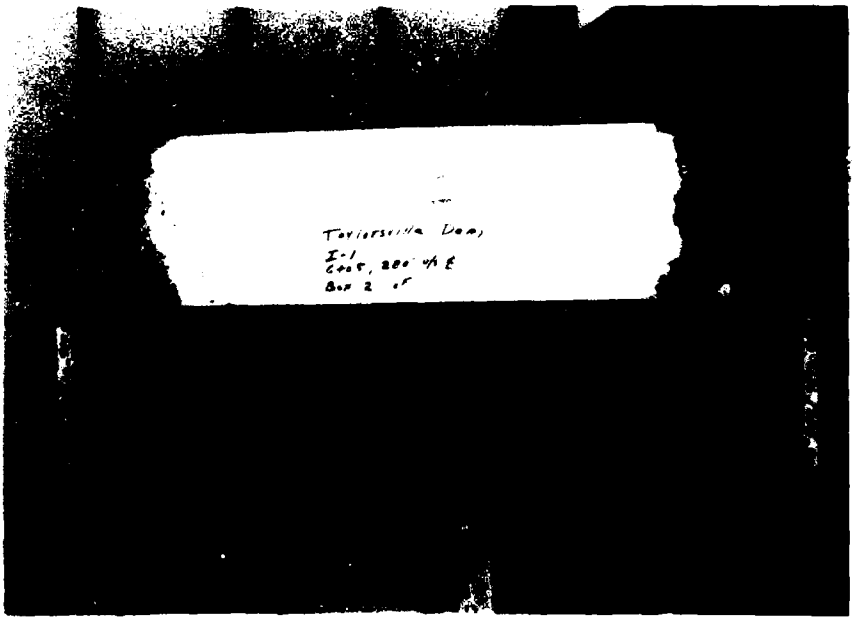


PHOTO NO. 620
I-1 STA 6+05 280 FT U/S CENTERLINE
BOX 2 OF 4
10 OCTOBER 1981

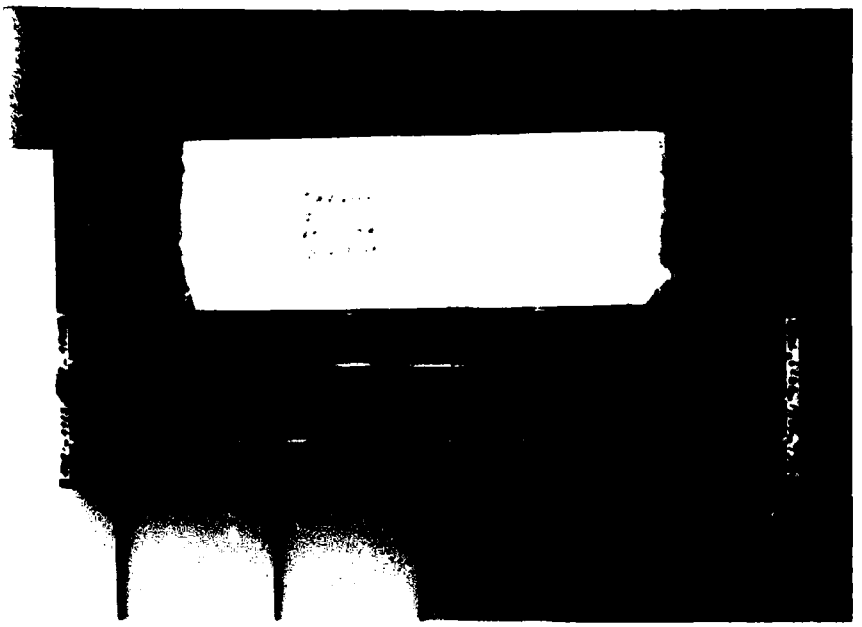


PHOTO NO. 621
I-1 STA 6+05 280 FT U/S CENTERLINE
BOX 3 OF 4
10 OCTOBER 1981

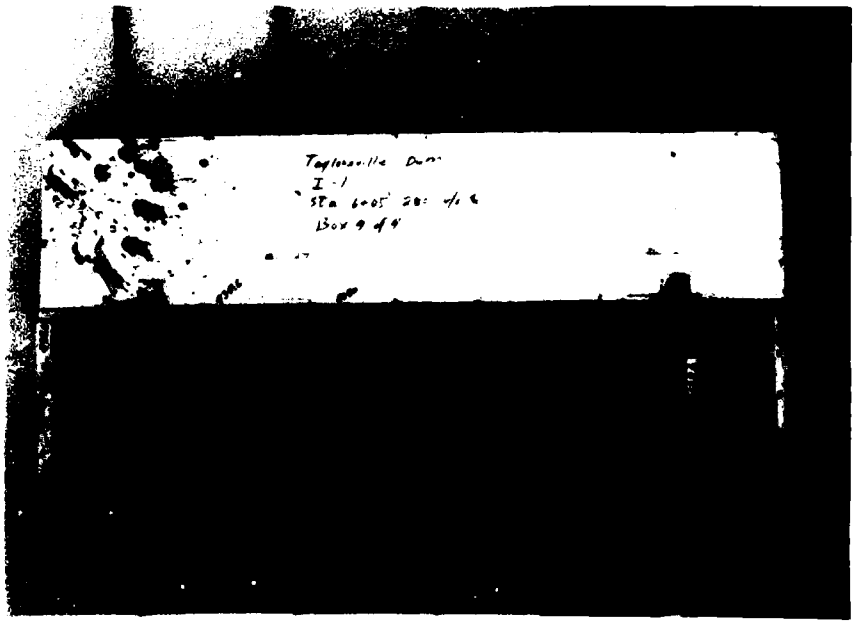


PHOTO NO. 622
I-1 STA 6+05 280 FT U/S CENTERLINE
BOX 4 OF 4
10 OCTOBER 1981

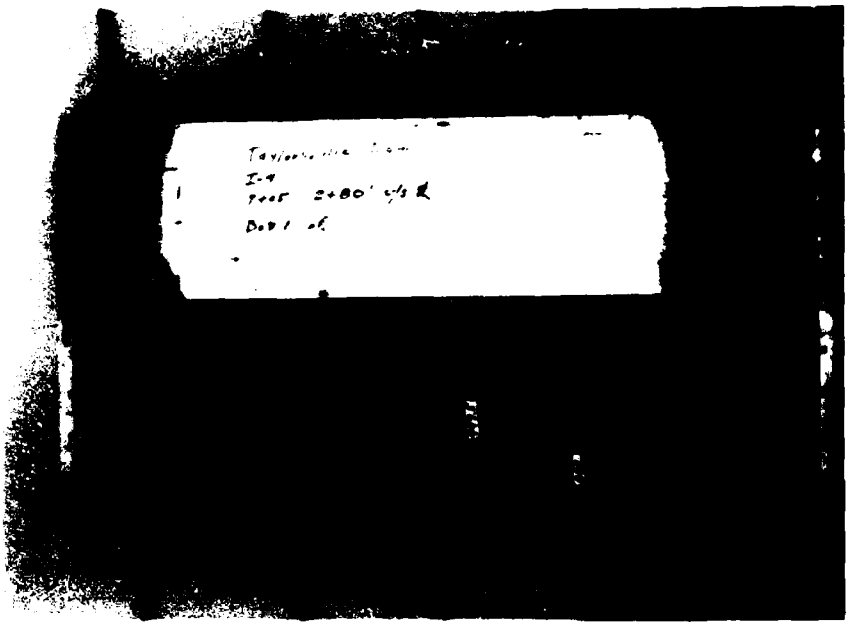


PHOTO NO. 623
I-4 STA 9+05 280 FT U/S CENTERLINE
BOX 1 OF 2
10 OCTOBER 1981

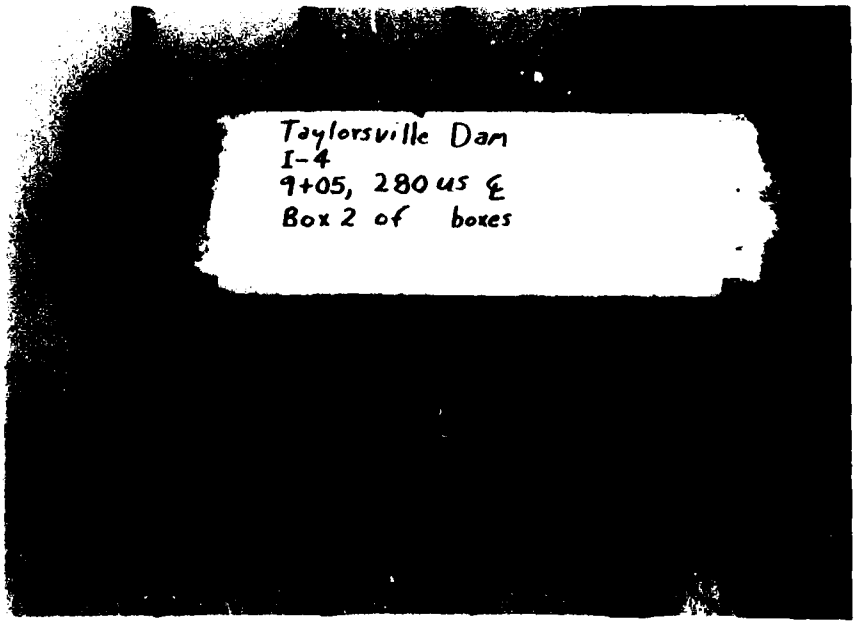
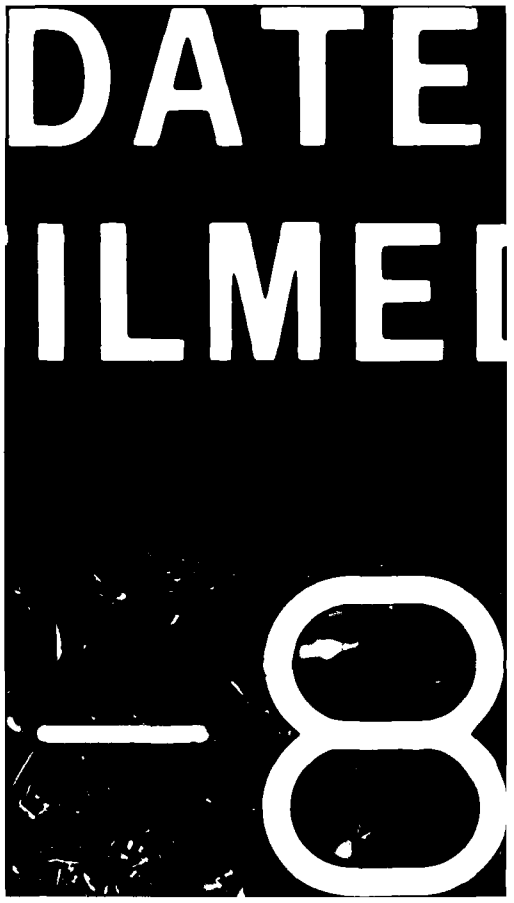


PHOTO NO. 624
I-4 STA 9+05 280 FT U/S CENTERLINE
BOX 2 OF 2
10 OCTOBER 1981


DATE
ILME
8