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OHIO RIVER BASIN  
TRIBUTARY TO MONONGAHELA RIVER  
FAYETTE COUNTY

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PENNSYLVANIA

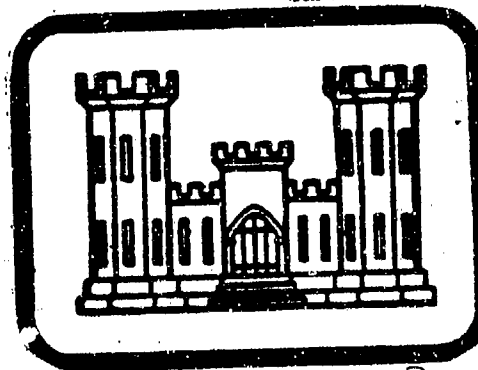
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PENN DER No. 26-105

LEVEL II

LABELLE SLURRY POND 3

JONES & LAUGHLIN STEEL CORPORATION  
VESTA-SHANNOPIN COAL DIVISION

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM



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DACW 31-81-C-0027  
PREPARED FOR

DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT, CORPS OF ENGINEERS  
BALTIMORE, MARYLAND 21203

BY

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JULY 1981

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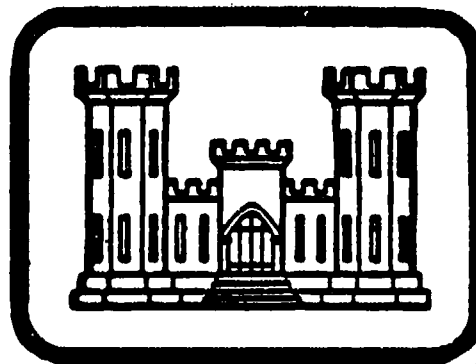
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OHIO RIVER BASIN

LABELLE SLURRY POND 3  
FAYETTE COUNTY, COMMONWEALTH OF PENNSYLVANIA  
NDI NO. PA 00295  
PennDER NO. 26-105

JONES AND LAUGHLIN STEEL CORPORATION  
VESTA-SHANNOPIN COAL DIVISION

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM



*DACW31-81-C-0027*

Prepared for: DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
Baltimore, Maryland 21203

Prepared by: ACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.  
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Date: July 1981

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## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, materials testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionally in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some time in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" (PMF) for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS

NAME OF DAM: LaBelle Slurry Pond 3  
STATE LOCATION: Pennsylvania  
COUNTY LOCATION: Fayette  
STREAM: Unnamed tributary to the  
Monongahela River  
DATE OF INSPECTIONS: 14 May 1981 and 3 June 1981  
COORDINATES: Lat. 39° 59' 55"  
Long. 79° 58' 21"

→ ASSESSMENT

Based on a review of available information, visual observations of conditions as they existed on the date of the field inspections, and supporting engineering calculations, the general condition of LaBelle Slurry Pond 3 is considered to be fair.

This assessment is based primarily on visual observations of embankment and spillway conditions and hydrology/hydraulic analyses of reservoir/spillway capacity.

The structure is classified as a "large" size, "significant" hazard dam. Corps of Engineers guidelines recommend the Probable Maximum Flood (PMF) as the Spillway Design Flood for a "large" size, "significant" hazard dam. LaBelle Slurry Pond 3's Spillway Design Flood is the Probable Maximum Flood. Spillway capacity is "inadequate" because the non-overtopping flood discharge was found, by using the HEC-1 computer program, to be 79 percent of the PMF.

The Phase I investigation of LaBelle Slurry Pond 3 revealed deficiencies and conditions which should be corrected or improved through implementation of the following recommended improvement efforts.

→ RECOMMENDATIONS are

→ (1) Embankment Improvements; The owner should continue to implement the existing abandonment plan with all possible speed. In particular, the deeper erosional gullies on the downstream face should be eliminated by collecting spring flows in underdrains and then backfilling the cavity with compacted coarse coal refuse.

Concurrently, surface drainage courses should be defined and improved to reduce erosion in the large existing gullies.

→ next page

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)

LaBelle Slurry Pond 3

Cont  
→

(2) Principal Spillway: The owner should immediately clean the principal spillway trash cage of debris and improve the inflow channel to permit unrestricted flow from the reservoir to the pipe; The trash cage should be periodically inspected (weekly or monthly) and cleaned as required to maintain the reservoir water level at its design elevation.

→ (3) Emergency Spillway: The emergency spillway should either be improved or eliminated; Improvements should be sufficient to prevent erosion of the downstream slope by spillway discharges.

→ (4) Emergency Operation and Warning Plan; The owner should develop an Emergency Operation and Warning Plan including:

(1) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(2) Procedures for around-the-clock surveillance during periods of heavy precipitation or runoff.

(3) Procedures for drawdown of the reservoir under emergency conditions.

(4) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

→ (5) Monitoring of Seepage Zones; <sup>and</sup> The seepage zones and springs on and about the downstream toe of the embankment should be monitored for changes in water quality and quantity. If one does not now exist, the owner should develop and implement a regularly scheduled monitoring program with appropriate records to indicate possible long-term changes in seepage conditions.

→ (6) Maintenance and Inspection Procedures; The owner should develop written maintenance and inspection procedures in the form of checklists and step-by-step instructions.

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)  
LaBelle Slurry Pond 3

Samuel G. Mazzella

17 July 1981

Samuel G. Mazzella  
Project Engineer

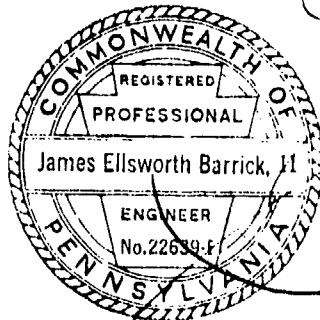
Date

James P. Hannan

17 July 1981

James P. Hannan  
Project Engineer

Date



James E. Barrick

17 July 1981

James E. Barrick, P.E.  
PA Registration No. 022639-E

Date

Approved by:

James W. Peck

11 Aug 81

JAMES W. PECK  
Colonel, Corps of Engineers  
Commander and District Engineer

Date

# LABELLE SLURRY POND 3



OVERVIEW

## TABLE OF CONTENTS

|                                                      | <u>Page</u> |
|------------------------------------------------------|-------------|
| PREFACE . . . . .                                    | i           |
| SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS . . . . . | ii          |
| OVERVIEW PHOTOGRAPH . . . . .                        | v           |
| SECTION 1 - PROJECT INFORMATION                      |             |
| 1.1 General . . . . .                                | 1           |
| 1.2 Description of Project . . . . .                 | 1           |
| 1.3 Pertinent Data . . . . .                         | 3           |
| SECTION 2 - ENGINEERING DATA                         |             |
| 2.1 Design . . . . .                                 | 5           |
| 2.2 Construction . . . . .                           | 5           |
| 2.3 Operation . . . . .                              | 6           |
| 2.4 Evaluation . . . . .                             | 6           |
| SECTION 3 - VISUAL INSPECTION                        |             |
| 3.1 Findings . . . . .                               | 7           |
| 3.2 Evaluation . . . . .                             | 11          |
| SECTION 4 - OPERATIONAL FEATURES                     |             |
| 4.1 Procedure . . . . .                              | 12          |
| 4.2 Maintenance of Dam . . . . .                     | 12          |
| 4.3 Inspection of Dam . . . . .                      | 12          |
| 4.4 Warning Procedure . . . . .                      | 12          |
| 4.5 Evaluation . . . . .                             | 12          |
| SECTION 5 - HYDROLOGY AND HYDRAULICS                 |             |
| 5.1 Evaluation of Features . . . . .                 | 13          |
| SECTION 6 - STRUCTURAL STABILITY                     |             |
| 6.1 Available Information . . . . .                  | 15          |
| 6.2 Evaluation . . . . .                             | 16          |
| SECTION 7 - ASSESSMENT AND RECOMMENDATIONS           |             |
| 7.1 Assessment . . . . .                             | 17          |
| 7.2 Recommendations . . . . .                        | 18          |

# TABLE OF CONTENTS (cont'd)

|                                                 | <u>Page</u> |
|-------------------------------------------------|-------------|
| APPENDIX A - VISUAL INSPECTION CHECKLIST        |             |
| Visual Observations Checklist I . . . . .       | A1          |
| Field Sketch . . . . .                          | A10         |
| Field Profile . . . . .                         | A11         |
| Field Section . . . . .                         | A12         |
| APPENDIX B - ENGINEERING DATA CHECKLIST         |             |
| APPENDIX C - PHOTOGRAPHS                        |             |
| Photo Key Map . . . . .                         | C1          |
| Photos 1 through 28 . . . . .                   | C2          |
| Photo Descriptions . . . . .                    | C9          |
| APPENDIX D - HYDROLOGY AND HYDRAULICS ANALYSES  |             |
| Methodology . . . . .                           | D1          |
| Engineering Data . . . . .                      | D3          |
| HEC-1 Data Base . . . . .                       | D4          |
| Loss Rate and Base Flow Parameters . . . . .    | D5          |
| Elevation-Area-Capacity Relationships . . . . . | D5          |
| Overtop Parameters . . . . .                    | D6          |
| Program Schedule . . . . .                      | D7          |
| HEC-1 Computer Analysis . . . . .               | D8          |
| Hydrologic Performance Plot . . . . .           | D11         |
| APPENDIX E - PLATES                             |             |
| List of Plates . . . . .                        | E1          |
| Plates I through VII                            |             |
| APPENDIX F - GEOLOGY                            |             |
| Geomorphology . . . . .                         | F1          |
| Structure . . . . .                             | F1          |
| Stratigraphy . . . . .                          | F1          |
| Mining Activity . . . . .                       | F1          |
| Geologic Map . . . . .                          | F2          |
| Geologic Column . . . . .                       | F3          |

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
LABELLE SLURRY POND 3  
NATIONAL I. D. NO. PA 00295  
PennDER No. 26-105

SECTION 1  
PROJECT INFORMATION

1.1 GENERAL

a. Authority: The Phase I investigation was performed pursuant to authority granted by Public Law 92-367 (National Dam Inspection Act) to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose: The purpose of the investigation is to make a determination on whether or not the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Dam and Appurtenances:

(1) Embankment: LaBelle Slurry Pond 3 was constructed as a randomly dumped coarse coal refuse bank. The impounding portion of the embankment is 1,060 feet long and has a maximum height of about 200 feet and a crest width that varies from 250 to 360 feet. The embankment's upstream slope was measured to be 0.5H:1V above the waterline. The downstream slope is approximately 2.8H:1V overall from crest to toe. Locally, very steep slopes exist.

(2) Principal Spillway: The principal spillway is a 12 inch diameter pipe with steel screen trash cage at the south end of the pond.

(3) Emergency Spillway: The emergency spillway is a 48 inch diameter asphalt coated corrugated metal pipe embedded in the impounding embankment near the left abutment.

(4) Outlet Works: There were no facilities observed that would drain the impoundment in the event of an emergency.

(5) Freeboard Conditions: Freeboard between the pool elevation at the time of the inspection and the crest of the embankment was measured to be 6.6 feet.

(6) Downstream Conditions: Discharge flows from LaBelle Slurry Pond 3 pass through a narrow valley below the downstream toe. Smaller flows will enter an incised sedimentation pond 1,500 below. Larger flows will breach the drainage channel and enter a steep-sided, wooded valley below. One inhabited dwelling, a highway, a rail yard and the U.S. Corps of Engineers' Maxwell Lock and Dam on the Monongahela River lie on the flood plain in the first 3,000 feet below LaBelle Slurry Pond 3.

(7) Reservoir: The LaBelle Slurry Pond 3 reservoir was about 1200 feet long at the time of the inspection. When the pool is at the dam's crest, the reservoir length increases to 1,400 feet.

(8) Watershed: The watershed contributing to LaBelle Slurry Pond 3, 96 acres, consists mostly of unvegetated coal refuse.

b. Location: LaBelle Slurry Pond 3 is located off Meadow Run in Luzerne Township, Fayette County, Pennsylvania, approximately one mile southeast of LaBelle, Pennsylvania.

c. Size Classification: The reservoir has a maximum storage capacity of 318 acre-feet and the dam has a toe to crest height of 200 feet. Based on the Corps of Engineers guidelines, LaBelle Slurry Pond 3 is a "large" size structure.

d. Hazard Classification: LaBelle Slurry Pond 3 is classified as a "significant" hazard dam. In the event of a dam failure, one major local highway (Legislative Route 977), one inhabited dwelling, a rail yard and the Corps of Engineers' Maxwell Lock and Dam would be at elevations low enough to possibly be subjected to substantial damage and loss of a few lives could result.

e. Ownership: LaBelle Slurry Pond 3 is owned by the Jones and Laughlin Steel Corporation, McMurray, Pennsylvania. Inquiries concerning the dam should be addressed to:

Jones and Laughlin Steel Corporation  
420 South Washington Road  
McMurray, PA 15317  
Attention: Mr. K. V. Rao, Chief Engineer  
(412) 941-3400

f. Purpose of Dam: The LaBelle Slurry Pond 3 was constructed as a storage facility for fine coal refuse produced at the LaBelle Coal Preparation Plant.

g. Design and Construction History: Pond 3 was constructed of coarse coal refuse by Jones and Laughlin Steel Corporation personnel. Fine coal refuse was first impounded in 1958.

h. Normal Operating Procedure: No fine coal refuse has been placed in Pond 3 since 1975. The owner is currently in the early stages of reshaping the refuse area and filling in Pond 3. Pool level is now maintained by the principal spillway trash cage.

### 1.3 PERTINENT DATA

|    |                                                  |               |
|----|--------------------------------------------------|---------------|
| a. | <u>Drainage Area</u>                             | 0.15 sq. mi.  |
| b. | <u>Discharge at Dam Facility</u>                 |               |
|    | Maximum Flood at Dam Facility                    | Unknown       |
|    | Emergency Spillway Capacity at Top of Embankment | Negligible    |
|    | Principal Spillway Capacity at Top of Embankment | Negligible    |
| c. | <u>Elevation (feet above MSL)</u>                |               |
|    | Design Top of Embankment                         | Unknown       |
|    | Current Top of Embankment (low point)            | 1100.4        |
|    | Emergency Spillway Invert                        | 1094.9        |
|    | Pool at Date of Inspection                       | 1093.8        |
|    | Principal Spillway Inlet Invert*                 | 1092.0        |
|    | Maximum Tailwater                                | Unknown       |
|    | Downstream Toe of Embankment                     | 900±          |
| d. | <u>Reservoir Length</u>                          |               |
|    | Maximum Pool                                     | 1,400 feet    |
|    | Pool at Emergency Spillway Inlet                 | 1,300 feet    |
|    | Pool at Time of Inspection                       | 1,200 feet    |
|    | Pool at Principal Spillway Inlet                 | 1,100 feet    |
| e. | <u>Reservoir Storage</u>                         |               |
|    | Current Top of Embankment                        | 318 acre-feet |
|    | Emergency Spillway Inlet                         | 179 acre-feet |
|    | Principal Spillway Inlet                         | 114 acre-feet |

---

\*Datum for field measurements as per discussion with owner's representatives.

f. Reservoir Surface

|                           |            |
|---------------------------|------------|
| Current Top of Embankment | 26.5 acres |
| Emergency Spillway Inlet  | 22.3 acres |
| Principal Spillway Inlet  | 21.1 acres |

g. Em bankment

|                      |                             |
|----------------------|-----------------------------|
| Type                 | Coarse Coal Refuse          |
| Length               | 1,060 feet                  |
| Height               | 200 feet                    |
| Crest Width          | Varies from 250 to 360 feet |
| Slopes               |                             |
| Downstream (Overall) | 2.8H:1V                     |
| Upstream             | 0.5H:1V                     |
| Impervious Core      | Unknown                     |
| Grout Curtain        | Unknown                     |

h. Principal Spillway

|               |                           |
|---------------|---------------------------|
| Type          | Steel Pipe Conduit        |
| Location      | South Side of Impoundment |
| Diameter      | 12 inches                 |
| Trash Cage    | Yes                       |
| Valve/Contrcl | No                        |

i. Emergency Spillway

|            |                                                                                |
|------------|--------------------------------------------------------------------------------|
| Type       | Asphalt Coated Corrugated<br>Metal Pipe Left End of Im-<br>pounding Embankment |
| Diameter   | 48 inches                                                                      |
| Trash Cage | No                                                                             |

j. Outlet Works

|      |      |
|------|------|
| Type | None |
|------|------|

## SECTION 2 ENGINEERING DATA

### 2.1 DESIGN

a. Design History: There was no information available concerning the design history of this structure.

b. Data Available: The data available for review included:

(1) The contents of the Pennsylvania Department of Environmental Resources files consisting of dam location data and a National Dam Inventory Form.

(2) A set of ten engineering drawings entitled "LaBelle Coal Refuse Disposal Facility, Operation and Abandonment Plan ...", provided by the owner.

(3) Conversations with the Owner's Representatives during the field inspections on 14 May 1981 and 3 June 1981.

### 2.2 CONSTRUCTION

a. Construction: The dam was constructed by Jones and Laughlin Steel Corporation using coarse coal refuse from the LaBelle Coal Preparation Plant. Placement procedures were not reported or documented. The impoundment was first used in 1958.

b. Modification: Current and future modifications to this facility are presented on the drawings referenced in 2.1.b(2) above. To date, the impoundment zone has been partially backfilled, the downstream drainage channels and sediment ponds have been constructed, and the subsurface drain has been installed.

In 1976, the 48 inch diameter CMP emergency spillway was installed by Jones & Laughlin personnel.

In 1975, the 12 inch diameter principal spillway conduit was installed by Jones & Laughlin personnel.

In 1975 and 1976, the embankment's downstream slope was buttressed at the right end and underdrains when installed. The embankment crest was widened by backfilling over the impoundment zone. At this time, also, the fine coal refuse slurry line was moved from the rear of the reservoir to the crest of the embankment.

### 2.3 OPERATION

- a. Dam: The dam was designed to operate without a dam tender and no operational data are available.
- b. Principal Spillway: The principal spillway is a 12 inch diameter steel pipe located at the south end of the impoundment. The inlet is uncontrolled except by debris clogging of the trash cage.
- c. Emergency Spillway: The emergency spillway is a 48 inch diameter asphalt coated, corrugated metal pipe located on the eastern side of the embankment. This inlet is uncontrolled.
- d. Outlet Works: There is no permanent outlet works to drain the impoundment in case of an emergency.

### 2.4 EVALUATION

- a. Availability: Available information was obtained from the Pennsylvania Department of Environmental Resources and the owner. The drawings mentioned in Appendix B were provided by the owner.
- b. Adequacy: The available design information, supplemented by field inspections and supporting engineering analyses presented in succeeding sections and conversations with a representative of the owner, is adequate for the purposes of this Phase I Inspection Report.
- c. Validity: There appears to be no reason to question the validity of the available information.

### SECTION 3 VISUAL INSPECTION

#### 3.1 FINDINGS

a. General: The field inspections of LaBelle Slurry Pond 3 were performed on 14 May 1981 and 3 June 1981 and consisted of:

- (1) Visual observations of the embankment crest and slopes, groins and abutments;
- (2) Visual observations of the principal and emergency spillways;
- (3) Visual observations of the embankment's downstream toe area, including drainage channels and surficial conditions;
- (4) Transit stadia field measurements of relative elevations along the embankment crest and across the embankment slopes;
- (5) Visual observations of the reservoir shoreline and watershed;
- (6) Visual observations of downstream conditions and evaluations of downstream hazard potential.

The visual observations and measurements were made during periods when the reservoir was at normal operating level.

Most of the visual observations and all of the measurements were made on 3 June 1981. Heavy rains were reported in the area the preceding day.

The visual observations checklist, field sketch, field profile and field section containing the observations and comments of the field inspection team are contained in Appendix A. Specific observations are illustrated on photographs in Appendix C. Detailed findings of the field inspection are presented in the following sections.

b. Dam Configuration: LaBelle Slurry Pond 3 is an extensive deposit of coarse coal refuse which has been placed across the valley of an unnamed tributary to the Monongahela River. Pipe culvert emergency and principal spillways are in use at the facility.

c. Embankment:

(1) Crest: The crest of the embankment is irregular, both horizontally and vertically. The crest rises sharply toward either end of the impounding embankment and attains its low point approximately 150 feet from the emergency spillway, which passes beneath the crest.

No cracks or significant discontinuities were observed on or along the crest that would indicate significant movement, settlement, or slope instability.

No significant depressions or low spots were observed that would impound surface runoff on or near the crest. Many small depressions exist, however.

In general, the crest is unvegetated and has suffered some erosion due to surface runoff. However, because of the great crest width, such erosional activity does not now constitute a threat to the impoundment.

(2) Upstream Slope: The upstream face of the embankment was generally irregular, both from crest to toe and abutment to abutment. The upstream face contained some erosional gullies that have resulted from surface runoff over unvegetated surfaces. The upstream slope was generally steep, but there were no indications of significant slope instability.

(3) Downstream Slope: The downstream face of the embankment consists of massive deposits of coarse coal refuse that have suffered significant erosional activity over the years since their deposition. Several deep erosional gullies were observed, which have resulted from both spring activity and surface runoff. Some surficial sloughing of steeper slopes was observed within the erosional gullies.

There were no indications of significant instability of the embankment's downstream slope. No large cracks, scarps, or anomalous bulges were observed anywhere on the downstream slope. The only vegetation observed consisted of a small stand of trees near the center of the crest and several swampy zones near the downstream toe that contained reeds and cattails.

(4) Seepage: Three well-defined springs and several other swamp zone sources of seepage were observed on the embankment's downstream slope. Visual estimates of seepage flows indicated that the strongest spring was discharging six to eight gallons per minute of clear water, and that the total flow from the embankment's downstream slope area was estimated to be 15 to 20 gallons per minute of clear water.

(5) Embankment Groins: The embankment groins consisted of irregular drainage channels at the immediate toe of the embankment on both the left and right sides. The channels were lined with vegetation ranging from grass to small trees, and were partially blocked at some locations by natural debris such as leaves, branches, and small duntimber.

The left abutment contained a significant flow of water which appeared to be originating at a swampy zone at the toe of the upper left end of the impounding embankment. In the lower reach, the channel lies in a deep erosional cut through coarse coal refuse materials that have been deposited by surface runoff flows from the embankment. Channel slopes in the cut ranged from vertical to very steep, and some surficial sloughing was observed. The estimated channel flow in this reach was 8 to 12 gallons per minute.

The right abutment groin contained a flow of less than 1/2 gallon per minute, which appeared to emanate from a spring at the base of a deep erosional gully in the right central portion of the embankment.

d. Abutments: The abutments of the impounding embankment were generally mild-sloped and wooded. There were no signs of erosion or instability of either abutment slope.

e. Principal Spillway: The principal spillway conduit is protected by a wire mesh trash cage which is 3 feet high and 3 feet by 5 feet in plan. On the date of inspection, the trash cage was clogged with silt, debris, and vegetal matter to a depth of approximately 2.5 feet. The inlet to the pipe did not appear to be blocked otherwise.

The principal spillway outlet location and structure were not observed during the field investigation. However, there was no indication of back-up or back water at the inlet to the pipe.

f. Emergency Spillway: The emergency spillway conduit passes through the dam at the left center of the impounding embankment. The pipe is located just beneath the crest of the dam, and discharges directly to the downstream slope. On the date of inspection, the inlet to the pipe was partially blocked by a conical pile of coal refuse, and a severe erosional gully was observed below the pipe's outlet. No significant obstructions were observed within the pipe.

The owner's representative indicated that the emergency spillway has never operated, and that the erosional gully below the pipe's outlet is the result of normal surface runoff.

g. Reservoir:

(1) Slopes: The slopes above the pond waterline were generally steep to very steep coarse coal refuse materials, and were completely unvegetated on the date of inspection. Considerable erosion has occurred on these slopes, and a considerable amount of sediment has been deposited at and just above the pool shoreline.

(2) Inlet Stream: The LaBelle Slurry Pond 3 has no defined inlet stream.

(3) Watershed: The watershed of Pond 3 is contained within the limits of the LaBelle Coal Refuse Disposal Area, and consists entirely of unvegetated coarse coal refuse surfaces adjacent to the perimeter of the pond.

(4) Sedimentation: Pond 3 is an inactive disposal facility for fine coal refuse wastes from the LaBelle Coal Preparation Plant below. According to the owner's representative, the pond is almost completely filled with fine coal refuse. The pond has not been in use since 1975. No sounding information was available to indicate the depth of standing water in the pond.

h. Downstream Conditions:

(1) Downstream Channels: Two downstream channels lead from the embankment's toe area to two sedimentation ponds which are located approximately between 1,000 and 1,500 feet below the toe of the embankment. Both ponds are incised into original ground, and appeared to be in very good condition on the date of inspection.

Discharges from the emergency spillway, if such were to occur, would be onto the embankment's downstream slope, to the downstream toe area, and into the drainage channel to the lower of the two sedimentation ponds. Flow below the lower sedimentation pond would be onto a wooded hillside below.

Major flows in the downstream toe area would probably breach the drainage channel and enter a natural, heavily wooded drainage swale below the toe of the dam.

The downstream channel for the principal spillway was not observed, but the owner's representative indicated that the principal spillway conduit discharges directly to Meadow Run and to the Monongahela River through an uninhabited valley.

(2) Floodplain Development: In the first 3,000 feet below Pond 3, one major local highway, one inhabited dwelling, a rail yard, and a Corps of Engineer's lock and dam lie at elevations low enough to possibly be imperiled by high flows.

### 3.2 EVALUATION

The following evaluations are based on the visual inspections performed on 3 June 1981.

a. Embankment: The significant conditions observed at LaBelle Slurry Pond 3 included:

(1) Considerable and sometimes significant erosion of the embankment's downstream slopes.

(2) Lack of vegetal covering that promotes the continued significant erosion of the embankment.

(3) No indication of embankment instability and no indication of a general high water level within the embankment.

(4) Numerous wet swampy zones located on and adjacent to the embankment's downstream toe.

(5) Several seeps and springs associated with deep erosional gullies.

(6) No indication, based on water clarity and sedimentation zones, that active internal erosion (piping) of the embankment is occurring.

(7) Sloughing of steep slopes, primarily in the deep erosional gullies.

b. Principal Spillway: The condition of the principal spillway is considered to be fair. This is based on an observed build-up of silt and debris around the perimeter of the trash cage.

c. Emergency Spillway: The condition of the emergency spillway is considered to be poor. This is based primarily on the observed pipe's alignment that directs emergency spillway flows onto the embankment's downstream slope.

Under normal circumstances, the deposit of coal refuse materials blocking the inlet would be considered a deficiency. In this case; however, it is considered to be beneficial, in that it restricts emergency spillway flows to elevations higher than the inlet of the pipe.

d. Hazard Potential: The LaBelle Slurry Pond 3 was assigned a "significant" hazard potential rating. This rating was based on the observed height and limited impounding capacity of the embankment and downstream conditions that included one inhabited dwelling, an important local highway, a railyard, and a Corps of Engineers lock and dam.

## SECTION 4 OPERATIONAL FEATURES

### 4.1 PROCEDURE

Reservoir pool level is supposed to be maintained by the inlet invert of the principal spillway. On the date of inspection, debris on the trash cage was controlling the reservoir pool level. Normal operating procedure does not require a dam tender. There are no operation facilities at the dam.

The emergency spillway is uncontrolled.

No outlet works for the reservoir was observed.

### 4.2 MAINTENANCE OF DAM

The embankment and appurtenances are not maintained.

### 4.3 INSPECTION OF DAM

The Jones and Laughlin Steel Corporation is required by the State of Pennsylvania to inspect the dam annually and make needed repairs.

The Jones and Laughlin Steel Corporation is required by the Mine Health and Safety Administration (MSHA) to inspect the dam at least once every seven days and to make an annual report and certification of the dam.

### 4.4 WARNING PROCEDURE

There is no warning system and no formal emergency procedure to alert or evacuate downstream residents upon threat of a dam failure.

### 4.5 EVALUATION

The lack of a facility or plan to drain the reservoir is considered to be a deficiency. The lack of a warning system/emergency plan is considered a deficiency. The recommendations presented in Section 7 should be implemented as part of a general abandonment, closure and reclamation plan.

## SECTION 5 HYDROLOGY/HYDRAULICS

### 5.1 EVALUATION OF FEATURES

a. Design Data: LaBelle Slurry Pond 3 has a watershed of 96 acres which is unvegetated coarse coal refuse. The watershed is about 2,900 feet long and 2,200 feet wide and has a maximum elevation of about 1,160 feet (MSL).

There is no information available concerning the principal or emergency spillway design, and there is no information available on the required spillway capacity at the time of this facility's construction.

No other hydrologic calculations were found relating reservoir/spillway performance to the Probable Maximum Flood or fractions thereof.

b. Experience Data: Records are not kept of reservoir level or rainfall amounts. There is no record or report of the embankment ever being overtopped.

c. Visual Observations: On the date of the field inspection, the pool elevation was about 6.6 feet below the crest of the dam.

The principal spillway was operating. However, its trash rack was clogged by debris to a depth of two feet. The 48 inch diameter emergency spillway was partially blocked at its upstream end by coarse coal refuse.

d. Overtopping Potential: Overtopping potential was investigated through the development of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir. The Corps of Engineers guidelines recommend the Probable Maximum Flood (PMF) for "large" size, "significant" hazard dams. Based on the size and hazard classification, LaBelle Slurry Pond 3 has a Spillway Design Flood (SDF) of the PMF.

Hydrometeorological Report No. 33 indicates the adjusted 24 hour Probable Maximum Precipitation (PMP) for the subject site is 19.3 inches. No calculations are available to indicate whether the reservoir is sized to store a flood corresponding to the runoff from 19.3 inches of rainfall in 24 hours. Consequently, an evaluation of the reservoir was performed to determine whether the dam's available storage capacity is adequate under current Corps of Engineers guidelines.

The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California, July 1978. The major methodologies and key input data for this program are discussed briefly in Appendix D.

The peak inflow to LaBelle Slurry Pond 3 was determined by HEC-1 to be 600 cfs for a full PMF.

The reservoir routing was performed assuming that the initial pool elevation was 1095.0. This elevation was used because of the observed condition of the principal spillway inlet and the potential for blockage to Elevation 1095.0.

The discharge capacity of the principal spillway was not used in the analysis because of its negligible effect on routing conditions.

The discharge capacity of the emergency spillway was not used because of the observed partial blockage at the conduit inlet. The unblocked capacity of the emergency spillway may have a definite effect on reservoir pool level during routing of the SDF. However, discharge from the emergency spillway should not be permitted until outlet conditions have been improved.

e. Adequacy: The capacity of the reservoir (with spillways blocked) was determined to be 79% of the PMF (SDF) by HEC-1. According to Corps of Engineers' Guidelines, LaBelle Slurry Pond 3's spillway capacity is "inadequate."

## SECTION 6 STRUCTURAL STABILITY

### 6.1 AVAILABLE INFORMATION

a. Design and Construction Data: No design documentation or calculations were available for review. The owner provided the modification drawings that are cited in Appendix B and presented in Appendix E.

b. Operating Records: There are no written operating records or procedures for this dam.

c. Mining Activity: The Pittsburgh Coal Seam lies approximately 300 feet below the dam and impoundment and reportedly has been deep mined in the site vicinity.

d. Visual Observations:

(1) Embankment: The field inspection disclosed no evidence of a high groundwater level in the embankment.

Several swampy zones were observed near the downstream toe that were emitting iron laden water and had considerable swamp related vegetation.

Several springs were observed at the bases of some of the deeper erosional gullies on the downstream slope. The estimated spring elevations did not suggest a high embankment water level.

Local slopes on the downstream face are very steep, particularly within the limits of the deeper erosional gullies. The overall downstream slope is moderate, being approximately 2.8H:1V as shown on Section B-B (Plate VII). The section location appears to be approximately through the steepest part of the embankment. Slope segments on Section B-B are as steep as 1.8H:1V.

No significant cracks, scarps or anomalous bulges were observed on the downstream slope, although sloughing of locally steep slopes has occurred at several places.

(2) Principal Spillway: The condition of the principal spillway structure could not be determined but on the date of the inspection, the spillway was functional.

(3) Emergency Spillway: No structural deficiencies of the emergency spillway were observed. The location of the conduit outlet provides for potential significant erosion of the impounding embankment's downstream slope.

(4) Evidence of Mine Subsidence: None.

e. Performance: No information was available on performance of LaBelle Slurry Pond 3 since its construction in 1958.

## 6.2 EVALUATION

a. Design Documents: No design documentation was available to evaluate the structure.

b. Embankment: Based on the results of the visual observations of embankment slopes, materials and seepage conditions, LaBelle Slurry Pond 3 impounding embankment appears to be stable with respect to major slope movement. Minor sloughing has and will continue to occur until locally steep slopes have been eliminated. Continued local sloughing could lead to more serious embankment stability problems if allowed to continue indefinitely.

c. Principal Spillway: The principal spillway was functional on the date of inspection.

d. Emergency Spillway: The emergency spillway was structurally stable on the date of inspection. The conduit alignment is considered to be seriously deficient with respect to potential erosional instability of the downstream slope.

e. Seismic Stability: According to the Seismic Hazard Map of the United States, LaBelle Slurry Pond 3 is located in Zone 1 where damage due to earthquakes would most likely be minor.

A dam located in Seismic Zone 1 may be assumed to present no hazard from an earthquake provided static stability conditions are satisfactory and conventional safety margins exist. No calculations were developed to verify this assessment, however.

SECTION 7  
ASSESSMENT AND RECOMMENDATIONS

7.1 ASSESSMENT

a. Evaluation:

(1) Embankment: LaBelle Slurry Pond 3's impounding embankment is considered to be in fair condition. This assessment is based on visual observations of significant erosional distress and uncontrolled seepage on the downstream slope.

The erosion and surface conditions are mitigated by a very wide embankment crest and no indication of a high groundwater level in the embankment.

(2) Principal Spillway: The condition of the principal spillway is considered to be poor. This assessment is based on visual observations of significant clogging of the trash cage and an "inadequate" capacity rating according to the HEC-1 analysis.

(3) Emergency Spillway: The condition of the emergency spillway is considered to be poor. This assessment is based on observations that indicate a potential for serious erosion of the embankment's downstream slope by spillway discharges.

(4) Emergency Plans: The lack of a documented emergency operation and warning plan is considered to be a deficiency. Also, the lack of a facility or plan to draw down the reservoir water level under emergency conditions is considered to be a deficiency.

b. Adequacy of Information: The information available on design, construction, operation and performance history in combination with visual observations and hydrology and hydraulic calculations was sufficient to evaluate the embankment and appurtenant structures in accordance with the Phase I investigations guidelines.

c. Urgency: The recommendations presented in Section 7 should be implemented immediately.

d. Necessity for Further Studies: None.

## 7.2 RECOMMENDATIONS

a. Embankment Improvements: The owner should continue to implement the existing abandonment plan with all possible speed. In particular, the deeper erosional gullies on the downstream face should be eliminated by collecting spring flows in underdrains and then backfilling the cavity with compacted coarse coal refuse.

Concurrently, surface drainage courses should be defined and improved to reduce erosion in the larger existing gullies.

b. Principal Spillway: The owner should immediately clean the principal spillway trash cage of debris and improve the inflow channel to permit unrestricted flow from the reservoir to the pipe. The trash cage should be periodically inspected (weekly or monthly) and cleaned as required to maintain the reservoir water level at its design elevation.

c. Emergency Spillway: The emergency spillway should either be improved or eliminated. Improvements should be sufficient to prevent erosion of the downstream slope by spillway discharges.

d. Emergency Operation and Warning Plan: The owner should develop an Emergency Operation and Warning Plan including:

(1) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(2) Procedures for around-the-clock surveillance during periods of heavy precipitation or runoff.

(3) Procedures for drawdown of the reservoir under emergency conditions.

(4) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

e. Monitoring of Seepage Zones: The seepage zones and springs on and about the downstream toe of the embankment should be monitored for changes in water quality and quantity. If one does not now exist, the owner should develop and implement a regularly scheduled monitoring program with appropriate records to indicate possible long-term changes in seepage conditions.

f. Maintenance and Inspection Procedures: The owner should develop written maintenance and inspection procedures in the form of checklists and step-by-step instructions.

**APPENDIX A**  
**VISUAL INSPECTION CHECKLIST**

**VISUAL OBSERVATIONS CHECKLIST I  
(NON-MASONRY IMPOUNDING STRUCTURE)**

Name of Dam LaBelle Slurry Pond 3 County Fayette State Pennsylvania National ID # PA 00295  
 Type of Dam Coarse Coal Refuse Hazard Category Significant  
 Dates of Inspection 14 May 1981 Weather Partly cloudy, warm Temperature 70°F  
3 June 1981 Cloudy, warm, light rain 65°F

Pool Elevation at Time of Inspection 1093.8 (MSL)

Inspection Personnel: 14 May 1981 Ackenheil & Associates, Project Manager  
J. E. Barrick, P.E. and Hydrologist  
J. P. Hannan Ackenheil & Associates, Geotechnical Engineer  
S. G. Mazzella Ackenheil & Associates, Civil Engineer  
K. V. Rao Jones & Laughlin Steel Corporation,  
Owner's Representative  
D. Wright Jones & Laughlin Steel Corporation,  
Owner's Representative

3 June 1981 Ackenheil & Associates, Project Manager  
J. E. Barrick, P.E. and Hydrologist  
J. P. Hannan Ackenheil & Associates, Geotechnical Engineer  
S. G. Mazzella Ackenheil & Associates, Civil Engineer  
D. Wright Jones & Laughlin Steel Corporation,  
Owner's Representative

Recorder J. E. Barrick

GEO Project G80138-A  
 PennDER I.D. No. 26-105

EMBANKMENT

| <u>VISUAL EXAMINATION OF</u>                                  | <u>OBSERVATIONS</u>                                                                                                                                                                                                                                                                                                                                                                                           | <u>REMARKS OR RECOMMENDATIONS</u> |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| <b>SURFACE CRACKS</b>                                         | <p>Randomly oriented drying cracks observed. Cracks ranged from closed to very slight opening.</p> <p>Numerous sharp, deep erosional gullies observed on embankment's downstream slope.</p>                                                                                                                                                                                                                   |                                   |
| <b>UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE</b>      | <p>None observed.</p>                                                                                                                                                                                                                                                                                                                                                                                         |                                   |
| <b>SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES</b> | <p>Significant erosion of embankment slopes both upstream and downstream observed over entire embankment. Some erosional gullies are very deep and contain surficial sloughing of very steep gully slopes.</p> <p>No significant sloughing or erosion of abutment slopes was observed.</p>                                                                                                                    |                                   |
| <b>VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST</b>         | <p>The embankment crest was quite irregular in both the horizontal and vertical planes. In general, the crest rose sharply toward either end of the dam, and was generally flat over the central portion.</p> <p>Horizontally, the embankment crest is convex in the downstream direction, and contains significant variations in crest width. The minimum observed crest width was approximately 250 ft.</p> |                                   |

# EMBANKMENT (CONTINUED)

| VISUAL EXAMINATION OF                  | OBSERVATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | REMARKS OR RECOMMENDATIONS |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| RIPRAP FAILURES                        | None observed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                            |
| SETTLEMENT                             | Settlement of the crest and slopes could not be evaluated because of the natural irregularity of the surfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                            |
| JUNCTION OF EMBANKMENT<br>AND ABUTMENT | <p>The junction of the embankment and the left abutment contains a small drainage channel that is generally irregular, rock and debris lined, and is surrounded by vegetation ranging from grass to small trees.</p> <p>In the lower reach, near the deepest section of the embankment, the channel has eroded deeply into coarse coal refuse materials that have been placed by sedimentation immediately below the toe of the embankment. Slopes within this reach are very steep and recent sloughing has occurred.</p> <p>The junction of the embankment and the right abutment is similar in nature to the junction of the embankment and the left abutment. The drainage channel in the groin within this reach, however, appears to be more stable, as it contains significantly smaller flows.</p> <p>Both abutments were generally mild in slope, and tree-covered on the date of inspection.</p> |                            |
| ANY NOTICEABLE SEEPAGE                 | <p>Numerous swampy areas and several well-defined springs were observed on and immediately below the embankment. In general, the springs and swampy zones contained considerable iron staining, but there were no indications of the internal erosion of embankment or foundation materials.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                            |

EMBANKMENT (CONTINUED)

| <u>VISUAL EXAMINATION OF</u> | <u>OBSERVATIONS</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <u>REMARKS OR RECOMMENDATIONS</u> |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
|                              | Several visual flow estimates were made during the field inspection, and are recorded by location, flow, and source on the field sketch, page A-10. The total estimated flow, below the toe of the embankment, was 15-20 gallons per minute.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                   |
| STAFF GAUGE AND<br>RECORDER  | None observed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                   |
| DRAINS                       | The owner's representative indicated that a subsurface toe drain had recently been constructed immediately beneath the access road that parallels the downstream toe of the embankment. The outlet end of the drain was not observed during the inspection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                   |
| SURFICIAL CONDITIONS         | <p>The embankment crest was unvegetated and generally irregular, consisting of coarse coal refuse deposits. No significant depressions were observed that might impound surface water, and surface drainage was generally uncontrolled.</p> <p>The embankment's upstream slope consists of randomly deposited coarse coal refuse. The upstream slope is unvegetated and has suffered some erosion of the slopes with subsequent sedimentation at the toe and along the reservoir waterline.</p> <p>The embankment's downstream slope is quite irregular, consisting of extensive coarse coal refuse deposits. The slope is unvegetated except for a few trees near the crest, and some swamp-type vegetal growth at several locations near the toe. Local slopes on the downstream face range from nearly vertical in some of the deep erosional cuts, to approximately angle of repose slopes at other points.</p> |                                   |

PRINCIPAL SPILLWAY

| VISUAL EXAMINATION OF | OBSERVATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | REMARKS OR RECOMMENDATIONS |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| INTAKE STRUCTURE      | <p>The principal spillway intake structure is the upstream end of a 12 inch diameter steel pipe that is protected by a wire screen trash cage which is approximately 3 feet by 5 feet in plan and approximately 3 feet deep. The wire screen has 2 inch openings.</p> <p>On the date of inspection, the trash cage was clogged by silt and debris to a height of approximately 2.0 feet above the invert of the principal spillway conduit.</p> <p>The approach channel to the intake structure was generally silted and overgrown by swamp-type vegetal growth.</p> |                            |
| CONDUIT               | <p>The only visible portion of the principal spillway conduit was at the intake structure. It appeared to be in good condition.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                  |                            |
| OUTLET STRUCTURE      | <p>The outlet end of the principal spillway conduit was not observed. The owner's representative indicated that the conduit passed beneath the massive refuse disposal area and discharges to Meadow Run approximately 1500 feet to the south.</p>                                                                                                                                                                                                                                                                                                                   |                            |
| EMERGENCY GATE        | <p>None observed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                            |

EMERGENCY SPILLWAY

| VISUAL EXAMINATION OF | OBSERVATIONS                                                                                                                                                                                                                                                                                                                                                                                                                   | REMARKS OR RECOMMENDATIONS |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| APPROACH CHANNEL      | The approach channel to the emergency spillway was generally clear, except at the immediate inlet end of the pipe, where a mound of coarse coal refuse has been placed, partially blocking the inlet to the pipe.                                                                                                                                                                                                              |                            |
| CONDUIT               | The emergency spillway conduit is an asphalt-coated, 48 in. diameter corrugated metal pipe.                                                                                                                                                                                                                                                                                                                                    |                            |
| DISCHARGE CHANNEL     | The emergency spillway pipe discharges directly to the embankment's downstream slope, just below the crest of the dam. The discharge channel consists of a significant erosional gully in the embankment's downstream slope. According to the owner's representative, however, the emergency spillway has never operated, and the erosional gully in the downstream slope has been caused by natural runoff and seepage flows. |                            |

# INSTRUMENTATION

| VISUAL EXAMINATION OF | OBSERVATIONS                                                                                                                                                                                                                                                                                     | REMARKS OR RECOMMENDATIONS |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| MONUMENTATION/SURVEYS | None observed.                                                                                                                                                                                                                                                                                   |                            |
| WEIRS                 | None observed.                                                                                                                                                                                                                                                                                   |                            |
| PIEZOMETERS           | <p>Five piezometers were observed at two locations on the embankment's crest. Near the downstream slope, piezometers, having depths of 100, 123, and 138 feet, were observed.</p> <p>Near the upstream slope, two piezometers, having depths of 90 and 125 feet, were observed.</p>              |                            |
| OBSERVATION WELLS     | <p>Two observation wells were observed at two locations on the embankment crest. Near the downstream slope, an observation well with a depth of 32 feet was observed, and near the upstream slope, an observation well with depth of 60 feet was observed. No water level data was obtained.</p> |                            |

RESERVOIR

| VISUAL EXAMINATION OF | OBSERVATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                  | REMARKS OR RECOMMENDATIONS |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| SLOPES                | <p>The reservoir slopes around the perimeter of the pond were moderately steep to steep and were generally barren, being entirely coarse coal refuse materials.</p> <p>The reservoir slopes have suffered some erosion by surface runoff flows from above.</p>                                                                                                                                                                                |                            |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |
| SEDIMENTATION         | <p>According to the owner's representative, the pond is almost entirely filled with fine coal refuse sediments that have been hydraulically deposited by pipeline from the LaBelle Coal Preparation Plant below. On the date of inspection, the depth of free water in the impoundment could not be determined.</p> <p>Considerable sedimentation of the reservoir shoreline has occurred as a result of erosion of the reservoir slopes.</p> |                            |
| INLET STREAM          | <p>The reservoir has no inlet stream.</p>                                                                                                                                                                                                                                                                                                                                                                                                     |                            |
| WATERSHED             | <p>The watershed for the pond consists of coarse coal refuse which are entirely unvegetated. The watershed is comprised generally of a narrow band of land that borders the perimeter of the pond. The upper end of the pond is gradually being filled by a continuous deposition of coarse coal refuse.</p>                                                                                                                                  |                            |

## DOWNSTREAM CONDITIONS

| VISUAL EXAMINATION OF                     | OBSERVATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | REMARKS OR RECOMMENDATIONS                                                                                                                                                                                                                                                                                |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHANNEL<br>OBSTRUCTIONS,<br>DEBRIS, ETC.) | <p>The downstream channel for the emergency spillway lies across the embankment's downstream slope and discharges into a drainage swale below the toe of the embankment that has been constructed to carry runoff from the embankment to a sedimentation pond approximately 1400 feet below the dam. A similar channel collects runoff from the embankment's left flank and adjacent refuse disposal area, and channels it to a second sedimentation pond below the dam's toe. Both sedimentation ponds have been incised into natural ground. On the date of inspection, both channels were generally clear of obstructions and were barren to partially vegetated. The owner's representative indicated that construction of the channels and downstream ponds had been completed last year, and that vegetation was still in the germination stage.</p> | <p>One inhabited dwelling, a major local highway, a major railroad, and the Maxwell Lock and Dam of the United States Army Corps of Engineers lie in the reach immediately below the LaBelle Slurry Pond 3. The lock and dam are approximately 3,000 feet below the toe of the impounding embankment.</p> |

APPROXIMATE NUMBER  
OF HOMES AND POPULATION

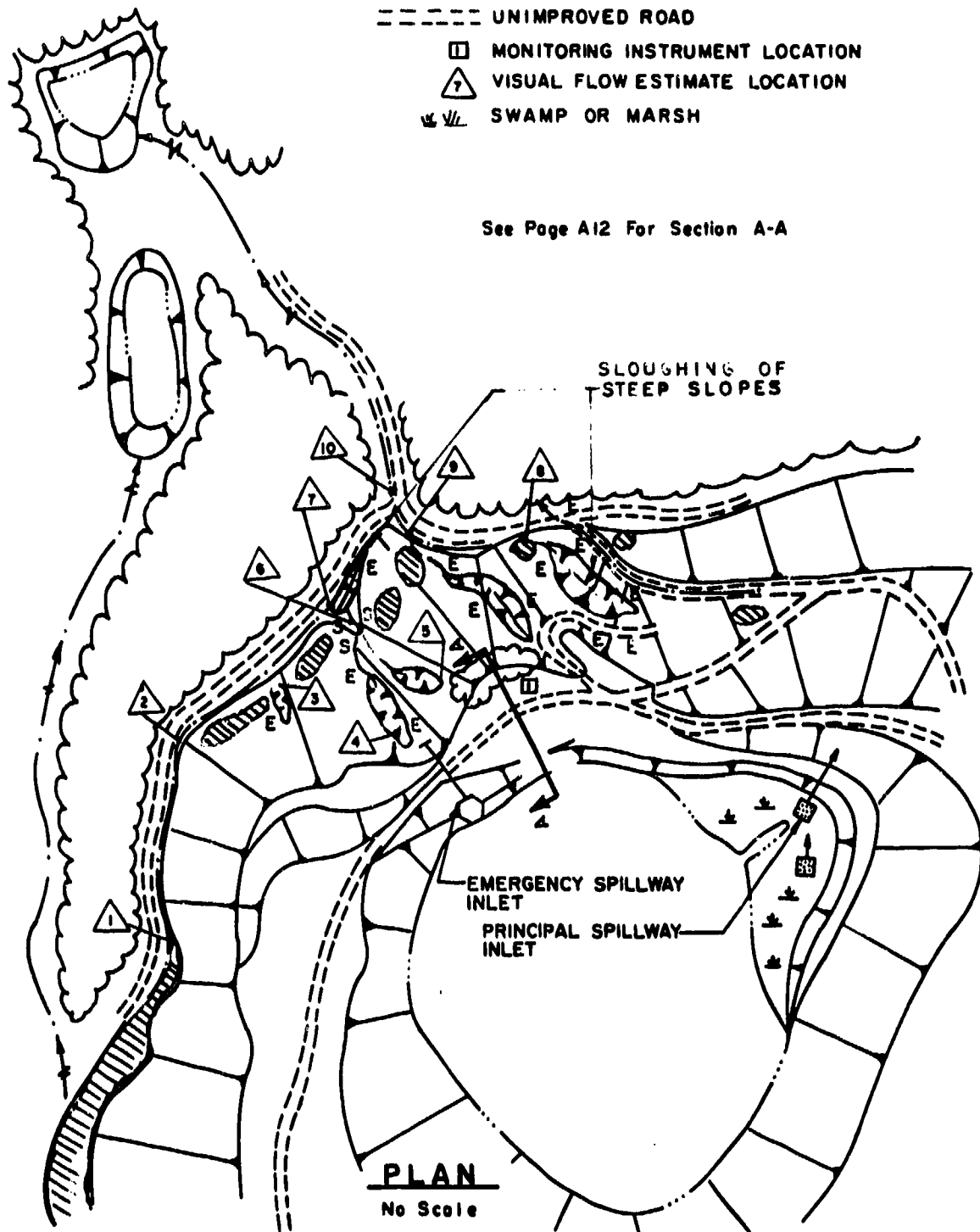
# **VISUAL FLOW ESTIMATES**

| Location | G.P.M.  | Source  |
|----------|---------|---------|
| 1        | 1 - 2   | SWAMP   |
| 2        | 3 - 5   | CHANNEL |
| 3        | 3 - 5   | SWAMP   |
| 4        | 6 - 8   | SPRING  |
| 5        | <1/2    | SPRING  |
| 6        | 6 - 8   | CHANNEL |
| 7        | 8 - 12  | CHANNEL |
| 8        | <1/2    | SWAMP   |
| 9        | <1/2    | CHANNEL |
| 10       | 15 - 20 | CHANNEL |

# **LEGEND**

- IMPOUNDING EMBANKMENT SLOPE
- OTHER SLOPES
- STREAM OR SHORELINE
- SURFACE DRAINAGE COURSE
- SWAMPY AREA
- CONCRETE STRUCTURE
- EROSION
- SPRING
- UNIMPROVED ROAD
- MONITORING INSTRUMENT LOCATION
- VISUAL FLOW ESTIMATE LOCATION
- SWAMP OR MARSH

See Page A12 For Section A-A



DATE: JULY 1981

SCALE: NONE

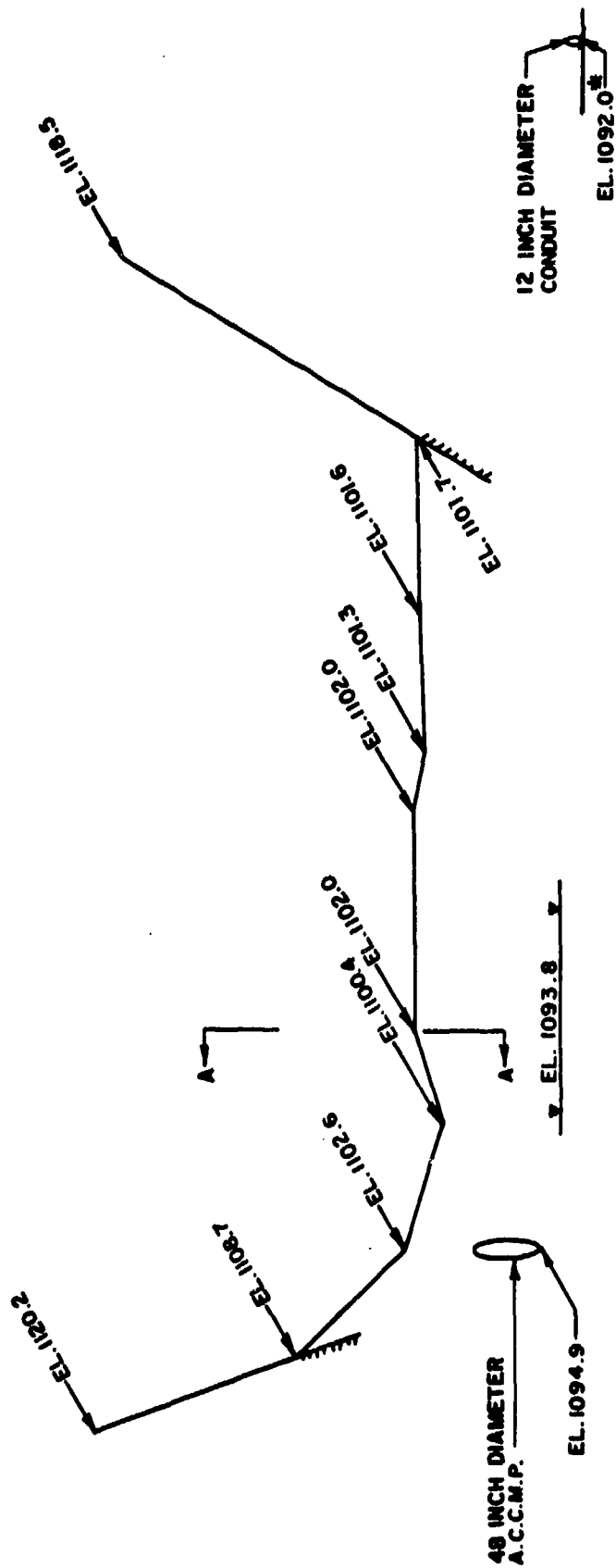
DR: JF CK: JEB

DWG. NO. 80138A-1

LABELLE SLURRY POND 3  
NATIONAL DAM INSPECTION PROGRAM

**ACKENHEIL & ASSOCIATES** CONSULTING  
GEO SYSTEMS, INC. ENGINEERS  
1000 BANKSVILLE RD./PITTSBURGH, PA. 15216

FIELD SKETCH



**CREST PROFILE**  
(LOOKING DOWNSTREAM)

SCALE:

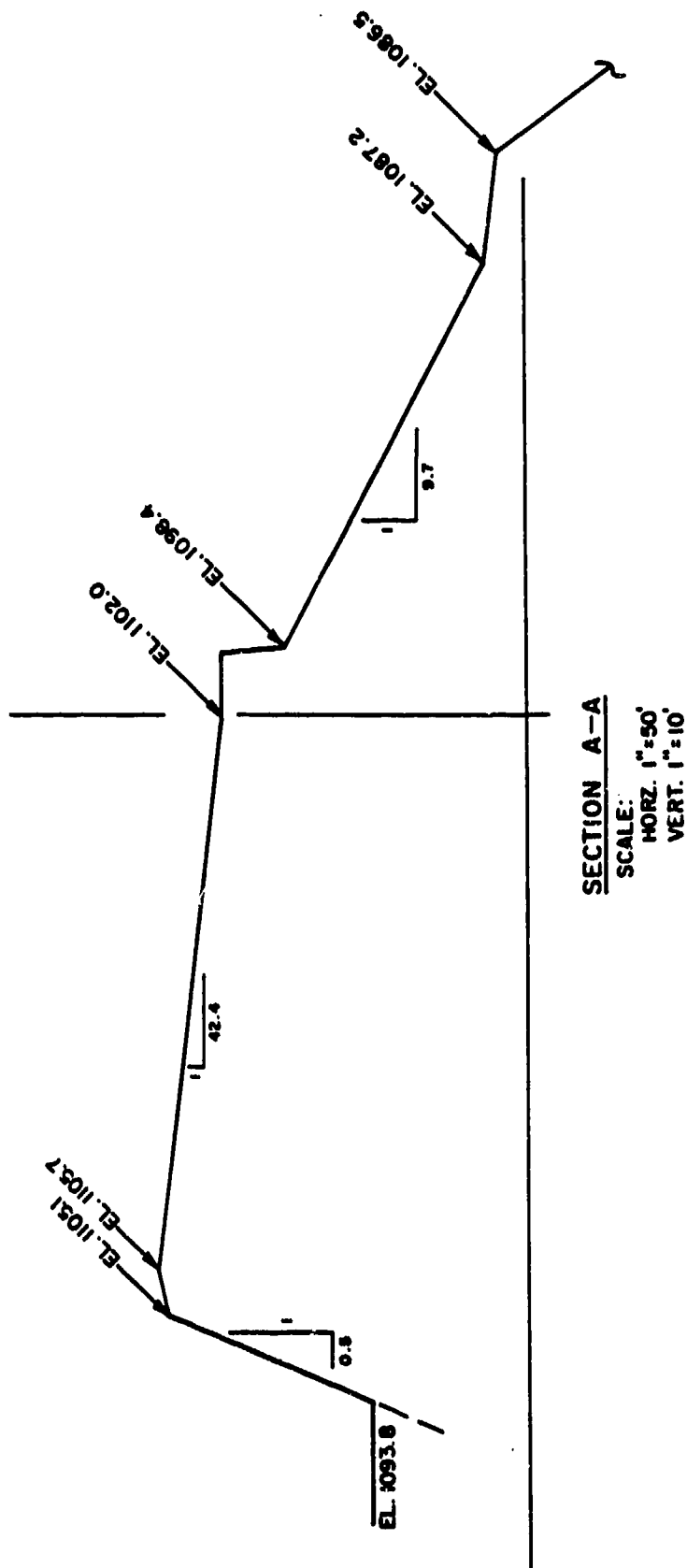
HORIZ. 1" = 200'

VERT. 1" = 10'

\* Assumed Benchmark For  
Field Measurements

|                   |         |
|-------------------|---------|
| DATE: JULY 1981   |         |
| SCALE: AS SHOWN   |         |
| DR: JF            | CK: JEB |
| DWG. NO. 80138A-3 |         |

FIELD PROFILE



NOTE: A COMPLETE SECTION OF THE EMBANKMENT,  
 AT ITS APPROXIMATE STEEPEST SECTION, IS  
 SHOWN ON SECTION B-B, DWG. A-3965  
 SHEET 7/10, PLATE VII, APPENDIX E

See Page A 10 For Section A-A Location

|                   |         |                                                               |  |               |
|-------------------|---------|---------------------------------------------------------------|--|---------------|
| DATE: JULY 1981   |         | LABELLE SLURRY POND 3                                         |  | FIELD SECTION |
| SCALE: AS SHOWN   |         | NATIONAL DAM INSPECTION PROGRAM                               |  |               |
| DR: JF            | CK: JEB | <b>ACKENHEIL &amp; ASSOCIATES</b> CONSULTING ENGINEERS        |  |               |
| DWG. NO. 80138A-2 |         | GEO SYSTEMS, INC.<br>1000 BANKSVILLE RD./PITTSBURGH PA. 15216 |  |               |

APPENDIX B  
ENGINEERING DATA CHECKLIST

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

NAME OF DAM LaBelle Slurry Pond 3  
I.D. No. PA 00295

| ITEM                  | REMARKS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| *Design Drawings      | <p>Drawings by Orbital Engineering, Carnegie, Pennsylv-<br/>vania for Jones and Laughlin Steel Corporation,<br/>Vesta-Shannopin Coal Division, LaBelle Coal Refuse<br/>Disposal Facility, Operation and Abandonment Plan.</p> <p>Sheet 1/10 Stage 1 Plan, Site Location Map and<br/>List of Drawings**</p> <p>Sheet 2/10 Stage 2 Plan, General Notes and Legend**</p> <p>Sheet 3/10 Stage 3 Plan and Suggested Construction<br/>Sequence**</p> <p>Sheet 4/10 Site Abandonment Plan **</p> <p>Sheet 5/10 Sedimentation Basins No. 1 and 2, Plans<br/>and Sections **</p> <p>Sheet 6/10 Section A-A **</p> <p>Sheet 7/10 Section B-B **</p> <p>Sheet 8/10 Sections</p> <p>Sheet 9/10 Sections and Details</p> <p>Sheet 10/10 Sections and Details</p> |
| As-Built Drawings     | None available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Regional Vicinity Map | USGS 7-1/2 Minute California and Carmichaels,<br>Pennsylvania Quadrangle Maps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| *Construction History | Constructed by Jones and Laughlin Steel Corporation<br>personnel. Dates of construction unknown. Con-<br>structed of coarse coal refuse from LaBelle Coal<br>Preparation Plant. Fine coal refuse impounded in<br>impoundment zone between 1958 and June 1976.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| ITEM                                                                | REMARKS                    |
|---------------------------------------------------------------------|----------------------------|
| *Typical Sections of Dam                                            | See Design Drawings above. |
| Outlets-Plans<br>Details<br>Constraints<br>Discharge Ratings        | None available.            |
| Rainfall/Reservoir Records                                          | None available.            |
| Design Reports                                                      | None available.            |
| Geology Reports                                                     | None available.            |
| Design Computations                                                 | None available.            |
| Hydrology and Hydraulics                                            | None available.            |
| Dam Stability                                                       | None available.            |
| Seepage Studies                                                     | None available.            |
| Materials Investigation,<br>Boring Records,<br>Laboratory,<br>Field | None available.            |
| *Post-Construction Surveys of Dam                                   | See Design Drawings above. |

| ITEM                                                 | REMARKS                    |
|------------------------------------------------------|----------------------------|
| Borrow Sources                                       | No Data Available.         |
| Monitoring Systems                                   | None reported.             |
| *Modifications                                       | See Design Drawings above. |
| High Pool Records                                    | None available.            |
| Post-Construction Engineering<br>Studies and Reports | None available.            |
| Maintenance,<br>Operation,<br>Records                | None available.            |
| Spillway-Plan<br>Sections<br>Details                 | None available.            |
| Operating Equipment<br>Plans and Details             | None available.            |
| Specifications                                       | None available.            |

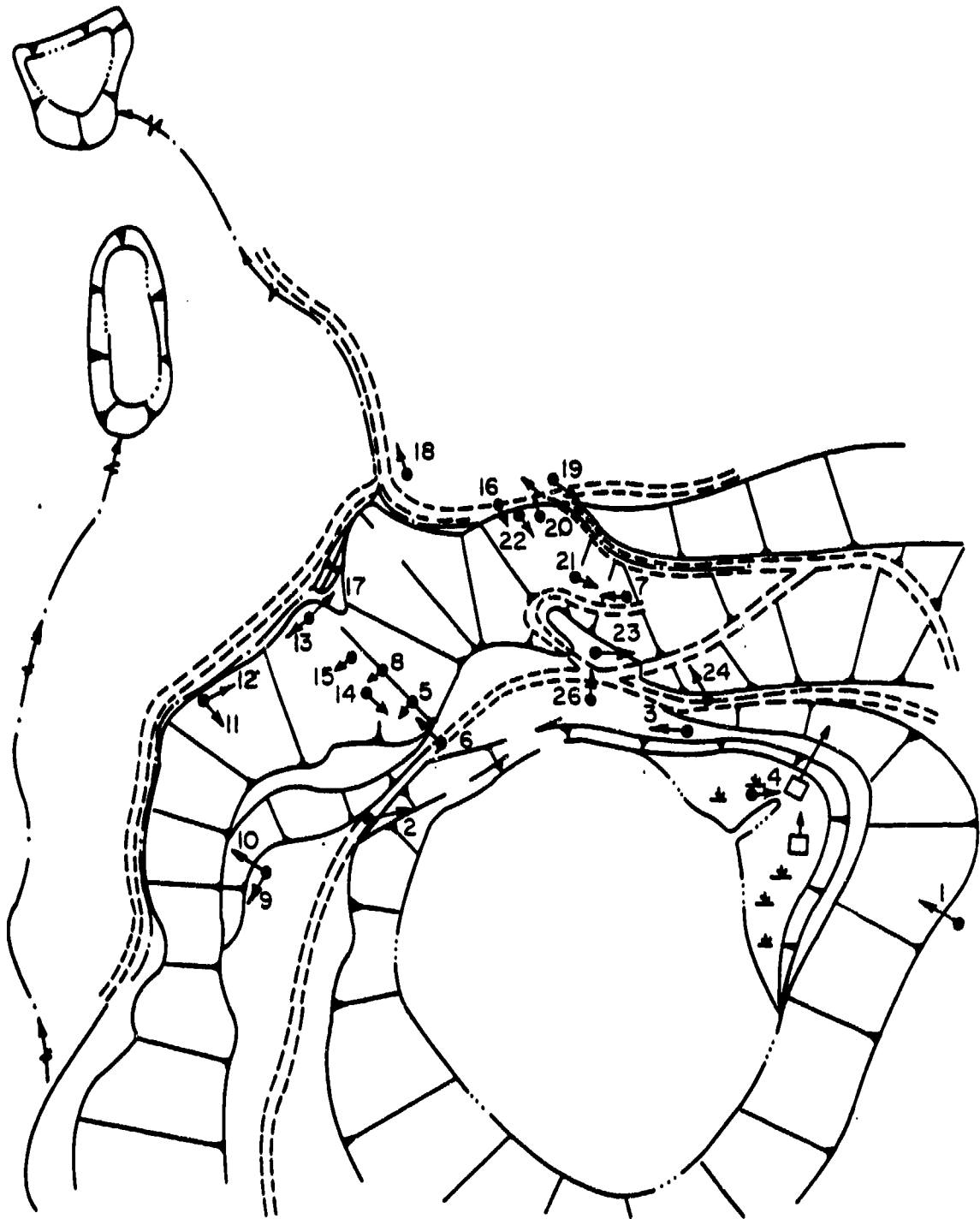
\* Information provided by J & L Steel Corporation  
 \*\*Reduced size reproduction contained in Appendix E.

C

APPENDIX C  
PHOTOGRAPHS

C

PHOTO 25, 27 and 28 LOCATIONS  
ARE NOT SHOWN



DATE: JULY 1991

SCALE: NONE

DR: JF CK: JEB

LABELLE SLURRY POND 3

NATIONAL DAM INSPECTION PROGRAM

**ACKENHEIL & ASSOCIATES** CONSULTING

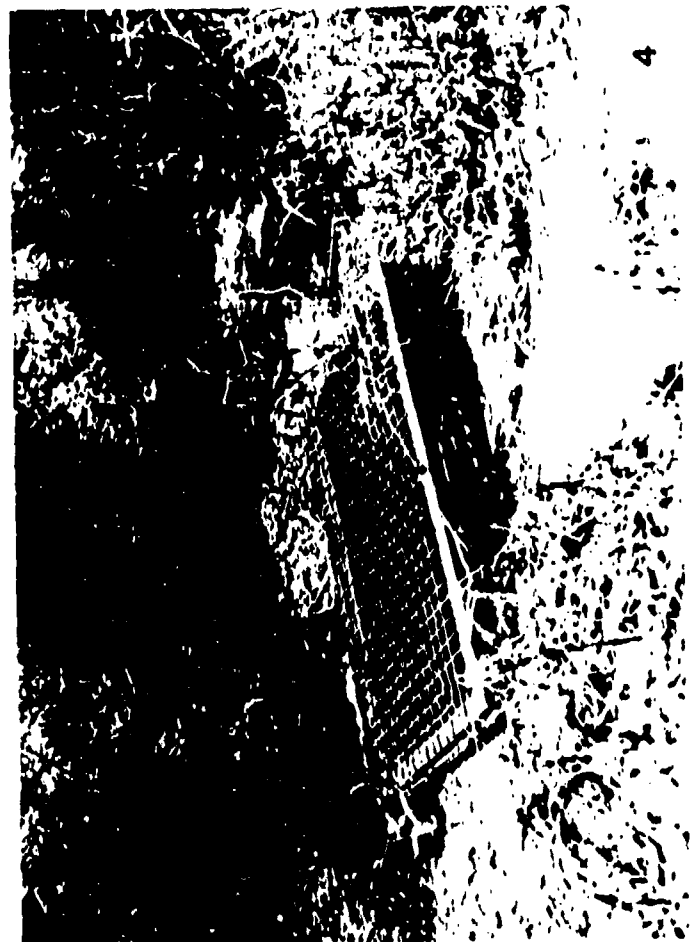
GEO SYSTEMS, INC.

1999 BANKEVILLE RD./PITTSBURGH, PA. 15216

ENGINEERS

PHOTO KEY MAP

LABELLE SLURRY POND 3



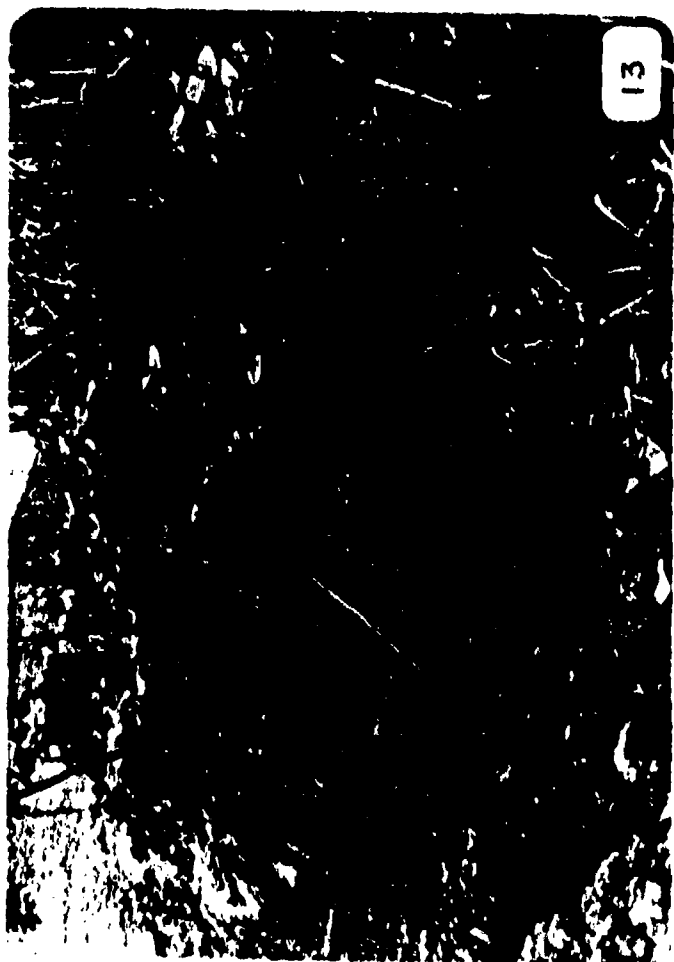
LABELLE SLURRY POND 3



LABELLE SLURRY POND 3



LABELLE SLURRY POND 3



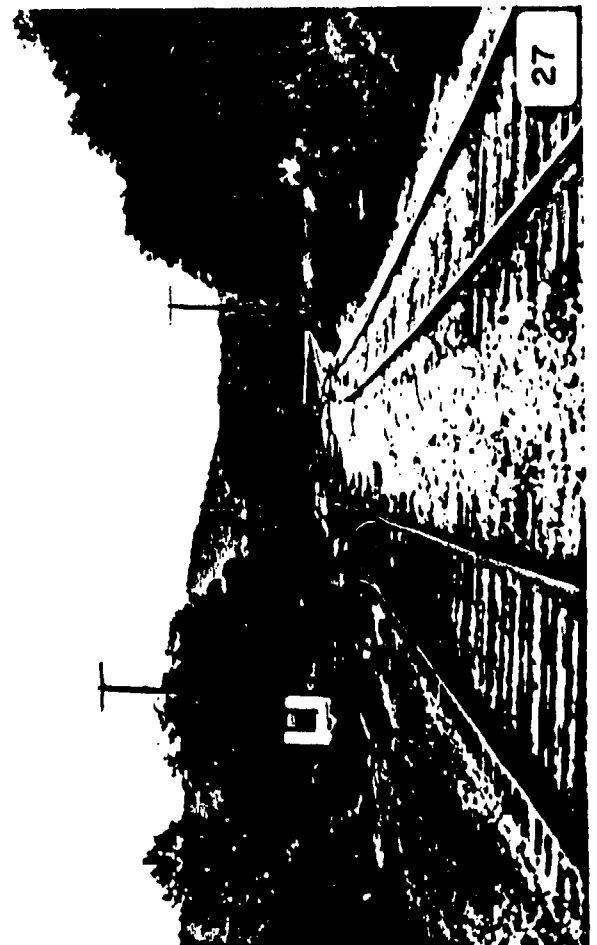
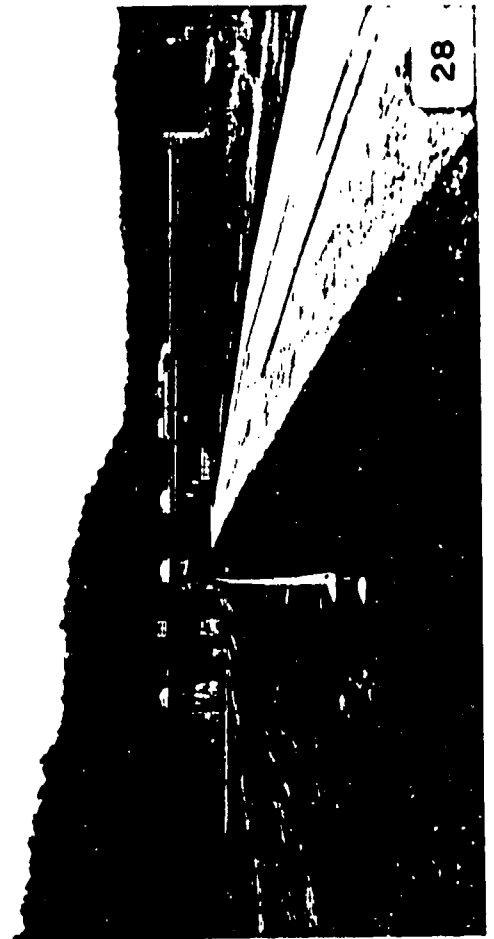
LABELLE SLURRY POND 3



LABELLE SLURRY POND 3



LABELLE SLURRY POND 3



### PHOTO DESCRIPTIONS

- Photo 1 Site Overview from right abutment.
- Photo 2 Embankment Crest from left abutment.
- Photo 3 Crest and Upstream Slope.
- Photo 4 Principal Spillway Trash Gage.
- Photo 5 Emergency Spillway Outlet.
- Photo 6 Erosion Gullies below Emergency Spillway Outlet.
- Photo 7 Erosion Gully on right portion of downstream slope.
- Photo 8 Erosion Gully with seepage in central portion of downstream slope.
- Photo 9 Downstream Slope and Left Abutment showing swampy conditions in left groin.
- Photo 10 Downstream Slope and Left Abutment showing swampy conditions in left groin.
- Photo 11 Downstream Slope, Left Portion showing erosion gullies.
- Photo 12 Downstream Slope, Central Portion showing erosion gullies and swampy area at embankment toe.
- Photo 13 Seepage from swampy area in left groin.
- Photo 14 Seepage in deep erosional gully.
- Photo 15 Seepage from slope of deep erosional gully.
- Photo 16 Seepage from swampy area on right portion of downstream slope.
- Photo 17 Erosion Gully in sediments at downstream toe of embankment.
- Photo 18 Downstream Channel.
- Photo 19 Erosion of Embankment, right abutment area.
- Photo 20 Erosion of Groin, right abutment area.
- Photo 21 Erosional Gullies on right portion of downstream slope.

- Photo 22 Erosional Gullies on right portion of downstream slope.
- Photo 23 Right Abutment Area from embankment crest.
- Photo 24 Downstream Slope from right abutment area.
- Photo 25 Downstream Hazard, inhabited dwelling.
- Photo 26 Overview of Downstream Area, showing sediment pond and Maxwell Lock and Dam.
- Photo 27 Downstream Hazard, railyard.
- Photo 28 Downstream Hazard, Maxwell Lock and Dam.

APPENDIX D  
HYDROLOGY AND HYDRAULICS  
ANALYSES

APPENDIX D  
HYDROLOGY AND HYDRAULICS  
ANALYSES

Methodology: The dam overtopping analysis was accomplished using the systemized computer program HEC-1 (Dam Safety Version), July, 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. Precipitation: The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 33" prepared by the U.S. Weather Bureau.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. Inflow Hydrograph: The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters, their definition and how they were obtained for these analyses.

| <u>Parameter</u> | <u>Definition</u>                                | <u>Where Obtained</u>                      |
|------------------|--------------------------------------------------|--------------------------------------------|
| Ct               | Coefficient representing variations of watershed | From Corps of Engineers*                   |
| L'               | Distance from centroid of watershed to outlet    | From USGS<br>7.5 minute<br>topographic map |
| Cp               | Peaking coefficient                              | From Corps of Engineers*                   |
| A                | Watershed size                                   | From USGS<br>7.5 minute<br>topographic map |

\*Developed by the Corps of Engineers on a regional basis for Pennsylvania.

C 3. Routing: Reservoir routing is accomplished by using Modified Puls routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the outlet works, spillways and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of the outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation-discharge relationship.

Storage in the pool area is defined by an area-elevation relationship from which the computer calculates storage. Surface areas are either planimetered from available mapping or USGS 7.5 minute series topographic maps or taken from reasonably accurate design data.

4. Dam Overtopping: Using given percentages of the PMF, the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Coarse coal refuse.

ELEVATION-TOP NORMAL POOL (STORAGE  
CAPACITY): 1092.0 (114 acre-feet)

ELEVATION-TOP FLOOD CONTROL POOL (STORAGE  
CAPACITY): 1100.4 (318 acre-feet)

ELEVATION-MAXIMUM DESIGN POOL: Unknown

ELEVATION-TOP DAM: 1102.5 (average) 1100.4 (minimum)

PRINCIPAL SPILLWAY (Active Inlet)

- a. Elevation 1092
- b. Type Steel pipe conduit (12 inch diameter) with a  
wire screen trash cage.
- c. Location Right reservoir shoreline on upstream of  
dam.
- d. Gate/Control None observed.

EMERGENCY SPILLWAY

- a. Type 48 inch diameter ACCMP
- b. Location At left side of embankment
- c. Entrance Invert 1094.9
- d. Exit Invert 1092.3
- e. Gate/Control None

HYDROMETEOROLOGICAL GAGES

- a. Type None
- b. Location N/A
- c. Records None

MAXIMUM REPORTED NON-DAMAGING  
DISCHARGE None reported

HEC-1 DAM SAFETY VERSION  
HYDROLOGY AND HYDRAULIC ANALYSIS  
DATA BASE

|                                                     |                        |
|-----------------------------------------------------|------------------------|
| NAME OF DAM: LaBelle Slurry Pond 3                  | NDI ID NO.<br>PA 00295 |
| Probable Maximum Precipitation (PMP)                | 24.1*                  |
| Drainage Area                                       | 0.15 sq. mi.           |
| Reduction of PMP Rainfall for Data Fit              | 0.8 (24.1)             |
| Reduce by 20%, therefore PMP rainfall               | =19.3 in.              |
| Adjustments of PMF for Drainage Area (Zone 7)       |                        |
| 6 hrs.                                              | 102%                   |
| 12 hrs.                                             | 120%                   |
| 24 hrs.                                             | 130%                   |
| 48 hrs.                                             | 140%                   |
| Snyder Unit Hydrograph Parameters                   |                        |
| Zone                                                | 29**                   |
| C <sub>p</sub>                                      | 0.50                   |
| C <sub>t</sub>                                      | 1.6                    |
| L' =                                                | 0.20 mile              |
| t <sub>p</sub> = C <sub>t</sub> (L') <sup>0.6</sup> | 0.61 hour              |
| Loss Rates                                          |                        |
| Initial Loss                                        | 1.0 inch               |
| Constant Loss Rate                                  | 0.05 inch/hour         |
| Base Flow Generation Parameters                     |                        |
| Flow at Start of Storm                              | 1.5 cfs/sq.mi=0.23 cfs |
| Base Flow Cutoff                                    | 0.05 x Q peak          |
| Recession Ratio                                     | 2.0                    |

---

\* Hydrometeorological Report 33

\*\* Hydrological zone defined by Corps of Engineers,  
Baltimore District, for determining Snyder's Coefficients  
(C<sub>p</sub> and C<sub>t</sub>).

ACKENHEIL & ASSOCIATES  
GEO Systems, Inc.  
1000 Banksville Road  
PITTSBURGH, PA. 15216  
(412) 531-7111

Job La Belle Sluiceway Pond 3 Job No. 80-138A  
Subject DATA Input  
Made By JPH Date 6/28/81 Checked JFB Date 6/29/81

### LOSS RATE AND BASE FLOW Parameters

As Recommended By Corps of Engineers, Baltimore District

STRCL = 1 inch

CNSTL = 0.05 in/hr

STRTO = 1.5 cfs/mi<sup>2</sup>

QRCSN = 0.05 (5% of Peak Flow)

RTIOR = 2.0

### Elevation - Area - Capacity Relationships

From USGS 7.5min Quad, Pond Data Files, Field Inspection Data,  
AND OWNER PROVIDED INFORMATION.

|              |      |                   |
|--------------|------|-------------------|
| AT ELEVATION | 1092 | Area = 21.1 acres |
| AT ELEVATION | 1096 | Area = 24.6 Acres |
| AT ELEVATION | 1100 | Area = 26.4 acres |
| AT ELEVATION | 1125 | Area = 39.3 acres |

From Data as of 28 April 1976

At elevation 1090 Area = 30 acres storage = 50 acre-ft.

At elevation 1099 Area = 49 acres storage = 430 acre-ft.

Principal Spillway Inlet Invert = 1092.0 (Lower inlet)

Assume pond began with pool at elevation 1092

Calculate storage below 1092, Assuming conic section.

$S_{1092} = 113.8$  Acre feet.

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1000 Banksville Road  
PITTSBURGH, PA. 15216  
(412) 531-7111

Job LA BELLE Sluiceway Pond 3 Job No. 30130-4  
Subject Lata Input  
Made By JHT Date 6/21/91 Checked JES Date 6/29

From Conic Method for Reservoir Volume  
Flood Hydrograph Package (HEC-1)  
Dam Safety Version (users manual)

$$H = 3Y_A = \frac{3(113.8)}{21.1} = 16.2$$

Elevation where Area Equals Zero  $1092.0 - 16.2 = 1075.8$

|     |        |        |        |        |        |
|-----|--------|--------|--------|--------|--------|
| \$A | 0.     | 21.1   | 24.6   | 26.4   | 39.3   |
| \$E | 1075.8 | 1092.0 | 1096.1 | 1100.1 | 1125.1 |

### Overtop Parameters

Top of Dam Elevation (Minimum) 1100.4  
Length of Dam 1000 feet.  
Coefficient of Discharge 3.09

The 48 inch diameter CMP emergency spillway and the 12 inch diameter steel pipe principal spillway were assumed blocked in the HEC analysis. The routing was begun at the invert elevation of the principal spillway invert plus three feet to allow for the observed, partially blocked trash cage.

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GEO Systems, Inc.  
1000 Banksville Road  
PITTSBURGH, PA. 15216  
(412) 531-7111

Job LaBelle Slurry Pond 3 Job No. EC128A  
Subject Cost Impact  
Made By TDH Date 6/25/81 Checked JTB Date 6/24

Program Schedule

Inflow LaBelle  
Slurry Pond 3

Route LaBelle  
Slurry Pond 3

END

\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 \*\*\*\*\*

|    |           |                                                               |       |        |       |        |       |       |       |         |   |
|----|-----------|---------------------------------------------------------------|-------|--------|-------|--------|-------|-------|-------|---------|---|
| 1  | A1        | NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS       |       |        |       |        |       |       |       |         |   |
| 2  | A2        | HYDROLOGIC AND HYDRAULIC ANALYSIS OF LABELLE SLURRY POND 3    |       |        |       |        |       |       |       |         |   |
| 3  | A3        | PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD |       |        |       |        |       |       |       |         |   |
| 4  | B         | 300                                                           | 0     | 10     | 0     | 0      | 0     | 0     | 0     | -4      | 0 |
| 5  | B1        | 5                                                             |       |        |       |        |       |       |       |         |   |
| 6  | J         | 1                                                             | 2     | 1      |       |        |       |       |       |         |   |
| 7  | J1        | 1.                                                            | .5    |        |       |        |       |       |       |         |   |
| 8  | K         | 0                                                             | 1     |        |       |        |       |       |       | 1       |   |
| 9  | K1        | INFLOW HYDROGRAPH FOR LABELLE SLURRY POND 3                   |       |        |       |        |       |       |       |         |   |
| 10 | M         | 1                                                             | 1     | .15    | .15   |        |       |       |       | 1       |   |
| 11 | P         |                                                               | 24.1  | 102    | 120   | 130    | 140   |       |       |         |   |
| 12 | T         |                                                               |       |        |       |        |       | 1.0   | .05   |         |   |
| 13 | W         | 0.61                                                          | 0.50  |        |       |        |       |       |       |         |   |
| 14 | X         | -1.5                                                          | -0.05 | 2.0    |       |        |       |       |       |         |   |
| 15 | K         | 1                                                             | 2     |        |       |        |       |       |       | 1       |   |
| 16 | K1        | ROUTING AT LABELLE SLURRY POND 3                              |       |        |       |        |       |       |       |         |   |
| 17 | Y         |                                                               |       | 1      | 1     |        |       |       |       |         |   |
| 18 | Y1        | 1                                                             |       |        |       |        |       |       |       | -1095.0 |   |
| 19 | \$A       | 0.                                                            | 21.1  | 24.6   | 26.4  | 39.3   |       |       |       |         |   |
| 20 | \$E1075.8 |                                                               | 1092. | 1096.  | 1100. | 1125.  |       |       |       |         |   |
| 21 | \$F1094.9 |                                                               | 0.001 | 3.09   | 1.5   |        |       |       |       |         |   |
| 22 | \$D1100.4 |                                                               | 3.09  | 1.5    | 960.  |        |       |       |       |         |   |
| 23 | \$L 20.   |                                                               | 80.   | 535.   | 630.  | 910.   | 955.  | 985.  | 1020. |         |   |
| 24 | \$V1100.4 |                                                               | 1101. | 1101.6 | 1102. | 1102.5 | 1103. | 1104. | 1105. |         |   |
| 25 | K         | 99                                                            |       |        |       |        |       |       |       |         |   |
| 26 | A         |                                                               |       |        |       |        |       |       |       |         |   |
| 27 | A         |                                                               |       |        |       |        |       |       |       |         |   |
| 28 | A         |                                                               |       |        |       |        |       |       |       |         |   |
| 29 | A         |                                                               |       |        |       |        |       |       |       |         |   |
| 30 | A         |                                                               |       |        |       |        |       |       |       |         |   |

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

|                      |   |
|----------------------|---|
| RUNOFF HYDROGRAPH AT | 1 |
| ROUTE HYDROGRAPH TO  | 2 |
| END OF NETWORK       |   |

\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 \*\*\*\*\*

RUN DATE: 24 JUN 81  
 RUN TIME: 12.48.16

NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS  
 HYDROLOGIC AND HYDRAULIC ANALYSIS OF LABELLE SLURRY POND 3  
 PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD

| JOB SPECIFICATION |     |      |       |     |       |       |      |      |       |
|-------------------|-----|------|-------|-----|-------|-------|------|------|-------|
| NQ                | NHR | NMIN | IDAY  | IHR | IMIN  | METRC | IPLT | IPRT | NSTAN |
| 300               | 0   | 10   | 0     | 0   | 0     | 0     | 0    | -4   | 0     |
|                   |     |      | JOPER | NWT | LROPT | TRACE |      |      |       |
|                   |     |      | 5     | 0   | 0     | 0     |      |      |       |

MULTI-PLAN ANALYSES TO BE PERFORMED  
 NPLAN= 1 NRTIO= 2 LRTIO= 1

RTIOS= 1.00 0.50

\*\*\*\*\*

# SUB-AREA RUNOFF COMPUTATION

## INFLOW HYDROGRAPH FOR LABELLE SLURRY POND 3

ISTAQ 1 ICOMP 0 IECON 0 ITAPE 0 JPLT 0 JPRT 0 INAME 1 ISTAGE 0 LAUTO 0

HYDROGRAPH DATA  
IHYDG 1 IUHG 1 TAREA 0.15 SNAP 0.0 TRSDA 0.15 TRSPC 0.0 RATIO 0.0 ISNOW 0 ISAME 1 LOCAL 0

PRECIP DATA  
SPFE 0.0 PMS 24.10 R6 102.00 R12 120.00 R24 130.00 R48 140.00 R72 0.0 R96 0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA  
LROPT 0 STRKR 0.0 DLTGR 0.0 RTIOL 1.00 ERAIN 0.0 STRKS 0.0 RTIOK 1.00 STRTL 1.00 CNSTL 0.05 ALSMX 0.0 RTIMP 0.0

UNIT HYDROGRAPH DATA  
TP= 0.61 CP=0.50 NTA= 0

RECESSION DATA  
STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 29 END-OF-PERIOD ORDINATES, LAG= 0.62 HOURS, CP= 0.50 VOL= 1.00  
10. 35. 64. 77. 71. 58. 48. 39. 32. 26.  
22. 18. 15. 12. 10. 8. 7. 5. 4. 4.  
3. 2. 2. 2. 1. 1. 1. 1. 1. 1.

END-OF-PERIOD FLOW  
MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q  
SUM 26.99 24.57 2.42 14253.  
( 686.)( 624.)( 61.)( 403.60)

\*\*\*\*\*

## HYDROGRAPH ROUTING

### ROUTING AT LABELLE SLURRY POND 3

ISTAQ 2 ICOMP 1 IECON 0 ITAPE 0 JPLT 0 JPRT 0 INAME 1 ISTAGE 0 LAUTO 0

ROUTING DATA  
GLOSS 0.0 CLOSS 0.0 AVG 0.0 IRES 1 ISAME 1 IOPT 0 IPMP 0 LSTR 0

NSTPS 1 NSTDL 0 LAG 0 AMSKK 0.0 X 0.0 TSK STORA ISPRAT -1095. 0

SURFACE AREA= 0. 21. 25. 26. 39.

CAPACITY= 0. 114. 205. 307. 1123.

ELEVATION= 1076. 1092. 1096. 1100. 1125.

CREL 1094.9 SPWID 0.0 COQW 3.1 EXPW 1.5 ELEV 0.0 COQL 0.0 CAREA 0.0 EXPL 0.0

DAM DATA  
TOPEL 1100.4 COQD 3.1 EXPD 1.5 DAMWID 960.

CREST LENGTH 20. 80. 535. 630. 910. 955. 985. 1020.  
AT OR BELOW  
ELEVATION 1100.4 1101.0 1101.6 1102.0 1102.5 1103.0 1104.0 1105.0

PEAK OUTFLOW IS 208. AT TIME 42.50 HOURS  
PEAK OUTFLOW IS 0. AT TIME 50.00 HOURS

\*\*\*\*\*

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

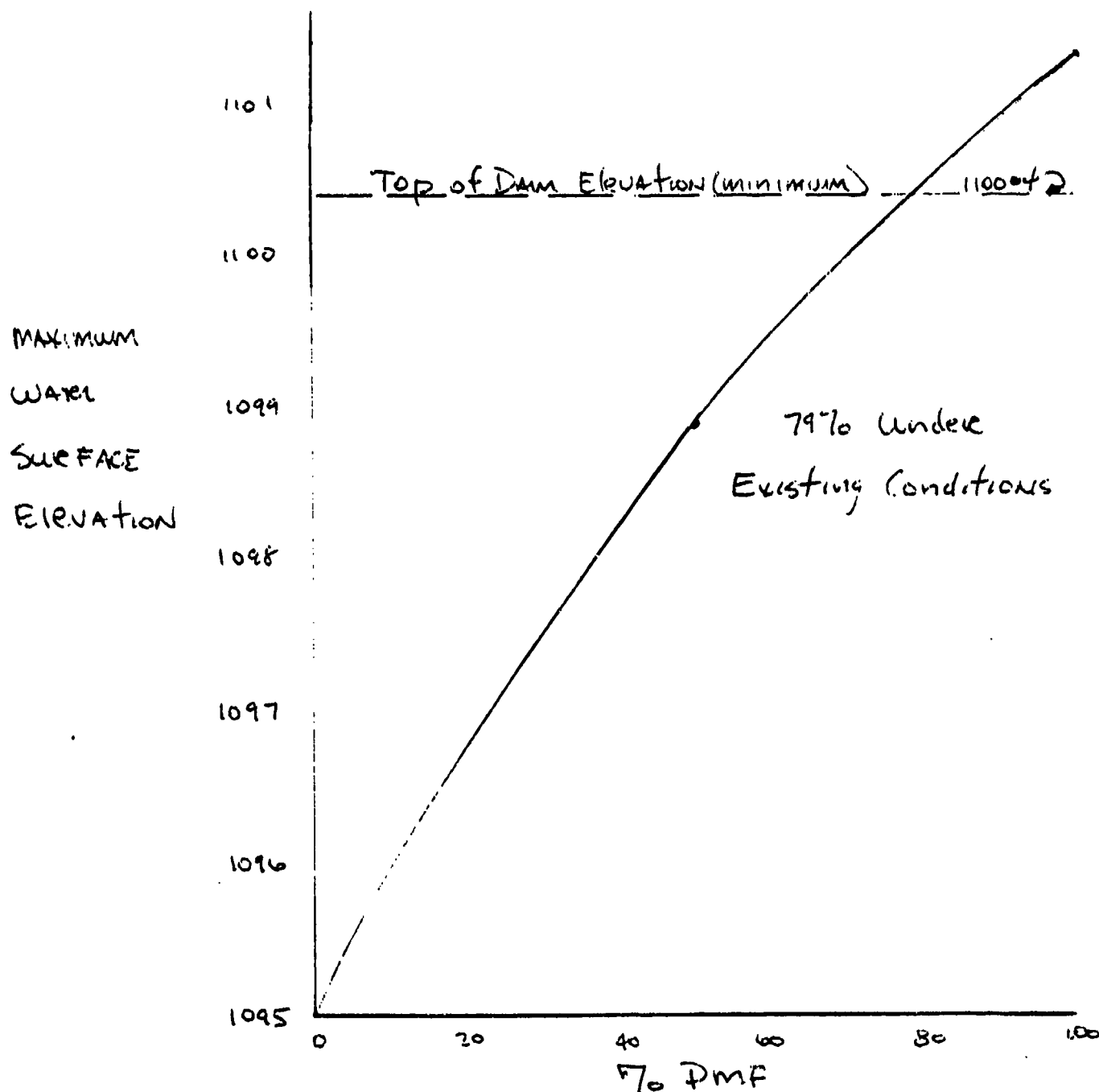
| OPERATION     | STATION | AREA  | PLAN | RATIOS APPLIED TO FLOWS |                 |
|---------------|---------|-------|------|-------------------------|-----------------|
|               |         |       |      | RATIO 1<br>1.00         | RATIO 2<br>0.50 |
| HYDROGRAPH AT | 1       | 0.15  | 1    | 599.                    | 299.            |
|               | (       | 0.39) | (    | 16.96)(                 | 8.48)(          |
| ROUTED TO     | 2       | 0.15  | 1    | 208.                    | 0.              |
|               | (       | 0.39) | (    | 5.89)(                  | 0.00)(          |

SUMMARY OF DAM SAFETY ANALYSIS

| PLAN 1 .....       |                                  | INITIAL VALUE                |                             | SPILLWAY CREST            |                               | TOP OF DAM                      |                             |
|--------------------|----------------------------------|------------------------------|-----------------------------|---------------------------|-------------------------------|---------------------------------|-----------------------------|
|                    | ELEVATION                        |                              | 1095.00                     |                           | 1094.90                       |                                 | 1100.40                     |
|                    | STORAGE                          |                              | 181.                        |                           | 179.                          |                                 | 318.                        |
|                    | OUTFLOW                          |                              | 0.                          |                           | 0.                            |                                 | 0.                          |
| RATIO<br>OF<br>PMF | MAXIMUM<br>RESERVOIR<br>W.S.ELEV | MAXIMUM<br>DEPTH<br>OVER DAM | MAXIMUM<br>STORAGE<br>AC-FT | MAXIMUM<br>OUTFLOW<br>CFS | DURATION<br>OVER TOP<br>HOURS | TIME OF<br>MAX OUTFLOW<br>HOURS | TIME OF<br>FAILURE<br>HOURS |
| 1.00               | 1101.34                          | 0.94                         | 343.                        | 208.                      | 9.00                          | 42.50                           | 0.0                         |
| 0.50               | 1098.90                          | 0.0                          | 279.                        | 0.                        | 0.0                           | 50.00                           | 0.0                         |

ACKENHEIL & ASSOCIATES  
GEO Systems, Inc.  
1000 Banksville Road  
PITTSBURGH, PA. 15216  
(412) 531-7111

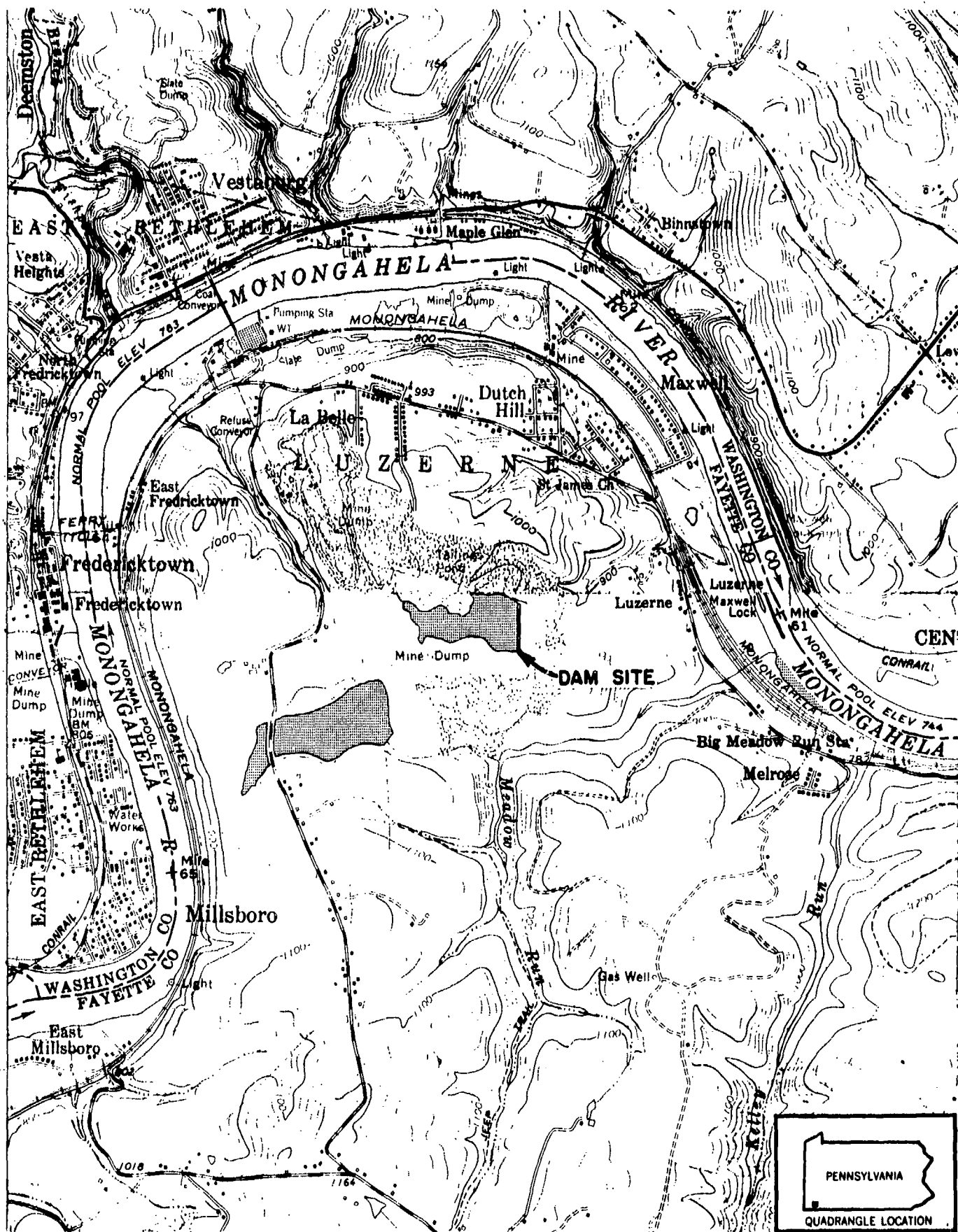
Job LaBelle Sluiceway Pond 3 Job No. 8038A  
Subject Hydrologic Performance Plot  
Made By PDH Date 6/24/81 Checked JEB Date 6/24/81



**APPENDIX E**  
**PLATES**

### LIST OF PLATES

|           |                                                        |
|-----------|--------------------------------------------------------|
| Plate I   | Regional Vicinity Map.                                 |
| Plate II  | Stage 1 Plan, Site Location Map and List of Drawings.  |
| Plate III | Stage 2 Plan, General Notes and Legend.                |
| Plate IV  | Stage 3 Plan and Suggested Construction Sequence.      |
| Plate V   | Site Abandonment Plan.                                 |
| Plate VI  | Sedimentation Basins Nos. 1 and 2, Plans and Sections. |
| Plate VII | Section B-B.                                           |



CALIFORNIA and CARMICHAELS U.S.G.S. 7 1/2 min. QUADRANGLES

DATE: JULY 1981

SCALE: 1"=2000'

DR: J CK: JEB

PLATE I

LABELLE SLURRY POND 3

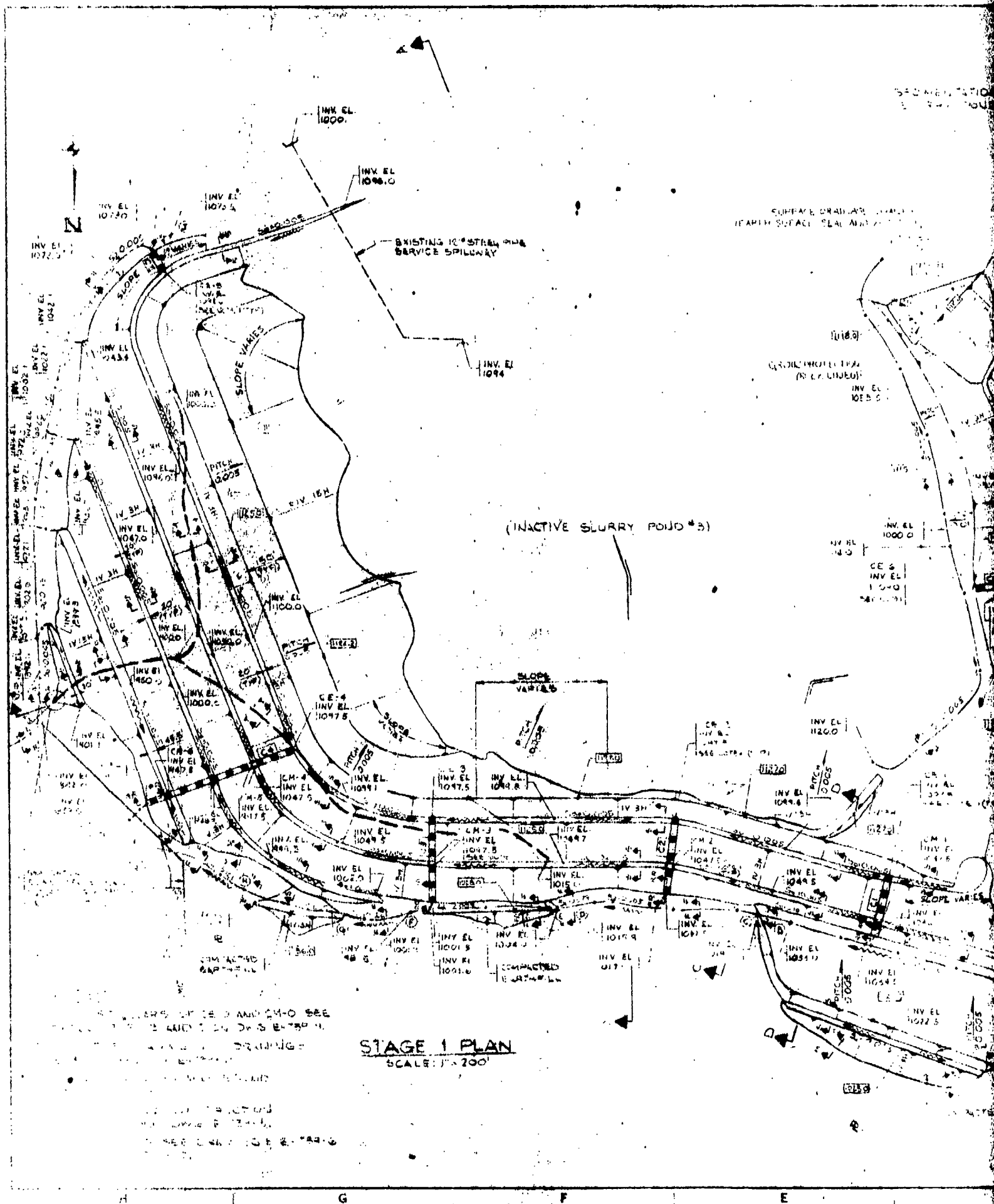
NATIONAL DAM INSPECTION PROGRAM

**ACKENHEIL & ASSOCIATES** CONSULTING

GEO SYSTEMS, INC. ENGINEERS

1000 BANKSVILLE RD./PITTSBURGH, PA. 15216

REGIONAL  
VICINITY  
MAP



SEAL AND

JOHN P. HICKS, CHAIRMAN  
(1900-1910)

[illegible]

• 30 •

INV 60  
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DATE 10/10/2017  
Page 2

LIST OF DRAWINGS

- E-7494-1 STAGE: PLANNING CONCEPTS  
 MAN: ANDREW J. B. JONES  
 E-7494-2 STAGE: PLANNING CONCEPTS  
 MAN: ANDREW J. B. JONES  
 E-7494-3 STAGE: PLANNING CONCEPTS  
 MAN: ANDREW J. B. JONES  
 E-7494-4 STAGE: PLANNING CONCEPTS  
 MAN: ANDREW J. B. JONES  
 E-7494-5 STAGE: PLANNING CONCEPTS  
 MAN: ANDREW J. B. JONES  
 E-7494-6 STAGE: PLANNING CONCEPTS  
 MAN: ANDREW J. B. JONES  
 E-7494-7 STAGE: PLANNING CONCEPTS  
 MAN: ANDREW J. B. JONES  
 E-7494-8 STAGE: PLANNING CONCEPTS  
 MAN: ANDREW J. B. JONES  
 E-7494-9 STAGE: PLANNING CONCEPTS  
 MAN: ANDREW J. B. JONES

THIS PAGE IS BEST QUALITY PRACTICE COPY  
FROM COPY FURNISHED TO DDC

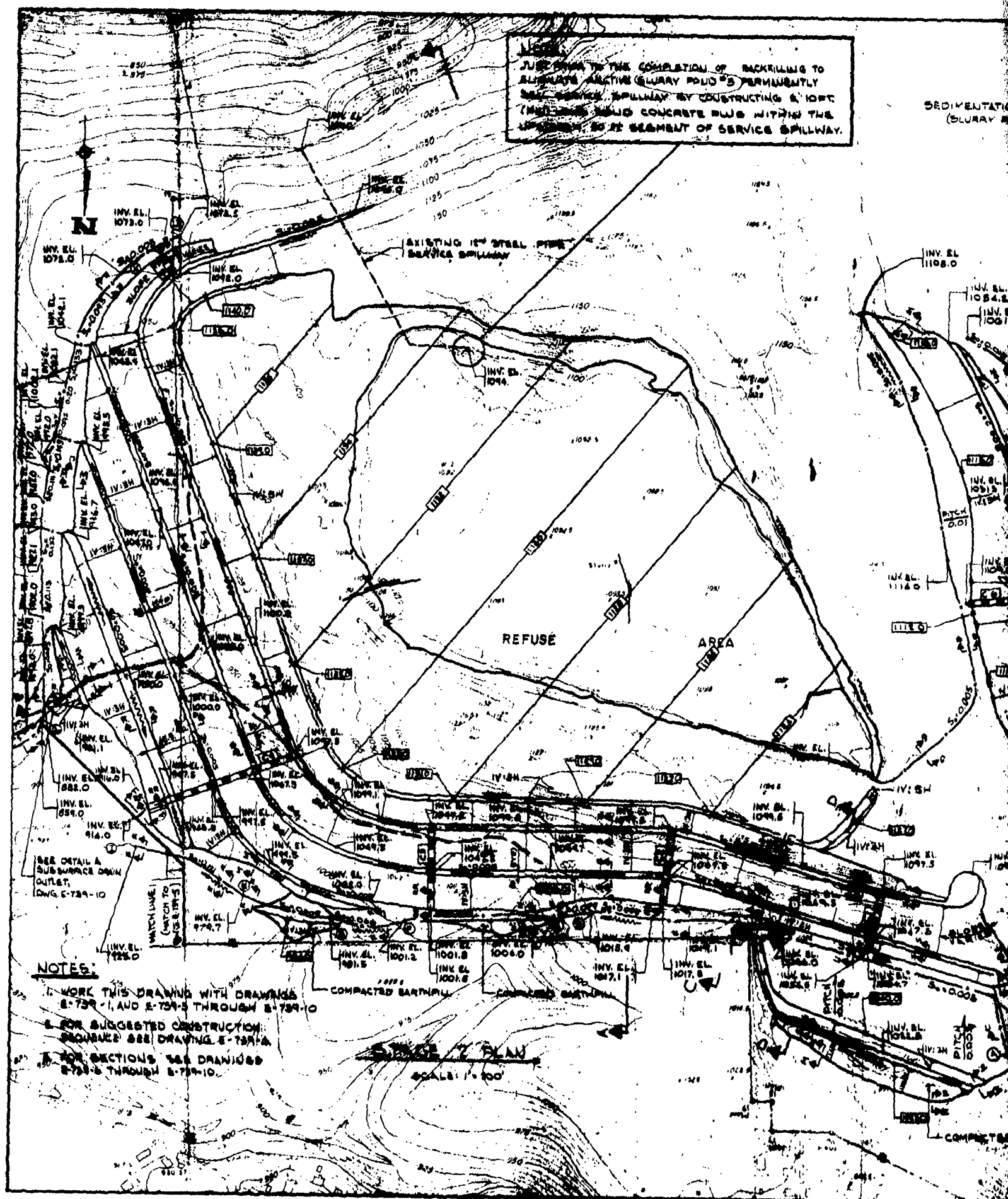
**SENT OUT**

MAY 22 1981

ORITAL ENGINEERING INC.

JAMES A. L. JACOBSON, JR.  
PHILADELPHIA

## PLATE II



JUST PRIOR TO THE COMPLETION OF BACKFILLING TO ELIMINATE EXISTING SLURRY POND'S PERMANENTLY SERVICE SPILLWAY BY CONSTRUCTING A 10FT (MINIMUM) THICK CONCRETE WALL WITHIN THE EXISTING 20 FT SEGMENT OF SERVICE SPILLWAY.

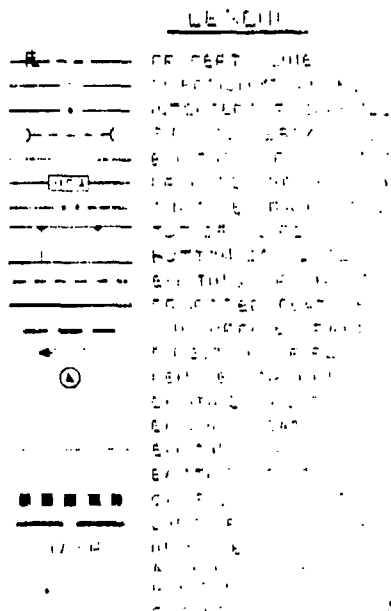
SEDIMENTATION (SLURRY)

# NOTES:

1. WORK THIS DRAWING WITH DRAWINGS E-739-1, AND E-739-2 THROUGH E-739-10
2. FOR SUGGESTED CONSTRUCTION SEQUENCE SEE DRAWING E-739-10
3. FOR SECTIONS SEE DRAWINGS E-739-1 THROUGH E-739-10.

STAGE 7 PLAN

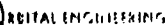
SCALE: 1" = 100'

[illegible]

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MAY 22 1981

**ORBITAL ENGINEERING INC.**



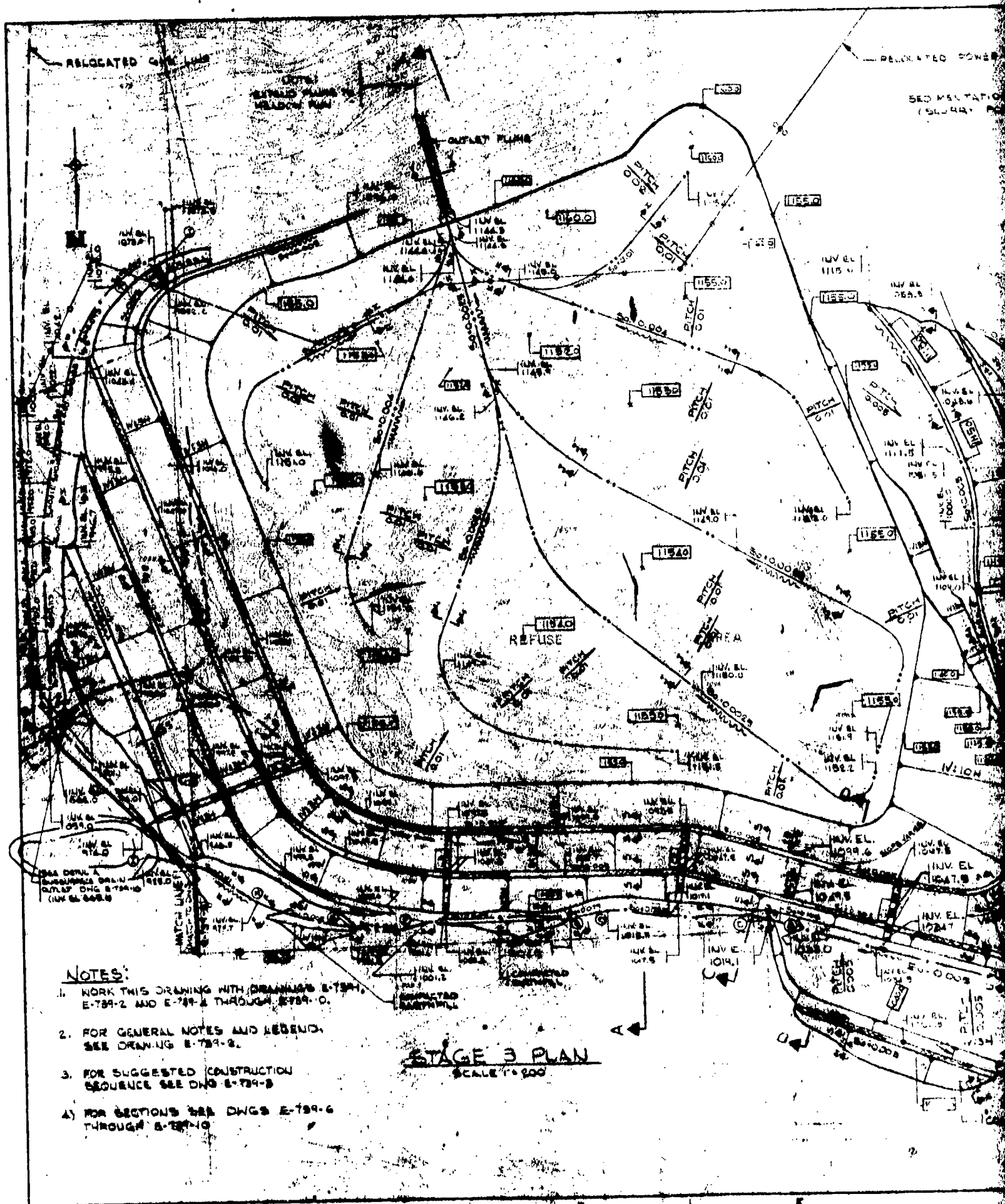
CARVER, PA

Jon Ne

SHT No. 1

[illegible]

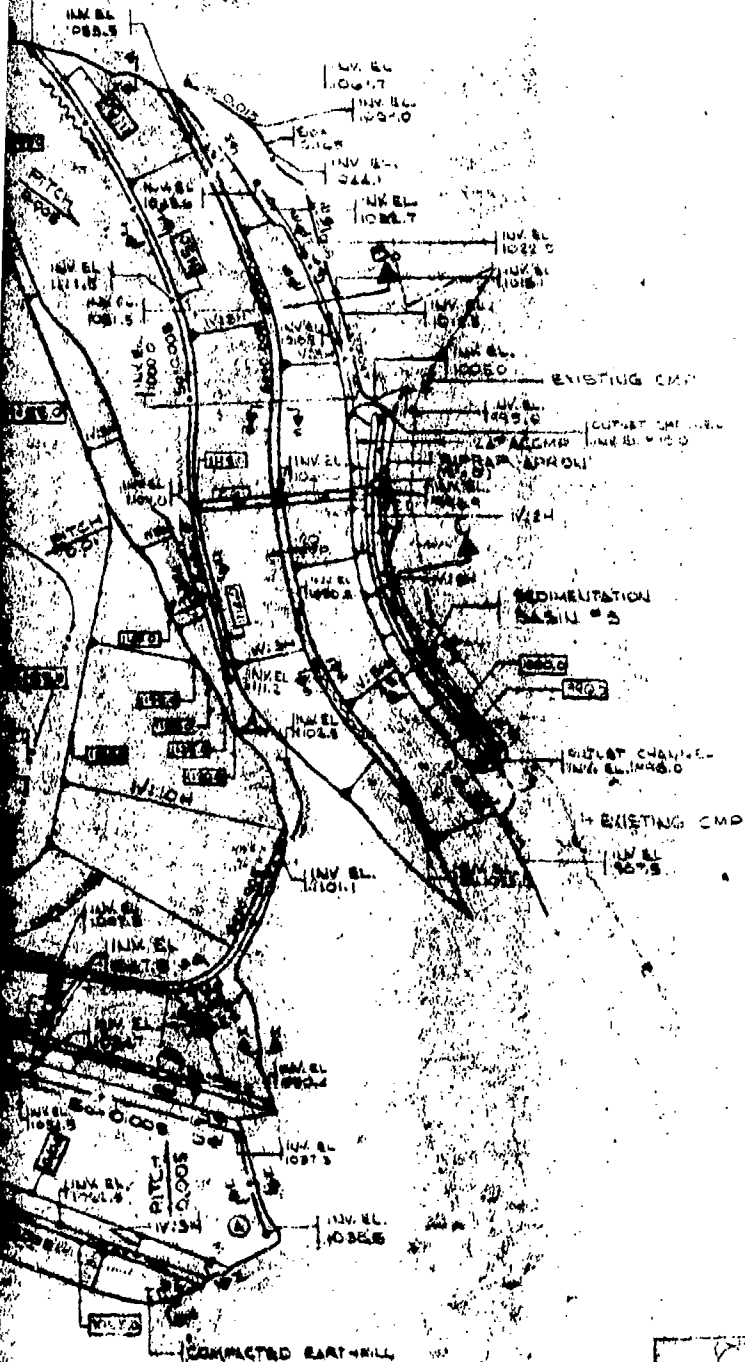
# PLATE III



RELOCATED POWER LINE

SEDIMENTATION BASIN #2  
(SLURRY POND #2)

THIS PAGE IS BEST QUALITY PRACTICABLE  
FROM COPY FURNISHED TO DDG



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MAY 28 1961

ORIENTAL ENGINEERING INC.

|                      |                 |
|----------------------|-----------------|
| ORIENTAL ENGINEERING |                 |
| JOB NO. 104          | SHEET NO. 104-1 |

|                  |      |
|------------------|------|
| JONES & LAUGHLIN |      |
| ENGINEERS        |      |
| SCALE            | DATE |
| AS SHOWN         | 1961 |

PLATE IV





THIS PAGE IS BEST QUALITY PRACTICAL  
FROM COPY FURNISHED TO DDC

SENT OUT

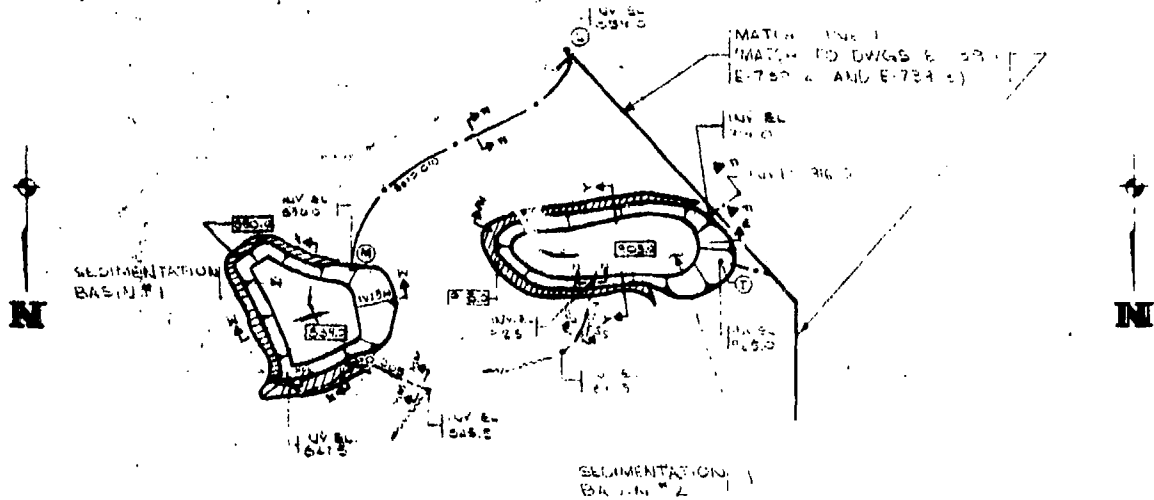
MAY 23 1981

ORBITAL ENGINEERING INC.

D

1 2 -

PLATE V



# SEDIMENTATION BASINS #1 AND #2

STAGE 1 PLAN

STAGE 2 PLAN

STAGE 3 PLAN

SCALE 1" = 10'

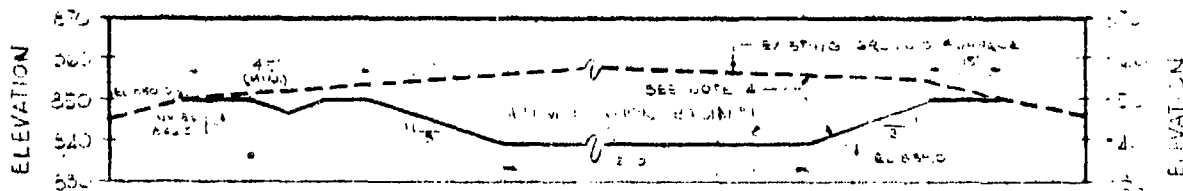
# SEDIMENTATION BASIN #2

STAGE 1 PLAN

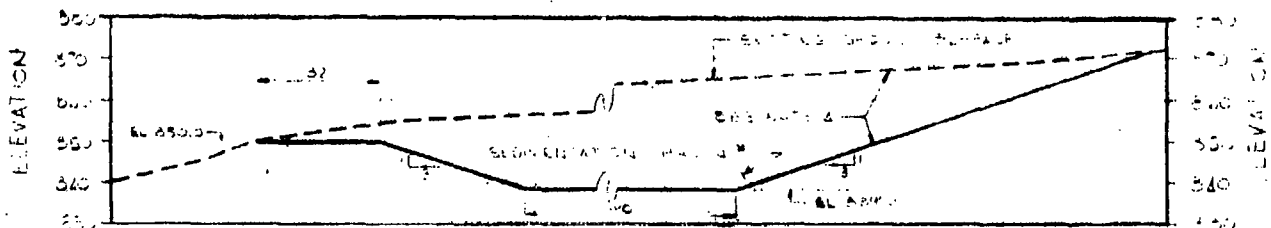
STAGE 2 PLAN

STAGE 3 PLAN

SCALE 1" = 10'



SECTION X-X  
SCALE 1" = 10'



SECTION W-W  
SCALE 1" = 10'

1. WORK THIS DRAWING WITH DRAWING E-734-1 THROUGH E-734-4 AND E-734-5 THROUGH E-734-10.
2. FOR THE 10' DEPTH OF THE BASIN, DRAWING E-734-2.
3. FOR SUGGESTED CONSTRUCTION SEE NOTE 4.
4. STAGES 1, 2 AND 3 CONSTRUCTION AS INDICATED.

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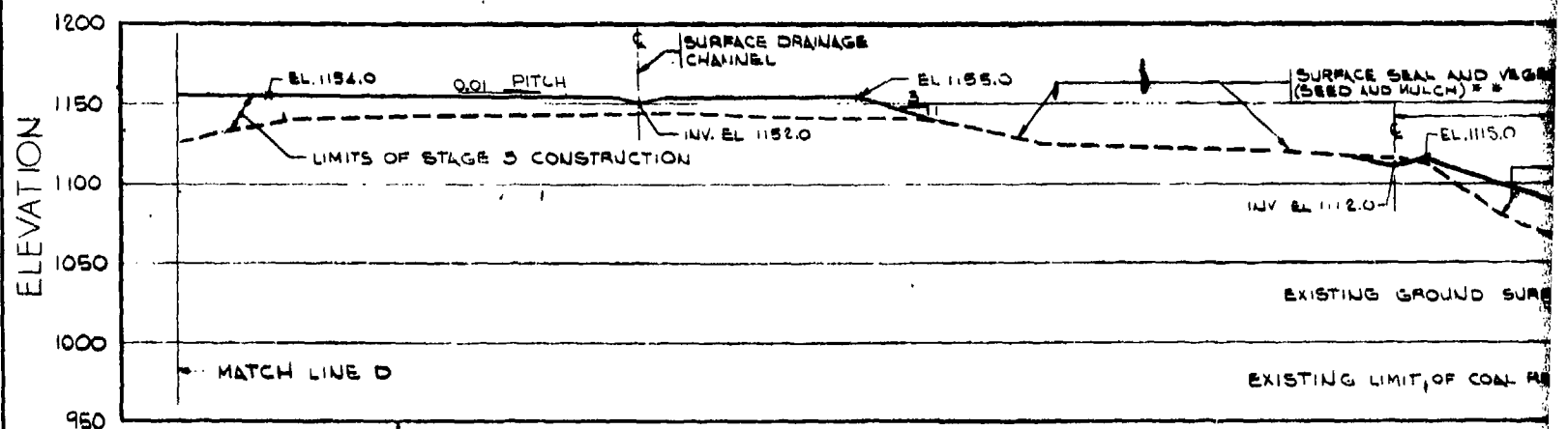
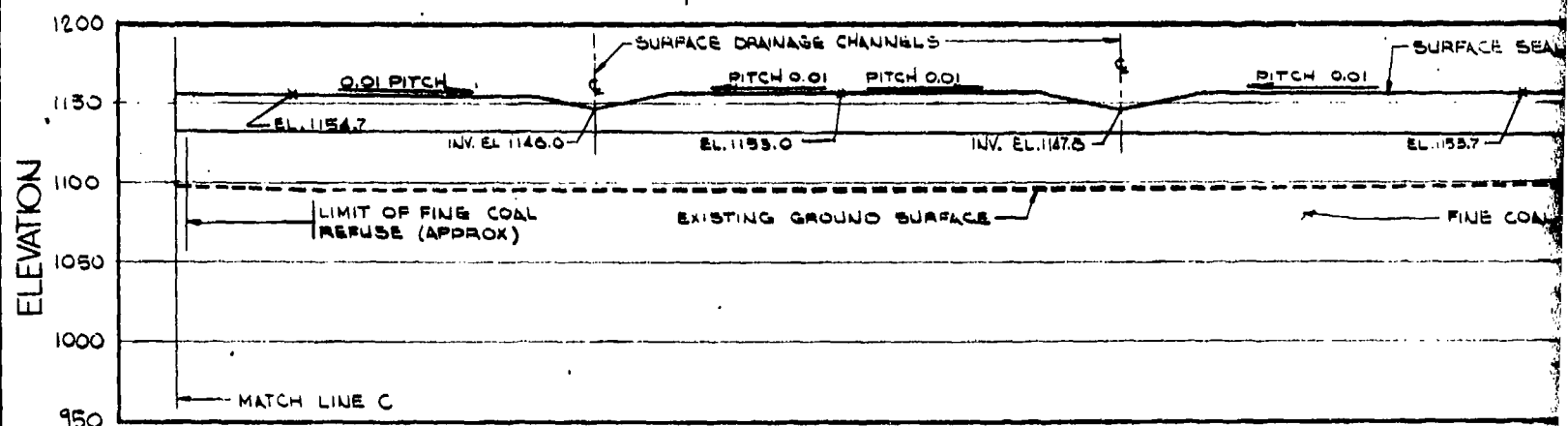
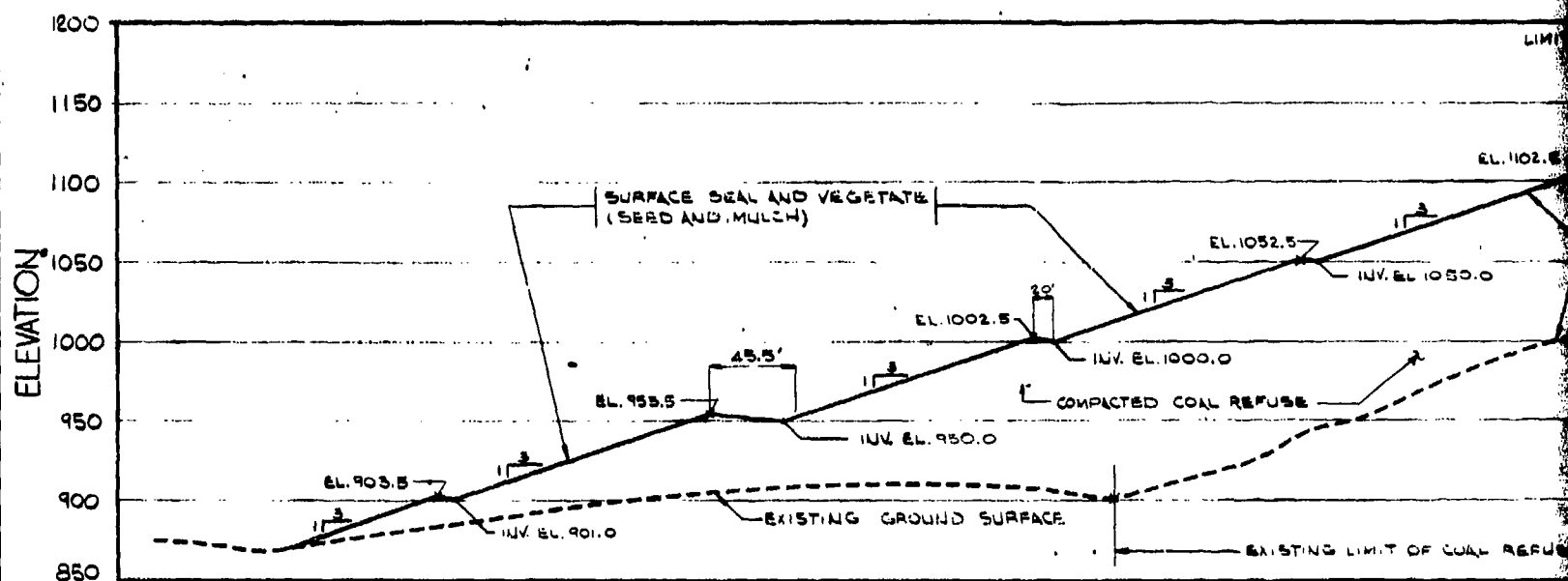
4

4

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4

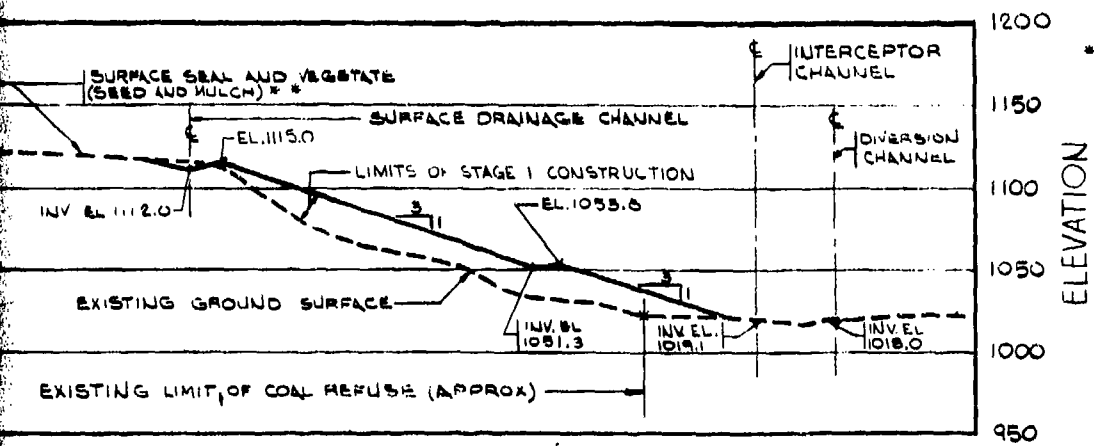
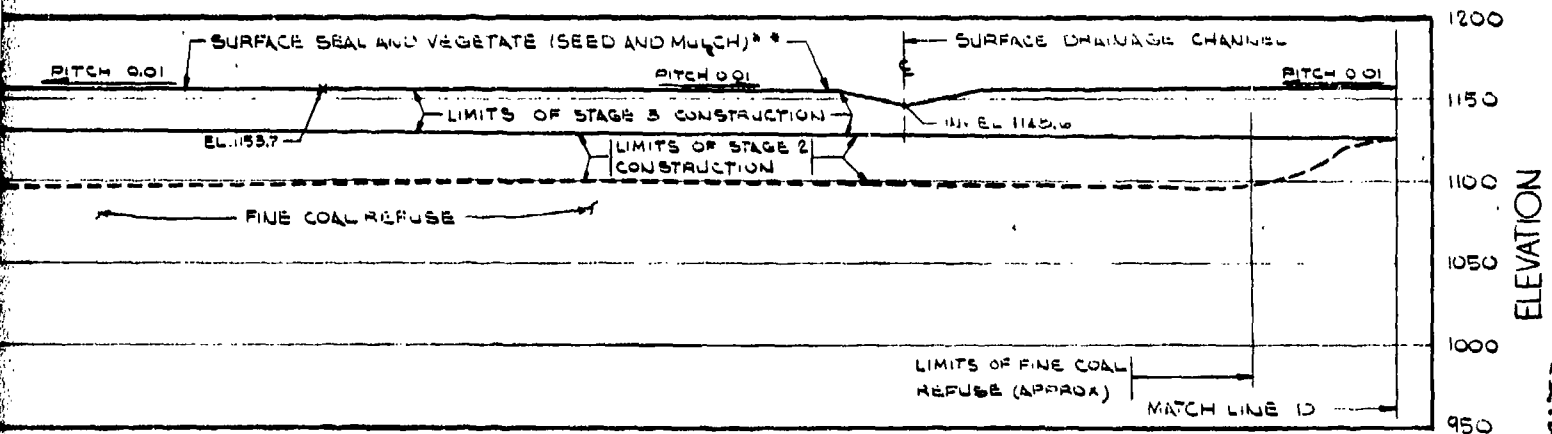
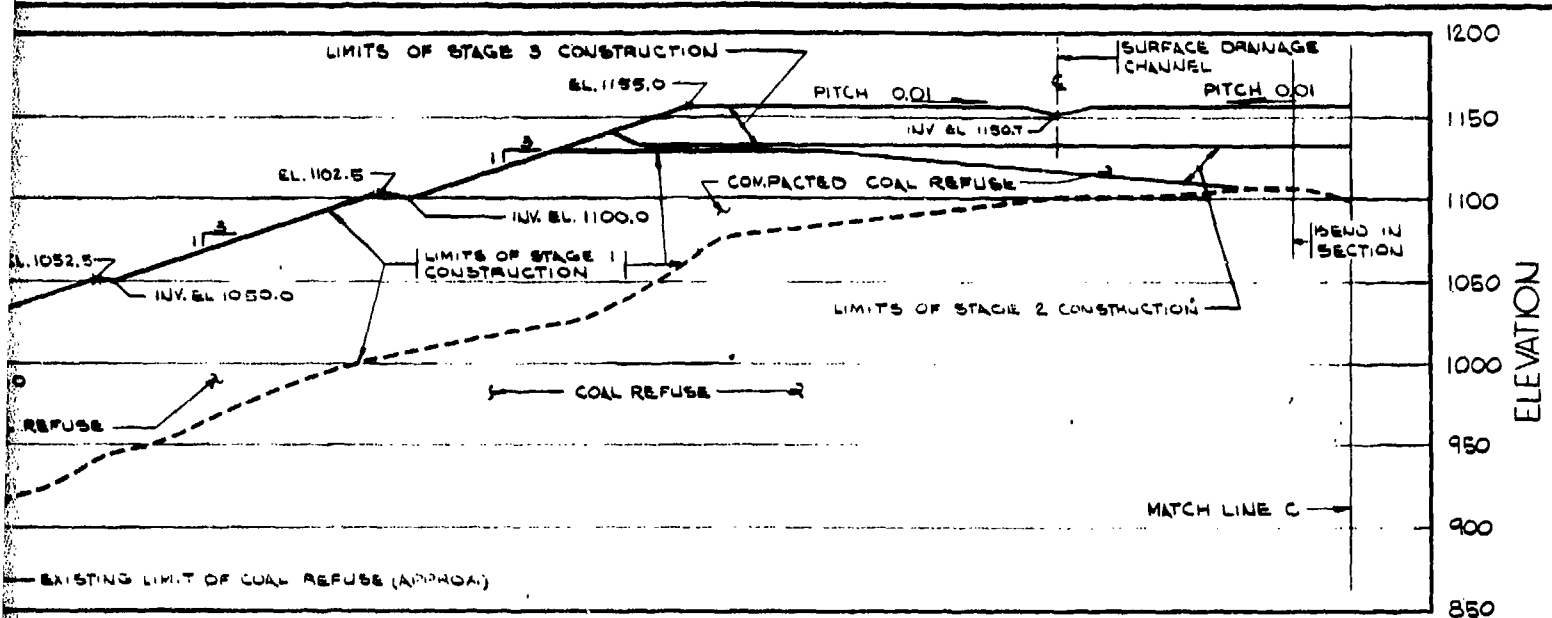
4



#### NOTES:

1. WORK THIS DRAWING WITH DRAWINGS E-739-1 THROUGH E-739-6 AND E-739-8 THROUGH E-739-10.
2. FOR SECTION LOCATION SEE DRAWINGS E-739-1, E-739-2 AND E-739-3.
3. FOR GENERAL NOTES AND LEGEND SEE DRAWING E-739-2.
4. FOR SUGGESTED CONSTRUCTION SEQUENCE SEE DWG E-739-3.

SECTION B-B  
SCALE 1"=50'



\*\* SURFACE SEAL AND VEGETATION (SEED AND MULCH) SHALL CONFORM TO APPLICABLE REQUIREMENTS OF MESA AND PENNINGER.

EXHIBIT J  
CROSS SECTIONS  
(SHEET 3 OF 6)

SENT OUT  
MAY 22 1981  
ORBITAL ENGINEERING INC.

|               |  |                 |  |
|---------------|--|-----------------|--|
| CARNegie, PA  |  | DENVER, COLO.   |  |
| Job No. 8-722 |  | SHT No. 8-722-7 |  |

|                                                                                                                                                                                  |         |      |    |                   |         |       |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------|----|-------------------|---------|-------|----|
| REVISIONS                                                                                                                                                                        |         |      |    | ORDERING DATA     |         |       |    |
| NO.                                                                                                                                                                              | DATE    | CHG. | BY | CHARGE ACCOUNT    | IN FILE | SHEET | OF |
| 1                                                                                                                                                                                | 3-31-78 |      |    |                   |         |       |    |
| JONES & LAUGHLIN STEEL CORPORATION<br>PITTSBURGH, PA.<br>VESTA - SHANNON COAL DIVISION<br>LABELLE COAL REFUSE DISPOSAL FACILITY<br>OPERATION AND ABANDONMENT PLAN<br>SECTION B-B |         |      |    |                   |         |       |    |
| SCALE: 1" = 20' HORIZ. 1" = 10' VERT.                                                                                                                                            |         |      |    | A-3965 SHEET 7/10 |         |       |    |

APPENDIX F

GEOLOGY

## GEOLOGY

### Geomorphology

LaBelle Slurry Pond 3 is located within the Pittsburgh Plateau section of the Appalachian Physiographic Province. This area is characterized by gently folded sedimentary rocks which have been deeply cut by streams to form steep sided valleys. The dam is located at the head of a small tributary to the Monongahela River on a hilltop which has been covered with mine tailings. Hilltops in this vicinity lie between elevations 1100 feet and 1200 feet. Relief between the dam and the Monongahela normal pool level at the discharge of the unnamed tributary is about 300 feet.

### Structure

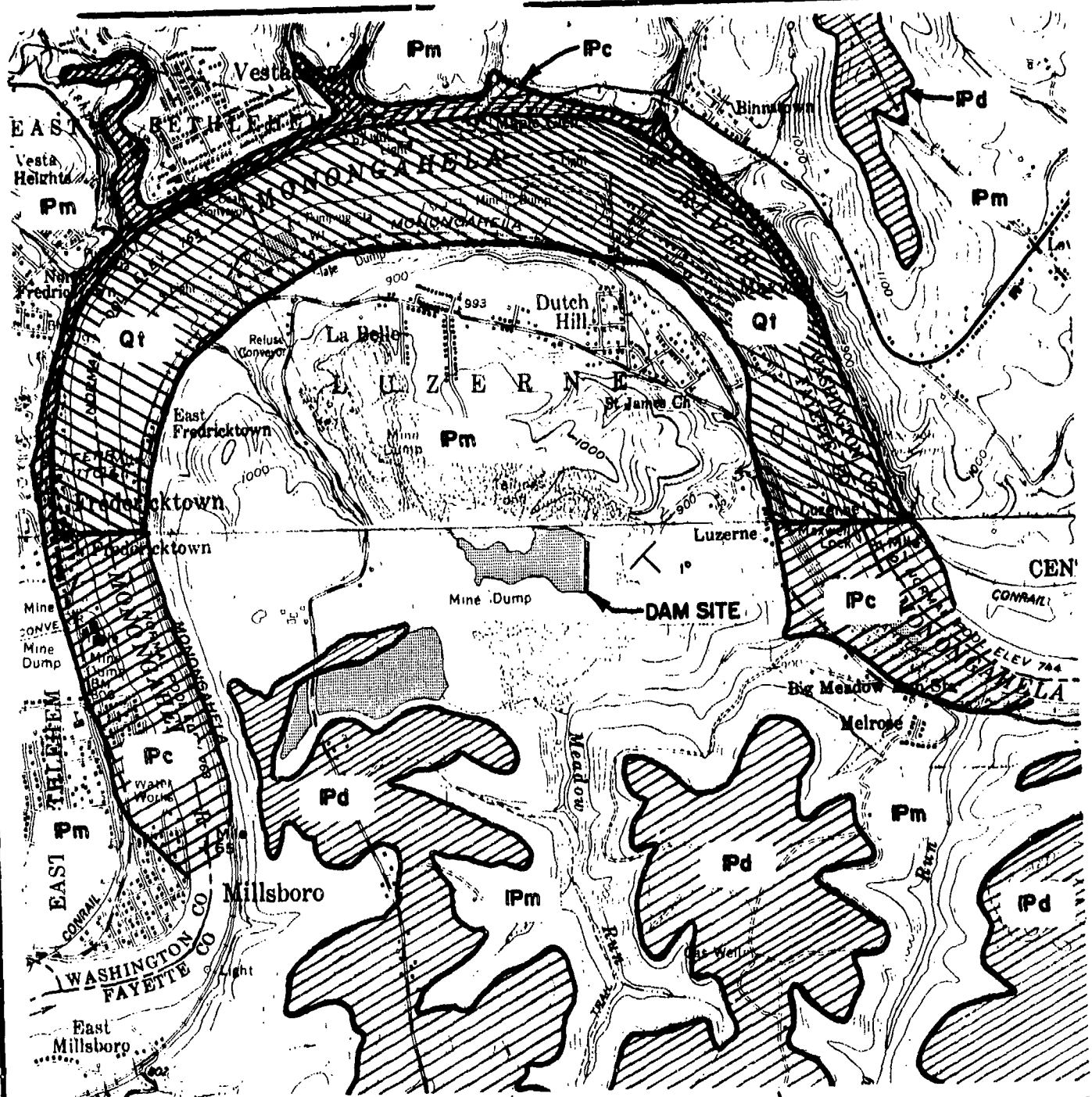
The site lies on the eastern flank of the Belle Vernon Anticline, a northeast-southwest trending structure which plunges to the southwest. Strata in the vicinity of the dam dip to the southeast at a rate of about 1 degree. No faults have been documented in the area of the dam and no observations were made that would indicate faulting in the rocks outcropping around the site.

### Stratigraphy

Rocks outcropping in the area of the dam belong to the Conemaugh and Monongahela Formations of Pennsylvanian Age and the Dunkard Formation of Permian Age. These formations consist of cyclic sequences of shale, sandstone, limestone and coal. The underlying Pittsburgh Coal seam outcrops along the Monongahela River to the northeast and west of the site. The Waynesburg Coal, the base unit of the Dunkard Formation, outcrops in the hillsides adjacent to the site which are higher in elevation.

### Mining Activity

The Pittsburgh Coal seam, the lower most unit of the Monongahela Formation, lies about 300 feet below the dam site. This coal is probably affected by deep mining at the location of the site.



# CALIFORNIA and CARMICHAELS QUADRANGLES, FAYETTE COUNTY, PENNSYLVANIA

SCALE: 0  1/2 MILE 1:24000  
 CONTOUR INTERVAL 20 FT. DATUM IS MEAN SEA LEVEL  
 ——— FORMATION CONTACT

DATA OBTAINED FROM PENNSYLVANIA GEOLOGIC SURVEY, BULLETIN C26, GEOLOGY AND MINERAL RESOURCES OF FAYETTE COUNTY, PENNSYLVANIA, 1940 and UNITED STATES GEOLOGICAL SURVEY, GEOLOGIC ATLAS OF THE UNITED STATES, BROWNSVILLE-CONNELLVILLE FOLIO, 1903 and PENNSYLVANIA TOPOGRAPHIC AND GEOLOGIC SURVEY GREATER PITTSBURGH REGION GEOLOGIC MAP AND CROSS SECTIONS, 1975.

|                 |                                                                                                                                                                                      |              |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| DATE: JULY 1981 | LABELLE SLURRY POND 3<br>NATIONAL DAM INSPECTION PROGRAM<br><b>ACKENHEIL &amp; ASSOCIATES</b> CONSULTING ENGINEERS<br>GEO SYSTEMS, INC.<br>1000 BANKSVILLE RD./PITTSBURGH, PA. 15216 | GEOLOGIC MAP |
| SCALE: 1"=2000' |                                                                                                                                                                                      |              |
| DR: JF CK:      |                                                                                                                                                                                      |              |

| AGE           | WCSO             | WCSO                     | COLUMNAR SECTION | PROMINENT BEDS                                                   |
|---------------|------------------|--------------------------|------------------|------------------------------------------------------------------|
| QUATERNARY    |                  | Q1                       |                  | PLEISTOCENE GLACIAL OUTWASH, RIVER TERRACE DEPOSITS AND ALLUVIUM |
| PERMIAN       | DOUGLASS (P4)    | WASHINGTON GREENE (P3)   |                  | UPPER WASHINGTON LIMESTONE                                       |
|               |                  | WASHINGTON (P4)          |                  | WASHINGTON COAL                                                  |
|               |                  | WAYNESBURG (P5)          |                  | WAYNESBURG SANDSTONE                                             |
|               |                  | WAYNESBURG (P5)          |                  | WAYNESBURG COAL                                                  |
|               |                  | UNIONTOWN (P6)           |                  | UNIONTOWN SANDSTONE                                              |
|               |                  | UNIONTOWN (P6)           |                  | UNIONTOWN COAL                                                   |
|               |                  | BENWOOD (P7)             |                  | BENWOOD LIMESTONE                                                |
|               |                  | SEWICKLEY (P8)           |                  | SEWICKLEY COAL                                                   |
|               |                  | PITTSBURGH (P9)          |                  | PITTSBURGH SANDSTONE                                             |
|               |                  | PITTSBURGH (P9)          |                  | PITTSBURGH COAL                                                  |
|               |                  | CONNELLVILLE (P10)       |                  | CONNELLVILLE SANDSTONE                                           |
|               |                  | MORGANTOWN (P11)         |                  | MORGANTOWN SANDSTONE                                             |
|               |                  | AMES (P12)               |                  | AMES LIMESTONE                                                   |
|               |                  | PITTSBURGH REDBEDS (P13) |                  | PITTSBURGH REDBEDS                                               |
|               |                  | SALTSBURGH (P14)         |                  | SALTSBURGH SANDSTONE                                             |
|               |                  | MAHONING (P15)           |                  | MAHONING SANDSTONE                                               |
|               |                  | UPPER FREEPORT (P16)     |                  | UPPER FREEPORT COAL                                              |
|               |                  | UPPER KITTANNING (P17)   |                  | UPPER KITTANNING COAL                                            |
|               |                  | WORTHINGTON (P18)        |                  | WORTHINGTON SANDSTONE                                            |
|               |                  | LOWER KITTANNING (P19)   |                  | LOWER KITTANNING COAL                                            |
|               |                  | HOMER (P20)              |                  | HOMER SANDSTONE                                                  |
|               |                  | MERCER (P21)             |                  | MERCER SANDSTONE, SHALE & COAL                                   |
|               |                  | CONHOQUESSING (P22)      |                  | CONHOQUESSING SANDSTONE                                          |
| MISSISSIPPIAN | LOCAL MARLS (M1) | MALCOLM (M2)             |                  | BURGOON SANDSTONE                                                |
|               |                  | POCONO (M3)              |                  | CUYAHOGA SHALE                                                   |
|               |                  |                          |                  | BEREA SANDSTONE                                                  |

DATE: JULY 1981

SCALE: 1" = 360'

DR: JF CK:

LABELLE SLURRY POND 3  
NATIONAL DAM INSPECTION PROGRAM

**ACKENHEIL & ASSOCIATES** CONSULTING ENGINEERS

GEO SYSTEMS, INC.  
1000 BANKSVILLE RD./PITTSBURGH, PA 15216

GEOLOGIC  
COLUMN