DOE/ET/14759--T1-Vol.2-14

DELIVERABLE 14

PROCESS ENGINEERING AND MECHANICAL DESIGN REPORTS VOLUME II OF V

DOE/ET/14759--T1-Vol.2-14

DE83 000856

AUGUST 1982

PRELIMINARY DESIGN AND ASSESSMENT OF A 50,000 BPD COAL-TO-GASOLINE-TO-METHANOL PLANT

W.R. GRACE & CO.
AGRICULTURAL CHEMICALS GROUP
P.O. BOX 27147
MEMPHIS, TENNESSEE 38127

GRACE PROJECT DIRECTOR

AUG 31 1982

DATE

PREPARED FOR THE UNITED STATES
DEPARTMENT OF ENERGY
UNDER COOPERATIVE AGREEMENT NO. DE-FC01-80ET-14759

DISCLAIMER

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, mark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendations, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

PATENT STATUS

This technical report is being transmitted in advance of DOE patent clearance and no further dissemination or publication shall be made of the report without prior approval of the DOE Patent Counsel.

TECHNICAL STATUS

This technical report is being transmitted in advance of DOE review and no further dissemination or publication shall be made of the report without prior approval of the DOE Project/Program Manager.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

NOTICE

PORTIONS OF THIS REPORT ARE ILLEGIBLE. It has been reproduced from the best available copy to permit the broadest possible availability.

United States
Department of Energy

DELIVERABLE 14

MASTER

PROCESS ENGINEERING AND MECHANICAL DESIGN REPORTS VOLUME II OF V

AUGUST 1982

PRELIMINARY DESIGN AND ASSESSMENT OF A 50,000 BPD COAL-TO-METHANOL-TO-GASOLINE PLANT

PREPARED UNDER
COOPERATIVE AGREEMENT NO. DE-FC01-80ET-14759

Keith A. Grimbi
PARSONS PROJECT DIRECTOR

August 6 1982
DATE

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

PARSONS

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

PRELIMINARY DESIGN AND ASSESSMENT OF A 50,000 BPD COAL-TO-METHANOL-TO-GASOLINE PLANT

DELIVERABLE 14

PROCESS ENGINEERING
AND MECHANICAL DESIGN REPORTS

VOLUME II OF V

AUGUST 1982

THE RALPH M. PARSONS COMPANY
100 WEST WALNUT STREET
PASADENA, CALIFORNIA 91124

PREPARED FOR THE
UNITED STATES DEPARTMENT OF ENERGY
UNDER COOPERATIVE AGREEMENT NO. DE-FC01-80ET-14759

- NOTICE -

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes legal liability or responsibility for any third party's use or the results of such use of any information, apparatus, product or process disclosed in this report or represents that its use by such third party would not infringe privately owned rights.

CONTENTS

VOLUME I - SUMMARY AND DESIGN CRITERIA

SECTION 1	INTRODUCTION	I-1-1
	1.1 General Description of Plant	I-1-1
	1.1.1 Block Flow Diagrams (Normal Operating Case)	I-1-3
	1.1.2 Process Train Configuration	I-1-4
	1.2 Artist's Conception of Plant	I-1-8
SECTION 2	FACILITY LOCATION AND ARRANGEMENT	I-2-1
	2.1 Site Location	I-2-1
	2.2 Overall Plot Plan	I-2-6
	2.3 Key Plans	I-2-7
SECTION 3	SUMMARY OF SYNTHESIS GAS DEMONSTRATION PLANT PROGRAM DATA REVIEW	I-3-1
	3.1 Gasification (Texaco)	I-3-2
	3.2 Coal Grinding and Slurrying	I-3-3
	3.3 Oxygen	I-3-3
	3.4 CO Shift	I-3-3
	3.5 Acid Gas Removal	I-3-4
	3.6 Nitrogen Wash	I-3-4
	3.7 Methanol Synthesis, Methanol Conversion to Gasoline, Alkylation, Fractionation	I-3-4
	3.8 Sulfur Recovery and Air Quality Control Alternatives	I-3-4
SECTION 4	DESIGN BASIS AND CONSIDERATIONS	I-4-1
	4.1 Plant Capacity and Product Slate	I-4-1
	4.2 Onstream Factor and Plant Life	I-4-2
	4.3 Design Coal Specifications	I-4-2
	4.3.1 Coal Specifications	I-4-2
	4.3.2 Impact of Variations in Coal Composition on Plant Design	I-4-3
	4.4 Transportation Basis	I-4-4
	4.4.1 Raw Materials and Chemicals	I-4-5
	4.4.2 Products	I-4-7
	4.4.3 By-products	I-4-7
SECTION 5	PROCESS SYSTEMS	I-5-1
SECTION 6	AUXILIARY SYSTEMS	I-6-1

CONTENTS (Contd)

VOLUME I - SUMMARY AND DESIGN CRITERIA (Contd)

SECTION 7 EQUIPMENT NUMBERING SYSTEM I-7-1

SECTION 8 DRAWING AND DOCUMENT IDENTIFICATION I-8-1

8.1 Cost Account I-8-1
8.2 Discipline Code. I-8-2
8.3 Numbering and Title System for Engineering Drawings I-8-3
8.4 Numbering of Criteria I-8-3
8.5 Numbering of Specifications I-8-4
8.6 Numbering of Data Sheets I-8-4

SECTION 9 DESIGN CRITERIA I-9-1

SECTION 10 STANDARD DRAWINGS I-10-1

10.1 PFCD Legends and Symbols I-10-1
10.2 Equipment Configurations I-10-2

SECTION 11 EQUIPMENT LISTS I-11-1

VOLUME II - FACILITIES DESIGN (PROCESS)

SECTION 1 FACILITIES DESIGN. II-1-1

1.1 General Constraints II-1-1
1.1.1 Codes and Standards II-1-1
1.1.2 Regulatory Standards and Requirements . . II-1-2
1.1.3 Spacing Criteria II-1-4
1.1.4 Special Metallurgical Requirements II-1-5
1.2 Process Units Design II-1.2-1
1.2.1 Coal Receiving and Unloading - Unit 11 . . II-1.2.1-1
1.2.2 Coal Conveying and Storage - Unit 12 . . . II-1.2.2-1
1.2.3 Coal Stacking and Reclaiming - Unit 13 . . II-1-2.3-1
1.2.4 Solid Waste Collection and Disposal - Unit 14 . . . . . II-1.2.4-1
1.2.5 Gasification - Unit 21 . . . . . II-1.2.5-1
1.2.6 Oxygen - Unit 22 . . . . . II-1.2.6-1
1.2.7 CO Shift - Unit 23 . . . . . II-1.2.7-1
1.2.8 Coal Grinding and Slurry Preparation - Unit 24 . . . . . II-1.2.8-1
1.2.9 Methanol Synthesis - Unit 25 . . . . . II-1.2.9-1
1.2.10 Ammonia Recovery - Unit 26 . . . . . II-1.2.10-1

CONTENTS (Contd)

VOLUME II - FACILITIES DESIGN (PROCESS) (Contd)

SECTION 1 FACILITIES DESIGN (Contd)

1.2.11 Effluent Water Treatment (Texaco) - Unit 27 . . . . . II-1.2.11-1
1.2.12 Methanol-to-Gasoline - Unit 31 . . . . . II-1.2.12-1
1.2.13 Gas Fractionation - Unit 32 . . . . . II-1.2.13-1
1.2.14 HF Alkylation - Unit 33 . . . . . II-1.2.14-1
1.2.15 Acid Gas Removal - Unit 34 . . . . . II-1.2.15-1
1.2.16 Sulfur Recovery (Claus) - Unit 36 . . . II-1.2.16-1
1.2.17 Sulfur Removal (BSRP) - Unit 37 . . . . II-1.2.17-1
1.2.18 Heavy Gasoline Treating - Unit 38 . . . II-1.2.18-1
1.2.19 Process Water Treatment - Unit 39. . . . II-1.2.19-1

VOLUME III - FACILITIES DESIGN (OFFSITES AND UTILITIES)

SECTION 1 AUXILIARY SYSTEMS III-1.1.1-1

1.1 Utilities Supply - Unit 51 . . . . . III-1.1.1-1
1.1.1 Descriptions III-1.1.1-1
1.1.2 Drawings III-1.1.2-1
1.2 Steam Generation - Unit 52 . . . . . III-1.2.1-1
1.2.1 Descriptions III-1.2.1-1
1.2.2 Drawings III-1.2.2-1
1.3 Waste Treatment - Unit 53 . . . . . III-1.3.1-1
1.3.1 Descriptions III-1.3.1-1
1.3.2 Drawings III-1.3.2-1
1.4 Site Preparation - Unit 54 . . . . . III-1.4.1-1
1.4.1 Description III-1.4.1-1
1.4.2 Drawings III-1.4.2-1
1.5 Gasoline Blending - Unit 55 . . . . . III-1.5.1-1
1.5.1 Description III-1.5.1-1
1.5.2 Drawings III-1.5.2-1
1.6 Infrastructure - Unit 56 . . . . . III-1.6.1-1
1.6.1 Description III-1.6.1-1
1.6.2 Drawings III-1.6.2-1
1.7 Storage and Shipping - Unit 57 . . . . . III-1.7.1-1
1.7.1 Descriptions III-1.7.1-1
1.7.2 Drawings III-1.7.2-1
1.8 Fire Protection - Unit 58 . . . . . III-1.8.1-1
1.8.1 Descriptions III-1.8.1-1
1.8.2 Drawings III-1.8.2-1
1.9 Flare - Unit 59 . . . . . III-1.9.1-1
1.9.1 Description III-1.9.1-1
1.9.2 Drawings III-1.9.2-1

CONTENTS (Contd)

VOLUME III - FACILITIES DESIGN (OFFSITES AND UTILITIES) (Contd)

SECTION 1 AUXILIARY SYSTEMS (Contd)

1.10 Off-plot Interconnecting Piping and Pipeways - Unit 60 . . . . . III-1.10-1
1.11 Barge Dock - Unit 61 . . . . . III-1.11-1
1.12 Maintenance Equipment - Unit 62 . . . . . III-1.12-1
1.12.1 Main Maintenance Buildings III-1.12-1
1.12.2 Satellite Maintenance Buildings III-1.12-2
1.12.3 Slag Hauling Locomotive and Railcar Maintenance Building III-1.12-3
1.12.4 Mobile Maintenance Equipment III-1.12-3
1.13 Intermediate Storage - Unit 63 . . . . . III-1.13.1-1
1.13.1 Description III-1.13.1-1
1.13.2 Drawings III-1.13.2-1

SECTION 2 UTILITY SUMMARIES III-2-1

SECTION 3 CATALYST AND CHEMICAL SUMMARIES III-3-1

SECTION 4 UNDERGROUND PIPING AND SEWERAGE III-4-1

VOLUME IV - APPENDIX

SECTION A-1 EQUIPMENT DATA SHEETS IV-A-1-1

VOLUME V - APPENDIX (Contd)

SECTION A-1 EQUIPMENT DATA SHEETS (Contd) V-A-1-1

SECTION A-2 INSTRUMENT CONTROL PHILOSOPHY V-A-2-1

1.1 Description of Process Plant Control Philosophy . V-A-2-1
1.2 Distributed Control Stations V-A-2-1
1.3 Local Operating Panels V-A-2-4
1.4 Analyzers V-A-2-5
1.5 Programmable Logic Controllers V-A-2-5
1.6 Uninterruptible Power Supply V-A-2-5
1.7 Control Coordination V-A-2-5
1.8 Coal Handling V-A-2-5
1.8.1 Conveyor Control Panel V-A-2-5
1.8.2 Conveyor System Emergency Monitors V-A-2-7
1.8.3 Tripper Control System V-A-2-7

CONTENTS (Contd)

VOLUME V - APPENDIX (Contd)

SECTION A-3 GENERAL SPECIFICATIONS AND STANDARDS V-A-3-1

SECTION A-4 RATIONALE FOR SOLIDS HANDLING SYSTEMS V-A-4-1

3.1 Train Unloading Systems
3.2 Stacking and Reclaiming Systems
3.3 Short-Term Gasification Coal Storage System
3.4 Ash/Slag and FGD Sludge Disposal Systems

FIGURES

I-2-1 Location Map I-2-2
I-2-2 Regional Map I-2-3
I-2-3 Vicinity Map I-2-4
I-2-4 Plot Plan I-2-5
II-1.2.12-1 MTG Plant Block Flow Diagram II-1.2.12-2

TABLES

I-4.3-1 Ultimate Analysis (Moisture-Free) I-4-2
I-5-1 Process Systems I-5-1
I-6-1 Auxiliary Systems I-6-1
II-1.2.12-1 Spent Catalysts for Disposal II-1.2.12-12
II-1.2.14-1 Recent Phillips HF Alkylation Licensees II-1.2.14-5
II-1.2.15-1 List of Rectisol Units Installed in the United States II-1.2.15-8
III-1.2.1-1 Total Steam Generation III-1.2.1-1
III-1.6-1 50,000-bpd Gasoline Plant Buildings III-1.6.1-3
III-1.7-1 Unit 57 Storage Tank Summary III-1.7.1-1
III-1.13-1 Unit 63 Storage Tank Summary III-1.13.1-1
III-3-1 Gasoline Plant Catalyst Requirements III-3-2
III-3-2 Gasoline Plant Consumable Chemicals and Supply Requirements III-3-3

ACRONYMS

ACI	American Concrete Institute
AGMA	American Gear Manufacturers Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
BACT	Best Available Control Technology
BOD	Biochemical Oxygen Demand
BREC	Big Rivers Electric Corporation
BSRP	Beavon Sulfur Removal Process
CAAS	Construct Across or Along Streams
CACS	Construct an Air Contaminant Source
CEMA	Conveyor Equipment Manufacturers Association
CHWL	Construct a Hazardous Waste Landfill
COD	Chemical Oxygen Demand
CRL	Construct a Residuals Landfill
DOE	Department of Energy
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FGD	Flue Gas Desulfurization
GRADD	Green River Area Development District
HGT	Heavy Gasoline Treating
LAER	Lowest Achievable Emission Rate
LPG	Liquefied Petroleum Gas
MRDC	Mobil Research and Development Corporation

ACRONYMS (Contd)

MTG	Methanol-to-Gasoline
NEC	National Electrical Code
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PCB	Power Control Building
PFCD	Process Flow and Control Diagrams
PSA	Pressure Swing Adsorption
PSD	Prevention of Significant Deterioration
RVP	Reid vapor pressure
SGDPP	Synthesis Gas Demonstration Plant Program
SRU	Sulfur Recovery Unit
TCGP	Texaco Coal Gasification Process
TDC	Texaco Development Corporation
TEMA	Tube Exchanger Manufacturers Association
UBC	Uniform Building Code

SECTION 1

FACILITIES DESIGN

1.1 GENERAL CONSTRAINTS

1.1.1 CODES AND STANDARDS

All national, state, and local codes and standards that apply to the construction and operation of the Gasoline Plant have been adhered to, as well as the standards of the industry deemed necessary for the safe design, fabrication, assembly, erection, inspection, and testing of the completed system. The latest editions of the following codes have been used:

Item	Regulation
Buildings	Uniform Building Code
Compressors	API Standard 617, 618, OSHA
Conveyor Components	CEMA
Drive Gears	AGMA
Electrical	NEMA, NEC
Exchangers	ASME Section VIII, Division I and TEMA B, C and R
Furnaces	API 530, ASME Section 1, ANSI B31.3
Navigational Hazards	FAA
Pipeline	ANSI B31.4
Plumbing	Uniform Building Code and Local Code
Pressure Vessels, Unfired	ASME Section VIII, Division I
Pumps	API Standard 610
Refinery Piping	ANSI B31.3
Safety	OSHA
Steam Generators	ASME Section I

Storage Tanks:	
Atmospheric	API Standard 620 and 650
Pressure	API Standard 620 and 650
Pressure Spheres	ASME Section VIII
Structures:	
Concrete	Uniform Building Code, ACI
Steel	AISC and UBC, ANSI AS 8.1
Turbines	API Standard 611 and 612

1.1.2 REGULATORY STANDARDS AND REQUIREMENTS

The construction and operation of the Gasoline Plant will require compliance with applicable local, state, and federal laws, codes, ordinances, and regulations. Key permits are being prosecuted as part of the Gasoline Plant project work. The key permits issued by federal agencies for which application has been submitted include:

(1) Permit to Construct on a Navigable Waterway, Section 10 permit, by the Corps of Engineers

(2) Permit to Discharge Dredged or Fill Material, Section 404 permit, by the Corps of Engineers

(3) National Pollution Discharge Elimination System (NPDES) notification to the Environmental Protection Agency

The NPDES notification is filed in lieu of an application for a NPDES permit which is not required since the Gasoline Plant has been designed to have no discharge of wastes to a navigable stream. The Environmental Protection Agency (EPA) is in the process of delegating to the Commonwealth of Kentucky the authority to administer the NPDES program and close contact with the Commonwealth of Kentucky will be maintained.

The project must comply with state and federal regulations for protection of air quality, water quality, and solid waste disposal. The responsibility for the administration of these regulations is to be delegated to the Commonwealth of Kentucky by EPA in accordance with federal law. For those regulations administered by Kentucky, EPA will retain review responsibility and, in some cases, notifications still must be issued to EPA by the applicant. For those regulations administered by EPA, application will be made to EPA, with the Commonwealth of Kentucky in an advisory or review role.

The permits for which application has been submitted to the Commonwealth of Kentucky include:

(1) Prevention of Significant Deterioration (PSD) permit
(2) Permit to Construct an Air Contaminant Source (CACS)
(3) Permit to Construct a Residuals Landfill (CRL)
(4) Permit to Construct a Hazardous Waste Landfill (CHWL)
(5) Water Withdrawal Permit
(6) Permit to Construct Across or Along Streams (CAAS)

These permits will be issued and administered by the Kentucky Department of Natural Resources and Environmental Protection. Items 1 and 2 are permits issued under authority delegated by EPA under the Clean Air Act. Items 3 and 4 are delegated by EPA under provisions of the Resource Conservation and Recovery Act.

The Corps of Engineers cannot issue its permits until the provisions of the National Environmental Policy Act (NEPA) have been met. NEPA requires that an Environmental Impact Statement (EIS) be prepared by the lead federal agency, the Corps of Engineers in this case, before a decision can be made as to whether permits can be issued. A draft EIS is now being prepared under a three-party agreement between the Corps of Engineers, W.R. Grace & Co., and an environmental consultant for scheduled issuance for public review in December 1982.

There are other permits by state and local authorities that will have to be obtained in connection with the Gasoline Plant construction. These are:

(1) Department of Transportation, Federal Aviation Administration, Notice of Proposed Construction or Alteration.

(2) Department of Interior: compliance with

(a) National and historic Preservation Act
(b) Wilderness Act of 1964
(c) Forest and Rangeland Renewable Resources Act
(d) Wild and Scenic Rivers Act
(e) Endangered Species Act
(f) Fish and Wildlife Coordination Act
(g) Protection of Bald and Golden Eagles

Deliverable 27, "Materials and License Report," includes a master schedule and staffing plan for their preparation, submittal, and prosecution. These permits will be obtained as an early action during the detailed design phase of this project.

1.1.3 SPARING CRITERIA

In the interest of continuous onstream operation of the Gasoline Plant, all major rotating equipment will be spared. In some instances, complete trains will be spared so that if an entire train of equipment is down, another can pick up its function without affecting the plant output. In other cases, trains of equipment will have design capacity to make up for the lost capacity of similar equipment that is down. Also, intermediate storage facilities are included to enable continuous plant operation for scheduled interruptions.

1.1.4 SPECIAL METALLURGICAL REQUIREMENTS

Unit 21 will have a high concentration of chlorides combined with CO_2 and H_2S in both the process water and the cooling water, presenting a difficult materials problem. To prevent stress corrosion cracking and pitting of the heat exchanger tubes and piping handling these waters, materials were selected that are suitable for the processing conditions specified.

In general, the materials of construction for the plant is carbon steel with the exception of some equipment and related piping where alloy, lined or nonferrous metals will be used to control corrosive or erosive process fluids.

1.2 PROCESS UNITS DESIGN

The Gasoline Plant is designed to produce a nominal 50,000 bpd of gasoline by gasifying high-sulfur agglomerating coal, synthesizing methanol from the coal-derived gas, and converting the methanol to gasoline.

The overall process configuration for the Gasoline Plant is shown in Process Block Flow Diagram D-01-FS-1 in Volume I, subsection 1.1.1.

Raw Kentucky No. 9 coal is delivered at Coal Receiving and Unloading - Unit 11 by railroad and barge. Coal unloaded at the railcar unloading station and the barge unloading stations is sampled and transported to storage. Then the coal is conveyed to Coal Grinding and Slurry Preparation - Unit 24, where a coal-water slurry is prepared to a specified grind size distribution and slurry concentration.

Coal-water slurry pumped from the slurry preparation unit is fed with high-purity oxygen from Unit 22 to the Texaco gasifiers in Gasification - Unit 21. Partial oxidation of the coal-water slurry occurs at 900 psig pressure and temperatures ranging from 2,200 to 2,800°F, producing a raw gas consisting mainly of CO, H_2, CO_2, and steam with a small amount of H_2S, COS, methane, inerts, and some unconverted carbon. The ash content of the feed coal leaves the gasifiers in the form of molten slag.

The raw gas is cooled by generating steam. Then is it quenched and scrubbed with water for particulate material removal before entering CO Shift - Unit 23.

About 62% of the raw gas is processed through a CO shift unit containing a cobalt/molybdenum catalyst. The remaining portion of the raw gas bypasses the shift reactor. This processing results in the correct H_2:CO ratio for methanol synthesis. Heat is recovered from both of the streams before flowing to the Acid Gas Removal - Unit 34.

An integrated heat recovery scheme has been designed to recover the useful energy for heating shift feed gas, high-pressure boiler feedwater, process condensate, and vacuum condensate. Process condensate from cooled shift effluent and bypass gas is reheated and returned to the Gasification Unit.

The shifted and unshifted gases are treated in Acid Gas Removal - Unit 34. The Acid Gas Removal Unit employs Lotepro Corporations Rectisol Process, which produces a synthesis gas suitable for methanol synthesis, an H_2S-rich gas for sulfur recovery in Sulfur Recovery (Claus) - Unit 36, and a CO-rich gas for further treating in the Torvex and washing system before venting of an environmentally acceptable tail gas.

Following compression, a low-pressure methanol synthesis loop is employed to convert the purified syngas into methanol. Part of the purge gas from the synthesis loop is fed to a Pressure Swing Adsorption (PSA) train, which provides high-purity hydrogen for Heavy Gasoline Treating - Unit 38. The remainder of the purge gas from the synthesis loop and the tail gas from the PSA Unit are sent to the fuel gas system.

Crude methanol is converted to hydrocarbons and water in the Methanol-to-Gasoline - Unit 31. The hydrocarbons are separated in Gas Fractionation - Unit 32 to produce fuel gas, HF Alkylation Unit feed, LPG, light gasoline, and a heavy gasoline feedstream. The process water from Unit 31 is biotreated to remove impurities before recycling and disposal. Fuel gas from the Gas Fractionation Unit is sent to the fuel gas system.

HF Alkylation - Unit 33 converts the alkylation feed, which includes butylenes, amylenes, and isobutane, to alkylate, a gasoline blending component, n-butane, used to adjust gasoline vapor pressure, and isobutane, which is used to adjust gasoline vapor pressure with the excess to sales.

Heavy Gasoline Treating - Unit 38 reduces the durene content in the heavy gasoline from the Gas Fractionation Unit to meet finished gasoline specification requirements. The PSA Unit provides the required hydrogen for

this catalytic hydrogenation. Treated heavy gasoline is sent to heavy gasoline storage in Unit 57 for product blending. Gas produced in this processing step is sent to the fuel gas system.

Alkylate, isobutane, and n-butane from HF Alkylation - Unit 33; light gasoline from Gas Fractionation - Unit 33; and treated heavy gasoline from heavy gasoline storage in Unit 57 are combined in Gasoline Blending - Unit 55 to make product gasoline.

Sulfur Removal (BSRP) - Unit 37 removes sulfur compounds from the tail gas of Sulfur Recovery (Claus) - Unit 36 before the tail gas is vented to the atmosphere. Sulfur product is recovered mainly from the Claus Unit and partly from the BSRP Unit.

Details of the process systems and offsite facilities are presented in Volumes II, and III, of this report.

1.2.1 COAL RECEIVING AND UNLOADING - UNIT 11

A. Basis of Design

The coal receiving and unloading systems employ commercially proven technologies currently in use at plants of similar size. The systems and equipment were selected to handle a nominal 30,000 stpd of coal for 330 days per year up to a total annual requirement of approximately 10 million short tons. The general design philosophy of the systems and the design bases are described in CRT-01-MH-1 and CRT-10-PR-1 included in Volume I, Section 9.

The design of the coal receiving and unloading systems is based on the premise of receiving the total annual requirement of coal by river barges, or up to a maximum of 60% of the annual requirement by railcars. The systems are capable of operating one at a time or simultaneously. The design basis for each of the two systems are described individually.

1. Barge Unloading. The barge unloading system is designed to handle 20 barges per day of 1,500-short-ton capacity each. These barges will be brought to the unloading dock in tows of four barges via the Green River. Any shipments via the Ohio River will be broken down from larger tows prior to placement.

The barge unloaders are sized to unload 30,000 short tons of coal in two 8-hour shifts per day, working 7 days per week, at a combined average rate of 2,500 stph or a nominal average rate of 1,250 stph for each unloader. The unloading dock and conveyors are designed to operate at river water levels of 342 feet (minimum) to 375.5 feet (maximum). All electrical equipment and motors are above 385 feet in elevation. The 100-year flood level at the site is 380 feet, and the 500-year flood level is 382 feet.

2. Train Unloading. The train unloading system is designed to handle a maximum of 18,000 tons of coal per day via 100-ton standard bottom dump coal cars. Each train is unloaded in 5 to 6 hours from the time the train is brought to the plant's track loop. The unloading operation is

carried out manually. The coal cars are spotted on the unloading hopper by means of a yard switch engine. A gas-fired thaw shed is provided for winter use as required. The train unloading operation may be performed in all three shifts of the day, 7 days of the week.

B. System Selection Rationale

Barge transport is the preferred mode of delivery for coal both by the suppliers as well as the consumers in the region since it is more economical and convenient than shipment by rail. The barge unloading facilities are designed to unload the total daily requirement of the plant. It is a standard practice to move barges only during daylight hours, so the unloaders have adequate capacity to unload the total requirement in two 8-hour shifts.

The location of the barge unloading equipment in a dredged slip was determined after discussions with the U.S. Army Corps of Engineers, the Kentucky Department for Natural Resources and Environmental Protection, and barge operating companies. The inland location of the slip away from river banks avoids any interference in the river barge traffic.

A choice was required between a continuous chain bucket-type unloader or a grab bucket-type unloader. The grab bucket unloader was found suitable for coal unloading rates up to 1,000 stph. However, since the Gasoline Plant required capacities in excess of that, the continuous chain bucket elevator type unloaders were selected. Although one chain bucket-type unloader could be designed for the total required unloading rate, the availability (reliability) of these machines is not compatible with the belt conveying system. Therefore, two barge unloaders, each with a nominal operating rate of half the plant requirement, were selected because of the greater reliability than one 100% unloader. This selection was also based on the flexibility of operation and turndown capability, lower maintenance requirement, and lowest capital and operating cost as well as acceptable environmental conditions.

A detailed study was performed to select a train unloading system based on project coal-handling criteria and standard engineering practices in related industries of comparable size. Having generally considered different alternatives, five schemes were studied in depth and a report on the selection of the scheme was prepared (see Volume V). Considering the advantages and disadvantages of each scheme, the scheme with the covered station and under-the-track hoppers using railway standard bottom dump cars was considered best suited for the project.

In conclusion, the equipment type and size selected for unloading coal from barges and trains are of proven technology, have no unusual break-in feature requirements, and can be purchased for delivery within the established schedule for the project.

C. System Description

1. Barge Unloading. The barge unloaders are the chain bucket type on a luffing boom of stationary style structures. The chain boom is mounted on a cross conveyor that can be raised or lowered according to the water level in the dock. The two unloaders, connected by belt conveyors, can unload two barges at a time at the designed rates. Winches are provided to move the barge being unloaded under the unloading boom. Two small harbor boats tow coal and product barges to and from the loading/unloading stations.

2. Train Unloading. The train unloading system is designed to unload coal from railway standard bottom dump coal cars. The bottom dump car train is pulled through a thaw shed (operating during winter months only) to the train unloading station; and the switch engine spots two cars at a time on the track hoppers. A car shaker is lowered on the car if required while the doors of the second car are being opened manually. After both cars are empty, the train is moved to advance the next two cars onto the unloading hoppers. The hoppers discharge coal by belt feeders onto a collecting belt to convey the coal to the yard stockpiles.

D. Risk Assessment

The philosophy used in the selection of the coal unloading systems for this project was to utilize a commercially proven, environmentally acceptable, and economical system. Furthermore, the basis of selection and design of individual equipment ensures efficient use of the equipment capacities, flexibility of operation, and built-in reserve capacities for momentary surges in the coal unloading rates. This philosophy was maintained in the determination of the number of trains, modules, and spare equipment. The system startup, turndown capability, maintenance, availability, and interchangeability of parts were considered in the risk assessment.

All manufacturer-furnished equipment was specified for maximum operating rates at 25% over and above the plant's designed operating conditions. The conveyors were designed for a maximum of 75% loading for capacities required by the Plant Design Operating Conditions. Individual components of the system have a minimum service factor of 1.25 or more in general conformity with the latest editions of applicable codes, standards, and practices of federal, state, and local authorities. In case of conflict in standards, the more conservative standard was used in the design or selection of the equipment/system.

The operation of the coal receiving and unloading systems is affected by five significant factors.

1. Reliability of Coal Supply and Transport Systems. To provide flexibility of supply and the most competitive prices, coal supply contracts will be entered into with three to five coal suppliers. The option to buy the coal in the spot market whenever it is advantageous to the purchaser will be available. The reliability of delivery is increased by providing two independent modes of coal receiving; i.e., by river barges as well as railcars. The provision of as much as a 90-day coal supply stockpile at the plantsite is a safeguard against a prolonged interruption of coal deliveries.

2. Availability and Occupancy of Coal Receiving and Unloading Systems. The coal unloaders at the barge docks are commercially proved, standard design with all applicable safety features. Their availability (reliability) will be over 85% and can be increased by employing two unloaders. This enables the receiving and unloading system to be available in excess of the single belt conveyor, which will transport the coal from the barges to the stockpile.

The train unloading station similarly has two unloading hoppers, each capable of handling the total design capacity. Similarly, there are two dust collectors at this station, of which any one can operate and maintain the area dustfree preventing the formation of a potentially explosive air/coal dust mixture.

3. Continuity of Coal Requirement by Process Units. In case of unexpected failure of the process units or the utility boilers, the demand for coal from the plant may suddenly reduce or totally stop. The loaded coal barges in the dock and those en route to the plant and the railcars within the plant area cannot be withheld from unloading without incurring demurrage charges. Coal stockpiles are provided so that the unloading operation can be sustained. Also, the availability of stockpiled coal reduces the risk of a forced plant shutdown in the event of a stoppage or slowdown in coal supply.

4. Effect on Equipment Performance Caused by Maloperation or Machine Parts Breakdown. The equipment and system are designed to perform at the maximum plant design operating conditions. Although all safeguards and protective devices are provided, mechanical failures may be caused by maloperation, fire and accident, or extended wear. Dual operating and monitoring devices are provided in each system to eliminate or minimize failures. Additionally, the coal unloading systems are each controlled by individual operators as well as monitored by their supervisors in a remote central control room. Additional operators (deck hands and conveyor walkers) will spot any abnormality in the operation and avert a breakdown.

E. Process Flow and Control Diagrams (Including Material Balances)

Process Flow and Control Diagrams for Coal Receiving and Unloading Unit 11 are as follows:

Drawing No.	Title
D-10-MP-1NP	Material Balance Coal Area
D-11-MP-1NP	PFCD Coal Area Units 11 and 12 - Barge Unloading, Conveying and Sampling
D-11-MP-2NP	PFCD Coal Area Units 11 and 12 - Train Unloading, Conveying and Sampling

FLOW SHEET DRAWING NUMBER D-11-MP-1NP

FLOW IDENTIFICATION	1 AS RECEIVED FROM BARGE UNLOADER	2 AS RECEIVED FROM BARGE UNLOADER	3 DISCHARGE FROM BARGE UNLOADERS	4 FEED TO STORAGE PILES	5 PRIMARY SAMPLE CUT	6 REJECTS FROM SECONDARY SAMPLE	7 SECONDARY SAMPLE CUT	8 FINAL CRUSHED SAMPLE	9 REJECTS F TERTIAR SAMPLE
MATERIAL	COAL	COAL	COAL	COAL	COAL	COAL	COAL	COAL	COAL
SIZE (INCHES) (MESH)	(-2)	(-2)	(-2)	(-2)	(-2)	(-2)	(-2)	(-1/4)	(-1
MOISTURE % (MAX.)	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	
TEMPERATURE °F	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.	A
BULK DENSITY	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/
OPERATING RATE STPH (LBS./HR.)	1250	1250	2500	2500	(9486)	(9241)	(245)	(40)	(2
DESIGN RATE NOMINAL STPH (LBS./HR.)	1250	1250	2500	2500	(9486)	(9241)	(245)	(40)	(2
DESIGN FACTOR EQUIPMENT	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1
WATER FLOW RATE GPM									
WATER FLOW PRESSURE PSIG									
AIR FLOW RATE SCFM									
AIR FLOW PRESSURE PSIG									

FLOW SHEET DRAWING NUMBER D-11-MP-2NP

FLOW IDENTIFICATION	1 AS RECEIVED FROM TRAIN U/L FEEDERS	2 AS RECEIVED FROM TRAIN U/L STATION	3 PRIMARY SAMPLE CUT	4 FEED TO STORAGE PILES	5 FINAL CRUSHED SAMPLE	6 REJECTS FROM SECONDARY SAMPLE	7 REJECTS FROM BARGE SAMPLERS	8 TOTAL SAMPLES REJECT	9 FEED T STORAGE P
MATERIAL	COAL	COAL	COAL	COAL	COAL	COAL	COAL	COAL	COAL
SIZE (INCHES) (MESH)	(-2)	(-2)	(-2)	(-2)	(-1/4)	(-1/4)	(-2)	(-2)	(
MOISTURE % (MAX.)	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	
TEMPERATURE °F	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.	A
BULK DENSITY (LBS./FT.^{3})	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/
OPERATING RATE STPH (LBS./HR.)	900	1800	(3180)	1800	(5)	(12,621)	(9446)	(22067) (MAX.)	4307 (MA
DESIGN RATE NOMINAL STPH (LBS./HR.)	900	1800	(3180)	1800	(5)	(12,621)	(9446)	(22067) (MAX.)	4307 (MA
DESIGN FACTOR EQUIPMENT	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1
WATER FLOW RATE GPM									
WATER FLOW PRESSURE PSIG									
AIR FLOW RATE SCFM									
AIR FLOW PRESSURE PSIG									

FLOW SHEET DRAWING NUMBER D-12-MP-1NP

FLOW IDENTIFICATION	1 FEED FROM STORAGE PILES	2 FEED FROM STORAGE PILES	3 FEED FROM DAY STORAGE SILOS	4 FEED TO SLURRY PREP MILLS	5 FEED FROM BOILER COAL BUNKERS	6 LIMESTONE FEED TO FGD PLANT	7	8	9
MATERIAL	COAL	COAL	COAL	COAL	COAL	LIME STONE			
SIZE (INCHES) (MESH)	(-2)	(-2)	(-2)	(-2)	(-2)	(2)			
MOISTURE % (MAX.)	9.4	9.4	9.4	9.4	9.4				
TEMPERATURE °F	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.			
BULK DENSITY (LBS./FT.^{3})	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(85)			
OPERATING RATE STPH (LBS./HR.)	1208	1208	75.5	(1) 110/151	12.59	1250			
DESIGN RATE NOMINAL STPH (LBS./HR.)	1208	1208	100	(2) 200	12.59	1250			
DESIGN FACTOR EQUIPMENT	1.25	1.25	1.25	1.25	1.25	1.25			
WATER FLOW RATE GPM									
WATER FLOW PRESSURE PSIG									
AIR FLOW RATE SCFM									
AIR FLOW PRESSURE PSIG									

FLOW SHEET DRAWING NUMBER D-13-MP-1NP

FLOW IDENTIFICATION	1 FEED FROM UNLOADING STATIONS	2 FEED FROM UNLOADING STATIONS	3 RECLAIM FROM STORAGE PILES	4 RECLAIM FROM STORAGE PILES	5 DISTRIBUTED FEED TO COAL SILOS	6 DISTRIBUTED FEED TO COAL SILOS	7 DISTRIBUTED FEED TO COAL SILOS	8 DISTRIBUTED FEED TO COAL SILOS	9 FEED T SILOS BUNKER
MATERIAL	COAL	COAL	COAL W(3)	COAL W(3)	COAL	COAL	COAL	COAL	COAL
SIZE (INCHES) (MESH)	(-2)	(-2)	(-2)	(-2)	(-2)	(-2)	(-2)	(-2)	(
MOISTURE % (MAX.)	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	
TEMPERATURE °F	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.	AMB.	A
BULK DENSITY (LBS./FT.^{3})	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/55)	(45/
OPERATING RATE STPH (LBS./HR.)	4307 (MAX.)	4307 (MAX.)	2416	2416	1208	1208	1208	1208	1
DESIGN RATE NOMINAL STPH (LBS./HR.)	4307 (MAX.)	4307 (MAX.)	2416	2416	1208	1208	1208	1208	1
DESIGN FACTOR EQUIPMENT	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1
WATER FLOW RATE GPM									
WATER FLOW PRESSURE PSIG									
AIR FLOW RATE SCFM									
AIR FLOW PRESSURE PSIG									

REFERENCES		REFERENCES		REVISIONS									REVISIONS									
DRAWING NO.	DESCRIPTION	DRAWING NO	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION			C	5-23-83		RS	[illegible]	SHR			FOR DESIG
														B	4/18/83		RS	OWN	SHR			FOR CLIEN
														A								ISSUED AS
														NO	DATE	BY	CHKD	SEC	PROJ	CLIENT		DE

ENG-GE-23 (12/78)

These are merely loaned and on the borrower's express agreement that they will not be disclosed, loaned, copied or used except in the business and private use permitted by any written consent given by the lender to the borrower.

NOTES:

1. THESE ARE THE RANGE OF OPERATING CONDITIONS. FOR ACTUAL OPERATING RATES OF SLURRY PREPARATION AREA SEE PROPRIETARY DRAWING No. D-24-MP-4.
2. THIS IS A NOMINAL DESIGN RATE OF MATERIAL HANDLING EQUIPMENT.
3. LIMESTONE FEED TO F.G.D. REMOVAL PLANT WILL HAVE THE SAME RATES (OTHER DATA NOT INDICATED)

9	10	11	12	13	14
REJECTS FROM TERTIARY SAMPLE	REJECTS OF SECONDARY & TERTIARY CUTS				
COAL	COAL				
(-1/4)	(-2)				
9.4	9.4				
AMB.	AMB.				
(45/55)	(45/55)				
(205)	(9446)				
(205)	(9446)				
1.25	1.25				

9	10	11	12	13	14
FEED TO STORAGE PILES	AIR DISCHARGE FROM COLLECTOR	FROM BARGE UNLOADING TRAIN			
COAL		COAL			
(-2)		(-2)			
9.4		9.4			
AMB.		AMB.			
(45/55)		(45/55)			
4307 (MAX.)		2511			
4307 (MAX.)		2511			
1.25		1.25			
	40,000 ea.				

9	10	11	12	13	14

9	10	11	12	13	14
FEED TO SILOS & BUNKERS	FEED TO SILOS & BUNKERS				
COAL	COAL				
(-2)	(-2)				
9.4	9.4				
AMB.	AMB.				
(45/55)	(45/55)				
1208	(9) 1208				
1208	1208				
1.25	1.25				

D10MPINP.DGA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

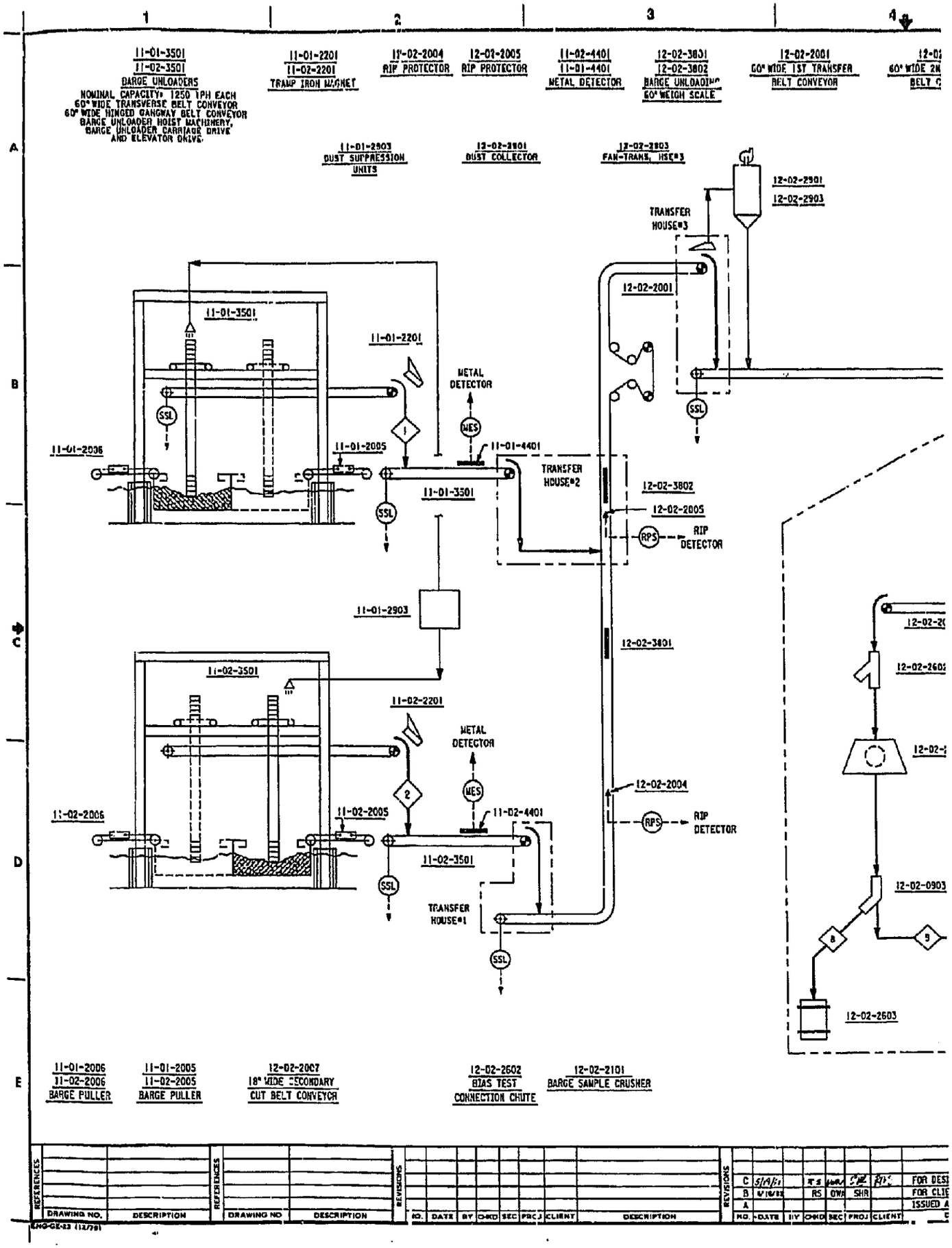
FOR DESIGN REPORT	DRAWN	DAR	
FOR CLIENT APPROVAL	CHECKED	RS	4/21/82
ISSUED AS D-10-FS-1	APVD SECT HD	DWA	4/21/82
DESCRIPTION	APVD PROJ MGR	SHR	4/21/82
	APVD CLIENT		

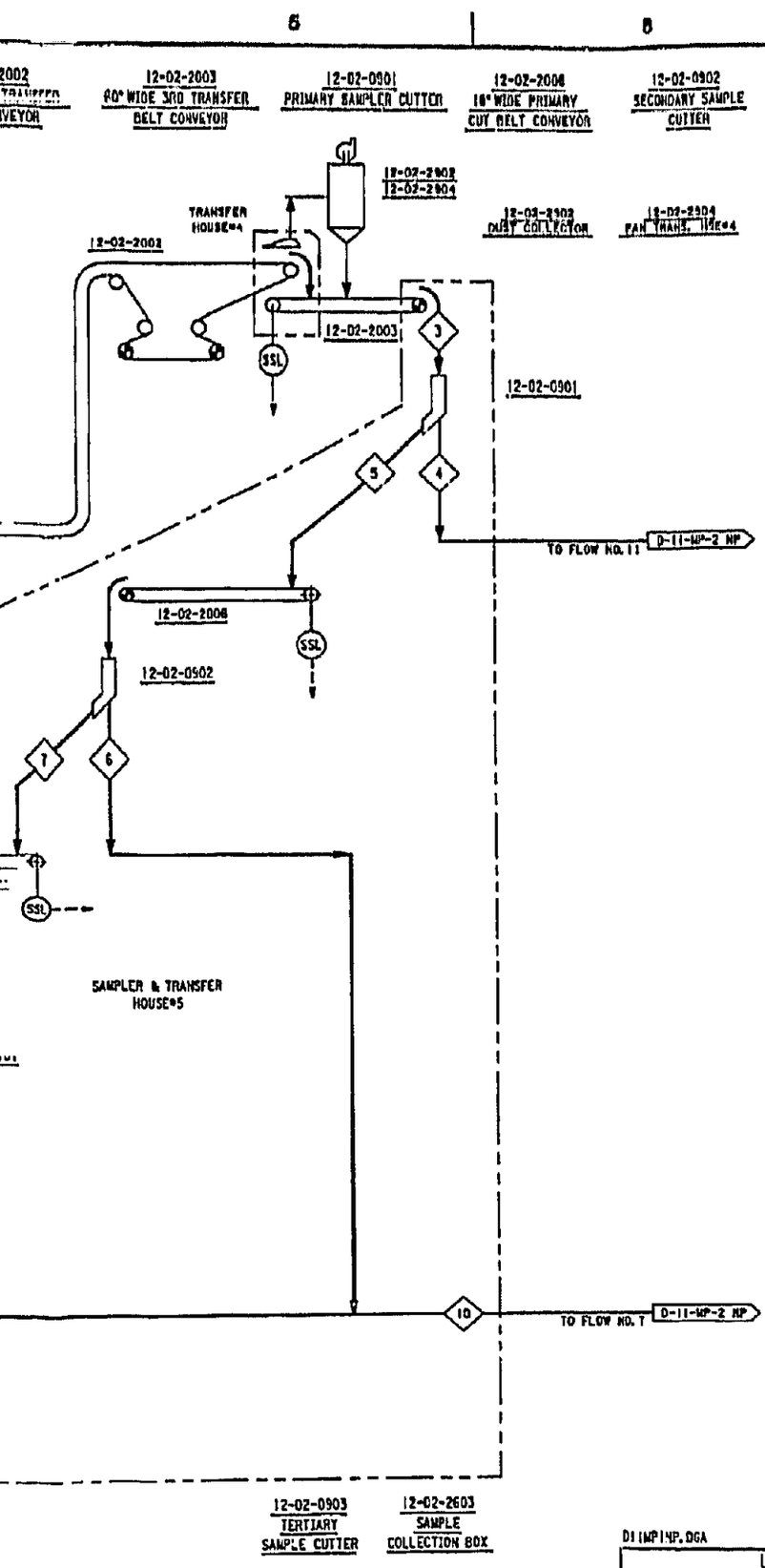
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

TITLE: MATERIAL BALANCE
COAL AREA - UNIT 10

SCALE: NONE | ACCOUNT NUMBER: 2000 | JOB NUMBER: 6182 | REVISION: C

DOCUMENT NUMBER: D-10-MP-1 NP


11-01-3501
11-02-3501
BARGE UNLOADERS
NOMINAL CAPACITY: 1250 TPH EACH
60" WIDE TRANSVERSE BELT CONVEYOR
60" WIDE HINGED GANGWAY BELT CONVEYOR
BARGE UNLOADER HOIST MACHINERY,
BARGE UNLOADER CARRIAGE DRIVE
AND ELEVATOR DRIVE.
11-01-2201
11-02-2201
TRAMP IRON MAGNET
11-02-2004
RIP PROTECTOR
12-02-2005
RIP PROTECTOR
11-02-4401
11-01-4401
METAL DETECTOR
12-02-3801
12-02-3802
BARGE UNLOADING
60" WEIGH SCALE
12-02-2001
60" WIDE 1ST TRANSFER
BELT CONVEYOR
11-01-2903
DUST SUPPRESSION
UNITS
12-02-2901
DUST COLLECTOR
12-02-2903
FAN-TRANS. HSE#3
12-02-2901
12-02-2903
TRANSFER
HOUSE#3
12-02-2001
11-01-3501
11-01-2201
METAL
DETECTOR
SSL
WES
11-01-2006
11-01-2005
11-01-4401
TRANSFER
HOUSE#2
12-02-3802
12-02-2005
RPS
RIP
DETECTOR
11-01-3501
11-01-2903
12-02-3801
11-02-3501
11-02-2201
METAL
DETECTOR
12-02-2004
11-02-2006
11-02-2005
11-02-4401
11-02-3501
TRANSFER
HOUSE#1
12-02-0903
12-02-2603
11-01-2006
11-02-2006
BARGE PULLER
11-01-2005
11-02-2005
BARGE PULLER
12-02-2007
18" WIDE SECONDARY
CUT BELT CONVEYOR
12-02-2602
BIAS TEST
CONNECTION CHUTE
12-02-2101
BARGE SAMPLE CRUSHER
REFERENCES
DRAWING NO.
DESCRIPTION
REVISIONS
NO.
DATE
BY
CHKD
SEC
PROJ
CLIENT
DESCRIPTION
FOR DES
FOR CLI
ISSUED A



NOTES:

1. BARGES TO BE UNLOADED IN 12 HOURS. MAX. FEED RATE 30,000 TPD÷12 HOURS=2500 TPH.
2. ITEMS MARKED THUS ⊕ ARE DRIVE PULLEYS.
3. ITEMS MARKED THUS ⊖ ARE PULLEYS WHERE MOTION DETECTOR SWITCHES ARE TO BE LOCATED.
4. WORK THIS DRAWING WITH DRAWINGS D-11-MP-1NP, D-13-MP-1NP, D-12-MP-1NP & D-10-MP-1NP.
5. ALL BELT CONVEYORS SHALL HAVE A 10 SEC. DELAY START TIED IN TO A LOCALLY PLACED ALARM.
6. ALL BELT CONVEYORS SHALL HAVE EMERGENCY PULL CORD SWITCHES.
7. RAILROAD CARS TO BE UNLOADED IN 10 HOURS. FEED RATE 18,000÷10H=1,800 TPH.

D11MP1NP.DGA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

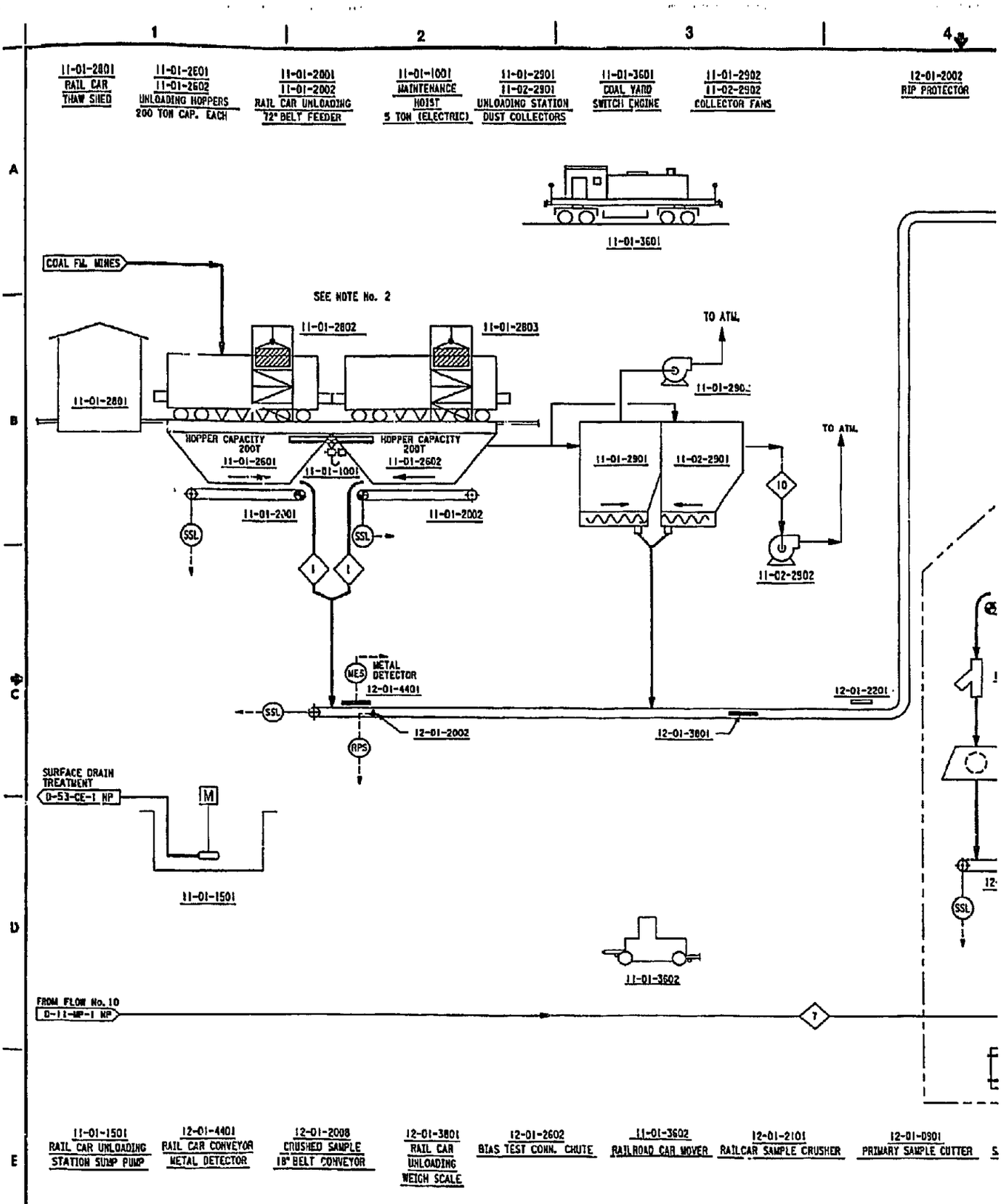
TITLE: PROCESS FLOW & CONTROL DIAGRAM COAL AREA - UNITS 11 & 12 BARGE UNLOADING, CONVEYING & SAMPLING	SCALE: NONE	ACCOUNT NUMBER: 2000	JOB NUMBER: 6182
	DOCUMENT NUMBER: D-11-MP-1 NP		REVISION: C

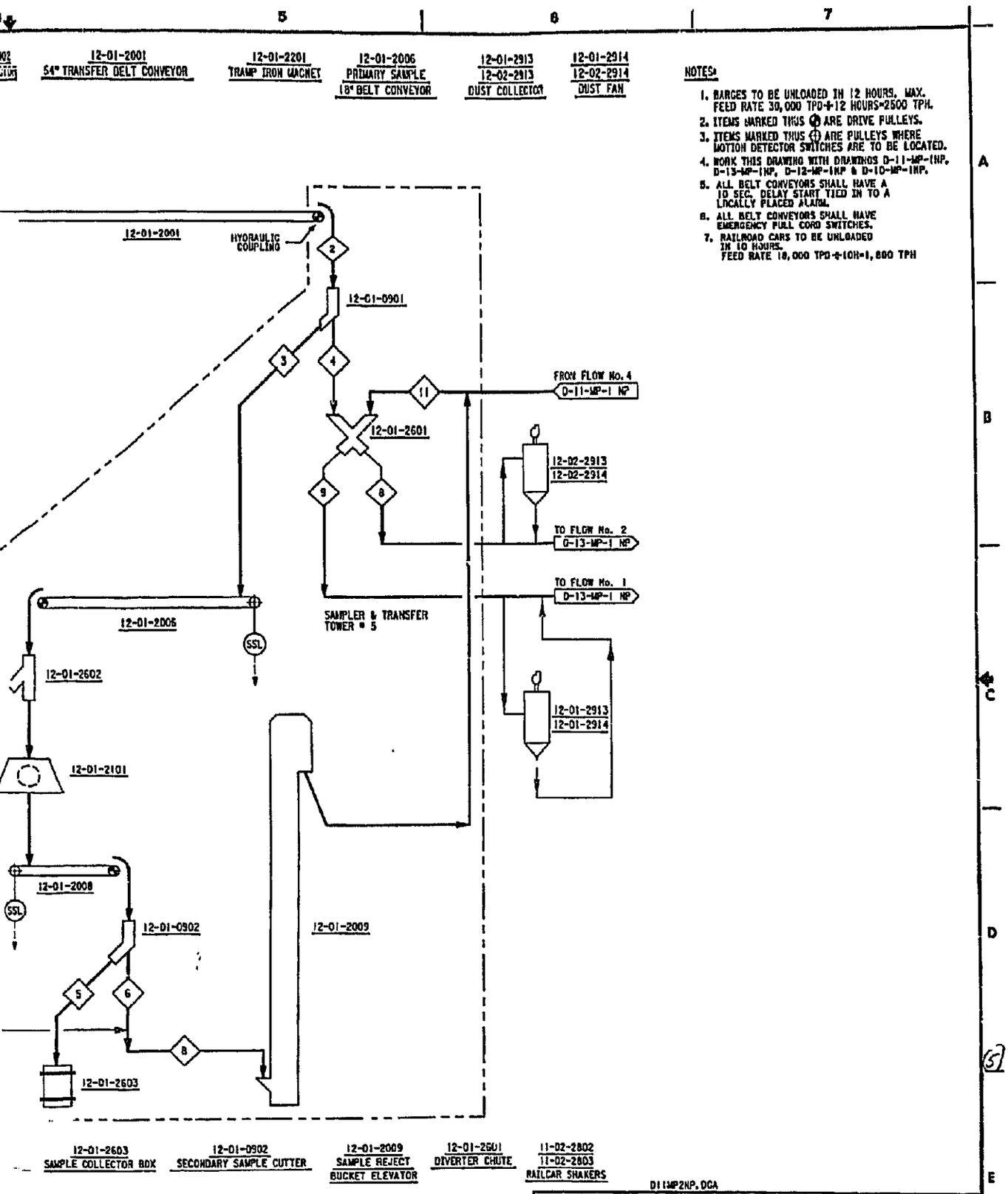
DRAWN	DAR	
CHECKED	RS	4-21-82
APVD DEPT HD	DWA	4-21-82
APVD PROJ MGR	SHR	4-21-82
APVD CLIENT		

APPROVAL

DESCRIPTION

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA


11-01-2801
RAIL CAR
THAW SHED
11-01-2601
11-01-2602
UNLOADING HOPPERS
200 TON CAP. EACH
11-01-2001
11-01-2002
RAIL CAR UNLOADING
72" BELT FEEDER
11-01-1001
MAINTENANCE
HOIST
5 TON (ELECTRIC)
11-01-2901
11-02-2901
UNLOADING STATION
DUST COLLECTORS
11-01-3601
COAL YARD
SWITCH ENGINE
11-01-2902
11-02-2902
COLLECTOR FANS
12-01-2002
RIP PROTECTOR
11-01-3601
COAL FM. MINES
SEE NOTE No. 2
11-01-2802
11-01-2803
TO ATM.
11-01-2801
HOPPER CAPACITY
200T
11-01-2601
HOPPER CAPACITY
200T
11-01-2602
11-01-1001
11-01-2901
11-02-2901
TO ATM.
11-01-2001
11-01-2002
SSL
SSL
SSL
11-02-2902
METAL
DETECTOR
12-01-4401
12-01-2201
12-01-2002
12-01-3801
RPS
SURFACE DRAIN
TREATMENT
D-53-CE-1 NP
M
11-01-1501
11-01-3602
FROM FLOW No. 10
D-11-MP-1 NP
11-01-1501
RAIL CAR UNLOADING
STATION SUMP PUMP
12-01-4401
RAIL CAR CONVEYOR
METAL DETECTOR
12-01-2008
CRUSHED SAMPLE
18" BELT CONVEYOR
12-01-3801
RAIL CAR
UNLOADING
WEIGH SCALE
12-01-2602
BIAS TEST CONN. CHUTE
11-01-3602
RAILROAD CAR MOVER
12-01-2101
RAILCAR SAMPLE CRUSHER
12-01-0901
PRIMARY SAMPLE CUTTER
REFERENCES
DRAWING NO.
DESCRIPTION
REFERENCES
DRAWING NO.
DESCRIPTION
REVISIONS
NO.
DATE
BY
CHKD
SEC
PROJ
CLIENT
DESCRIPTION
REVISIONS
C
B
A
FOR DEST
FOR CLIE
ISSUED A
NO.
DATE
BY
CHKD
SEC
PROJ
CLIENT



NOTES:

1. BARGES TO BE UNLOADED IN 12 HOURS. MAX. FEED RATE 30,000 TPD÷12 HOURS=2500 TPH.
2. ITEMS MARKED THUS ⊕ ARE DRIVE PULLEYS.
3. ITEMS MARKED THUS ⊕ ARE PULLEYS WHERE MOTION DETECTOR SWITCHES ARE TO BE LOCATED.
4. WORK THIS DRAWING WITH DRAWINGS D-11-MP-1NP, D-13-MP-1NP, D-12-MP-1NP & D-10-MP-1NP.
5. ALL BELT CONVEYORS SHALL HAVE A 10 SEC. DELAY START TIED IN TO A LOCALLY PLACED ALARM.
6. ALL BELT CONVEYORS SHALL HAVE EMERGENCY PULL CORD SWITCHES.
7. RAILROAD CARS TO BE UNLOADED IN 10 HOURS. FEED RATE 18,000 TPD÷10H=1,800 TPH

D11MP2NP.DGA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

FOR DESIGN REPORT	DRAWN		
FOR CLIENT APPROVAL	CHECKED	RS	4-21-82
ISSUED AS D-11-FS-2	APVD SECT MGR	DWA	4-21-82
DESCRIPTION	APVD PROJ MGR	SHR	4-21-82
	APVD CLIENT		

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

TITLE: PROCESS FLOW & CONTROL DIAGRAM
COAL AREA -UNITS 11 & 12
TRAIN UNLOADING, CONVEYING & SAMPLING

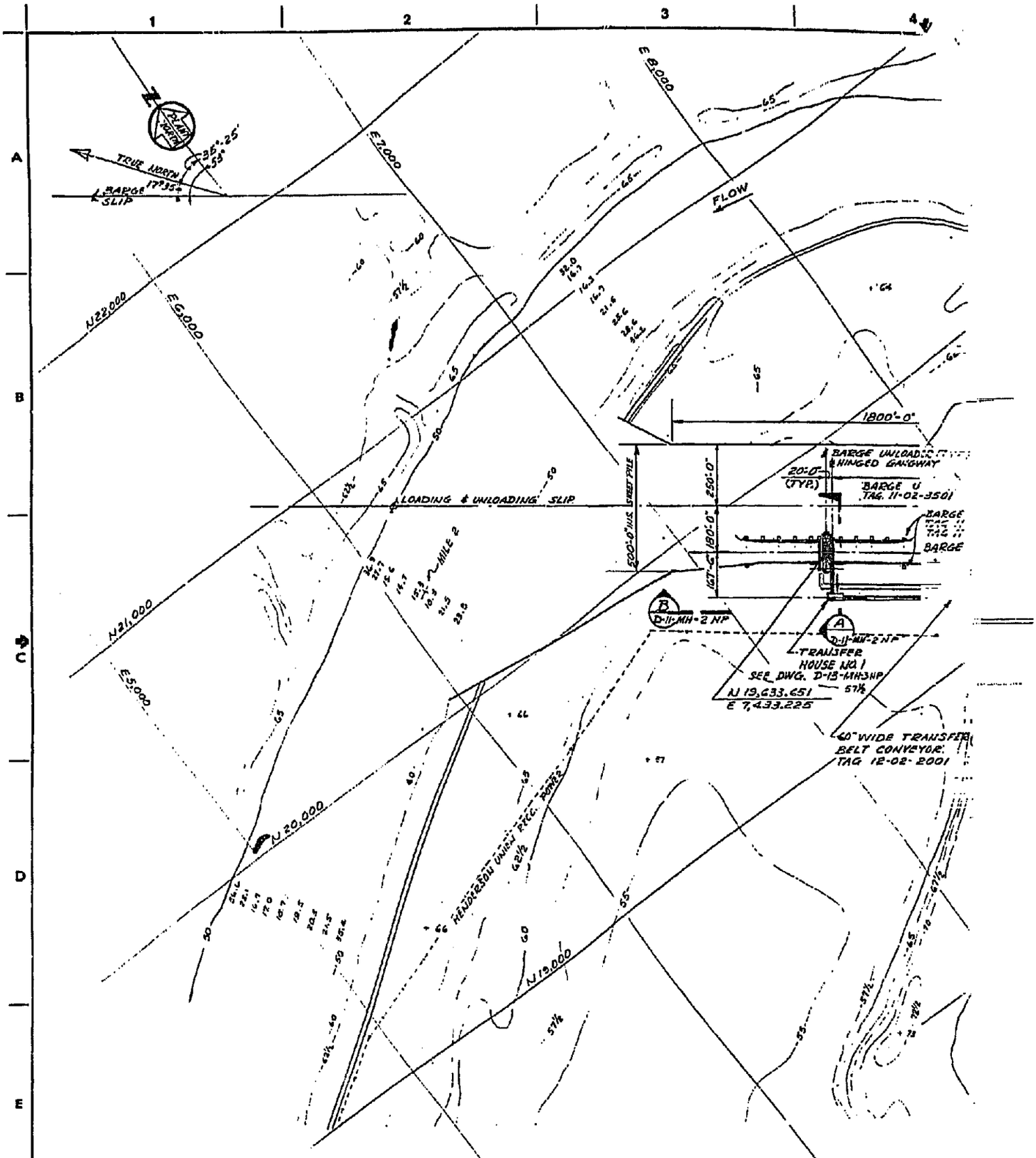
SCALE: NONE | ACCOUNT NUMBER: 2000 | JOB NUMBER: 6182 | REVISION: C

DOCUMENT NUMBER: D-11-MP-2 NP

F. Plot Plan/General Arrangement Drawings

Plot Plan/General Arrangement Drawings for Coal Receiving and Unloading Unit 11 are as follows:

Drawing No.	Title
D-11-MH-1NP	General Arrangement - Receiving and Unloading - Unit 11 Barge Unloading - Plan
D-11-MH-2NP	General Arrangement - Receiving and Unloading - Unit 11 Barge Unloading - Elevations
D-11-MH-3NP	General Arrangement - Receiving and Unloading - Unit 11 Rail Unloading - Plan
D-11-MH-4NP	General Arrangement - Receiving and Unloading - Unit 11 Rail Unloading - Sections



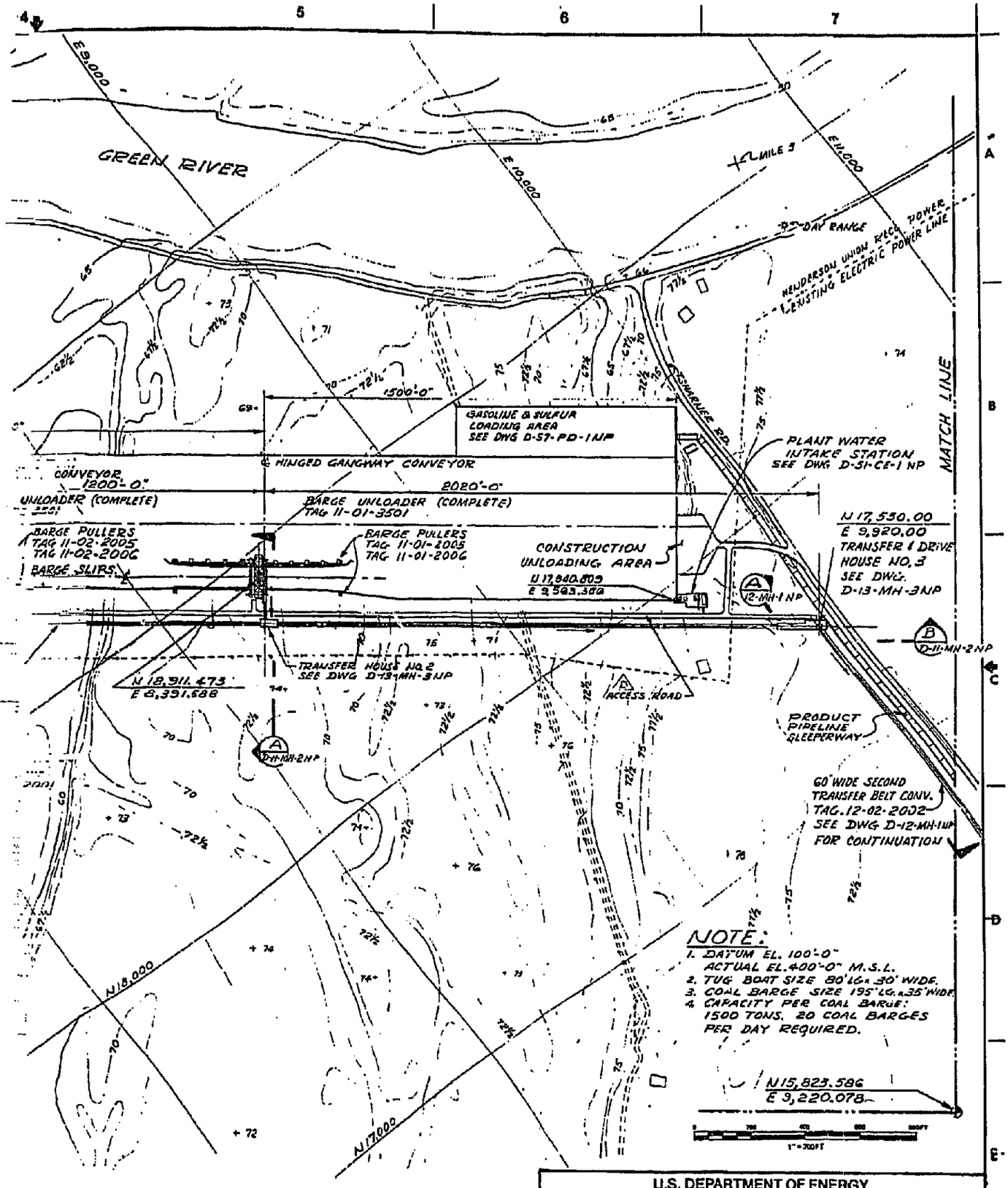
REFERENCES	DRAWING NO.	DESCRIPTION
	5.01-PD-3NA	PLOT PLAN
	D-11-MH-2NP	BARGE UNLOAD - SECT.
	D-12-MH-1NP	CONV. - PLANS & SECT.

REFERENCES	DRAWING NO.	DESCRIPTION

REVISIONS NO	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	
D	6/12/72	W.J.	A.S.				ISSUED FOR
C	3-6-72	A.S.					
B	1-18-72	S.S.					

ENG-GE-23 (12/70)



U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

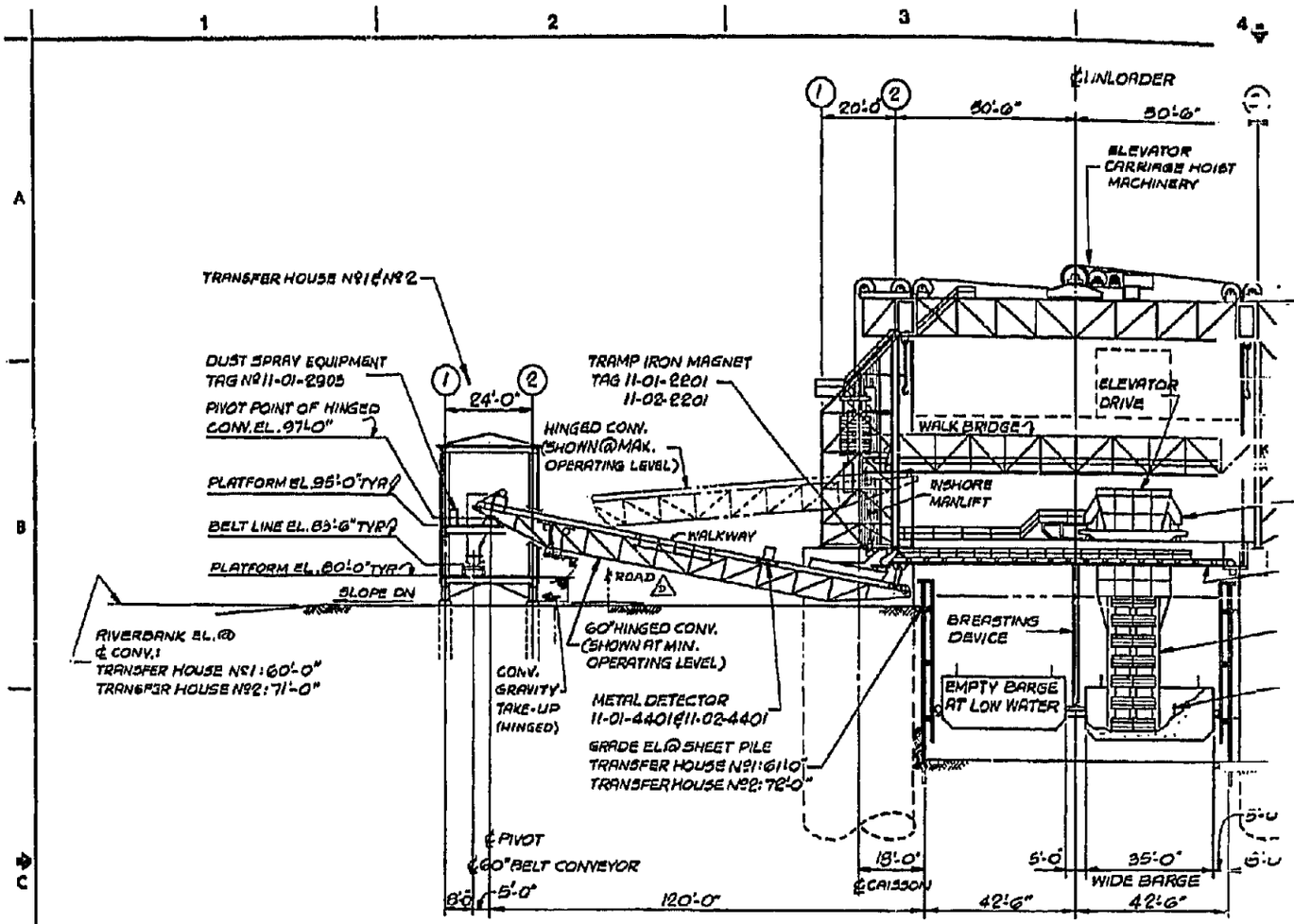
50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

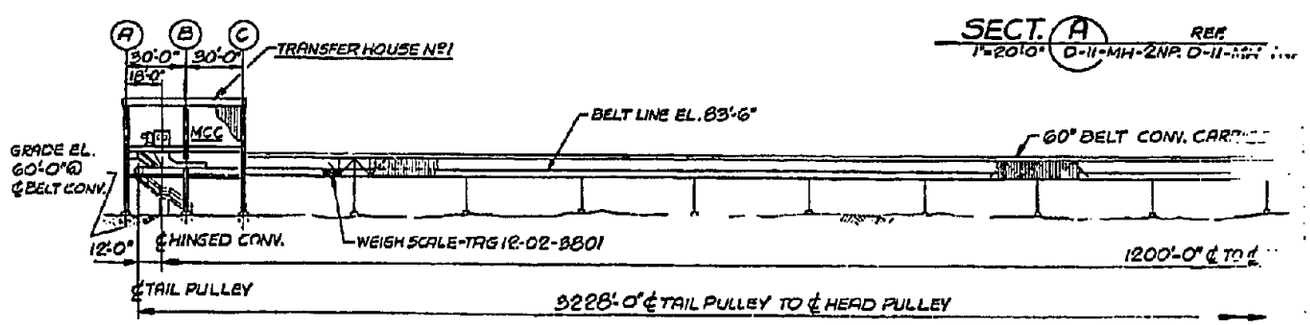
TITLE: GENERAL ARRANGEMENT RECEIVING & UNLOADING — UNIT II BARGE UNLOADING PLAN	SCALE: 1" = 200'	DRAWING NUMBER: 2000	SHEET NUMBER: G122
	DOCUMENT NUMBER: D-11-MH-1 NP		REVISION: D

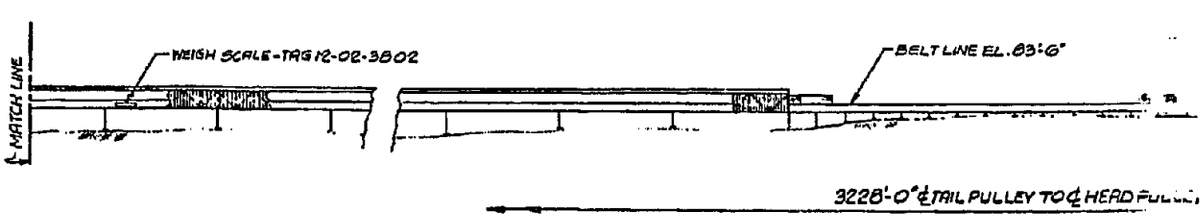
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

DESCRIPTION			
DEMAN REPORT	DRAWN		1-12-81
	CHECKED		1-12-81
	APVD MGR MP		1-29-81
	APVD PROJ MGR		2-4-81
	APVD CLIENT		2/11/81



SECT. (A) REF.
1"=20'-0" D-11-MH-2NP, D-11-...





SECT. (B)
1"=40'-0" D-...

1" = 20FT

1" = 40FT

REFERENCES	
ROL-PD-2NP	PLOT PLAN
D-11-MH-1NP	BARGE UNLOAD-PLAN
D-12-MH-1NP	CONV.-PLAN & SECT.
DRAWING NO.	DESCRIPTION

REFERENCES	
DRAWING NO.	DESCRIPTION

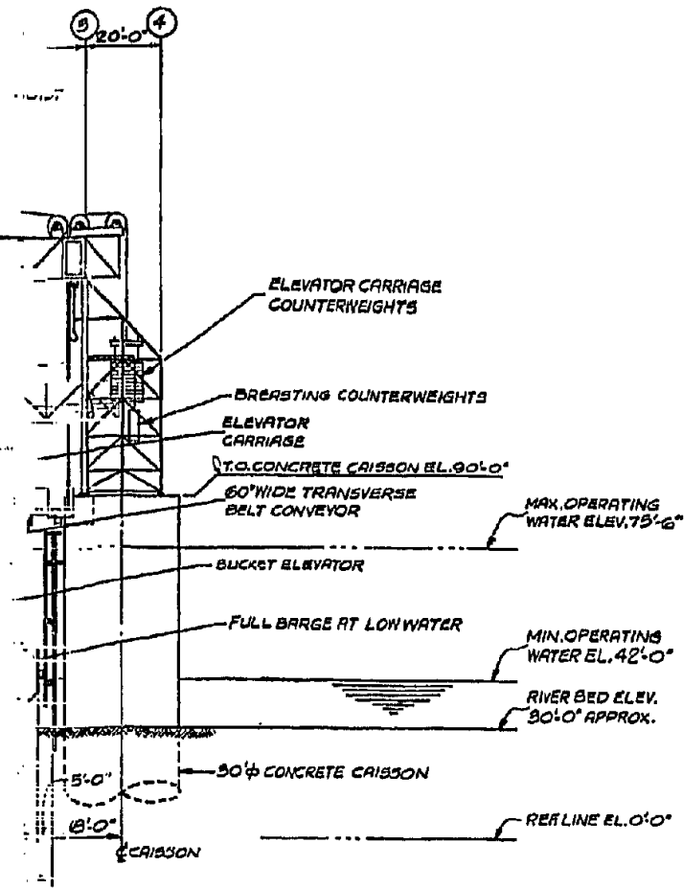
REVISIONS							
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

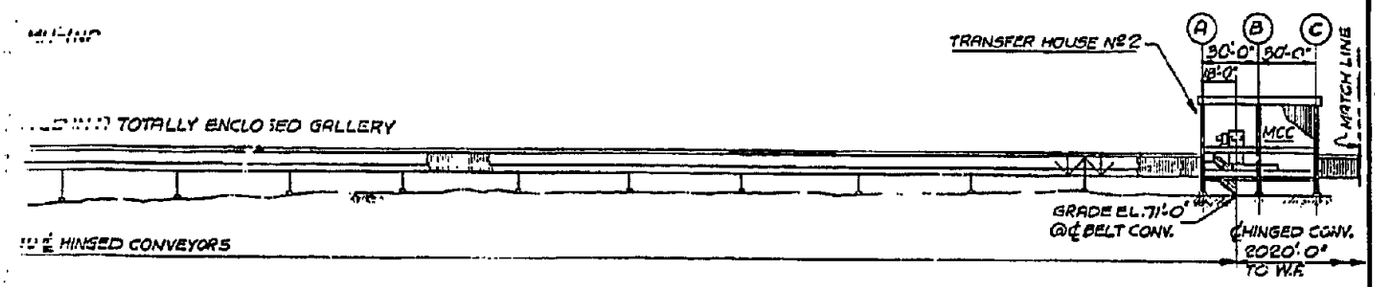
REVISIONS							
D	4-11-82						
C	4-14-81						
B	1-08-82						
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	

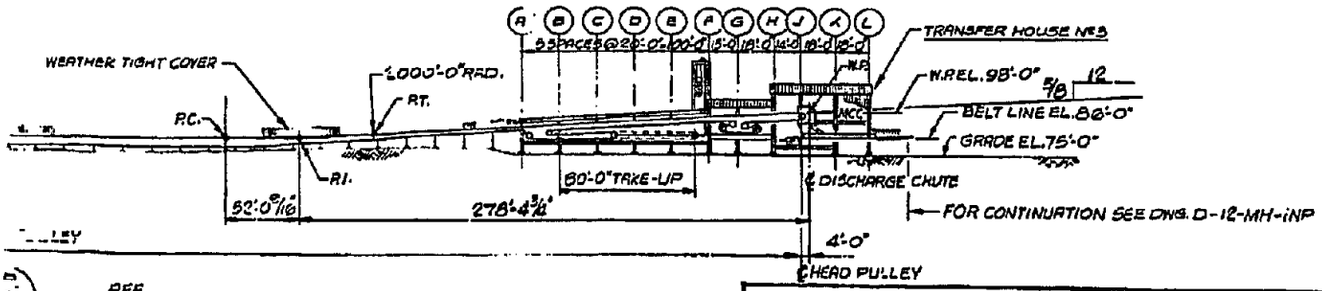
ENG-GE-23 (12/79)

NOTES:

1. BARGE UNLOADERS (TAG 11-01-B501 & 11-02-B501) CONSIST OF BARGE UNLOADER FRAME, BUCKET ELEVATOR, HOIST MECHANISM, 60" WIDE TRANSVERSE BELT CONVEYOR & 60" WIDE HINGED GANGWAY CONVEYOR
2. DATUM EL.100'-0" ACTUAL EL. 400'-0"







REF
D-11-MH-2NP

DESIGN REPORT	DRAWN	L.B.K.	3-19-82
	CHECKED	R.S.	3-19-82
	APVD SECT NO		3-31-82
RELEASED 30% COMPLETED	APVD PROJ MGR		4-1-82
DESCRIPTION	APVD CLIENT	RMS	4/6/82

RMP
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

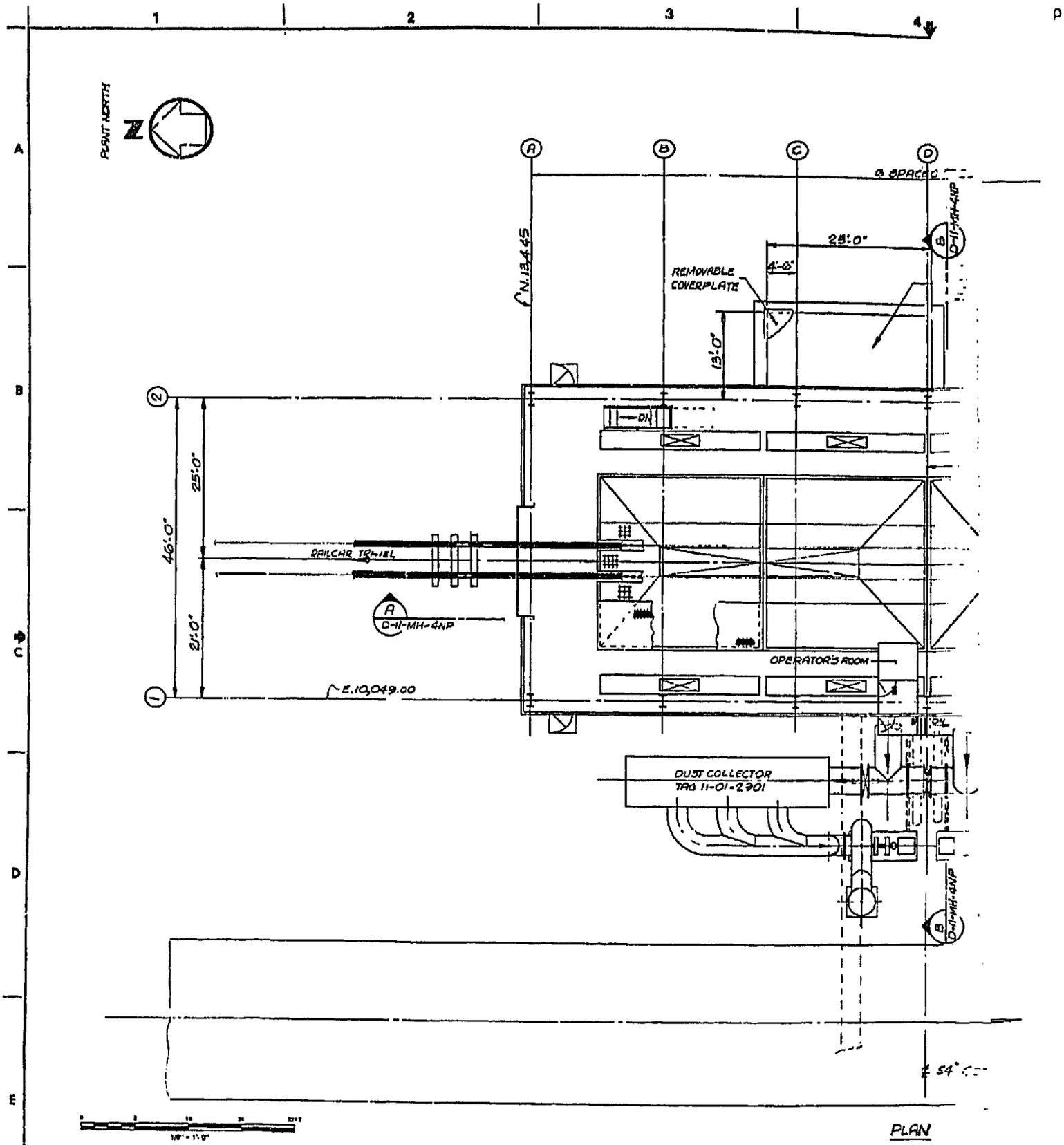
50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: GENERAL ARRANGEMENT RECEIVING & UNLOADING — UNIT II BARGE UNLOADING ELEVATIONS

SCALE: AS NOTED | DOCUMENT NUMBER: 2000 | JOB NUMBER: 6182 | REVISION: D

DOCUMENT NUMBER: D-11-MH-2NP



PLAN

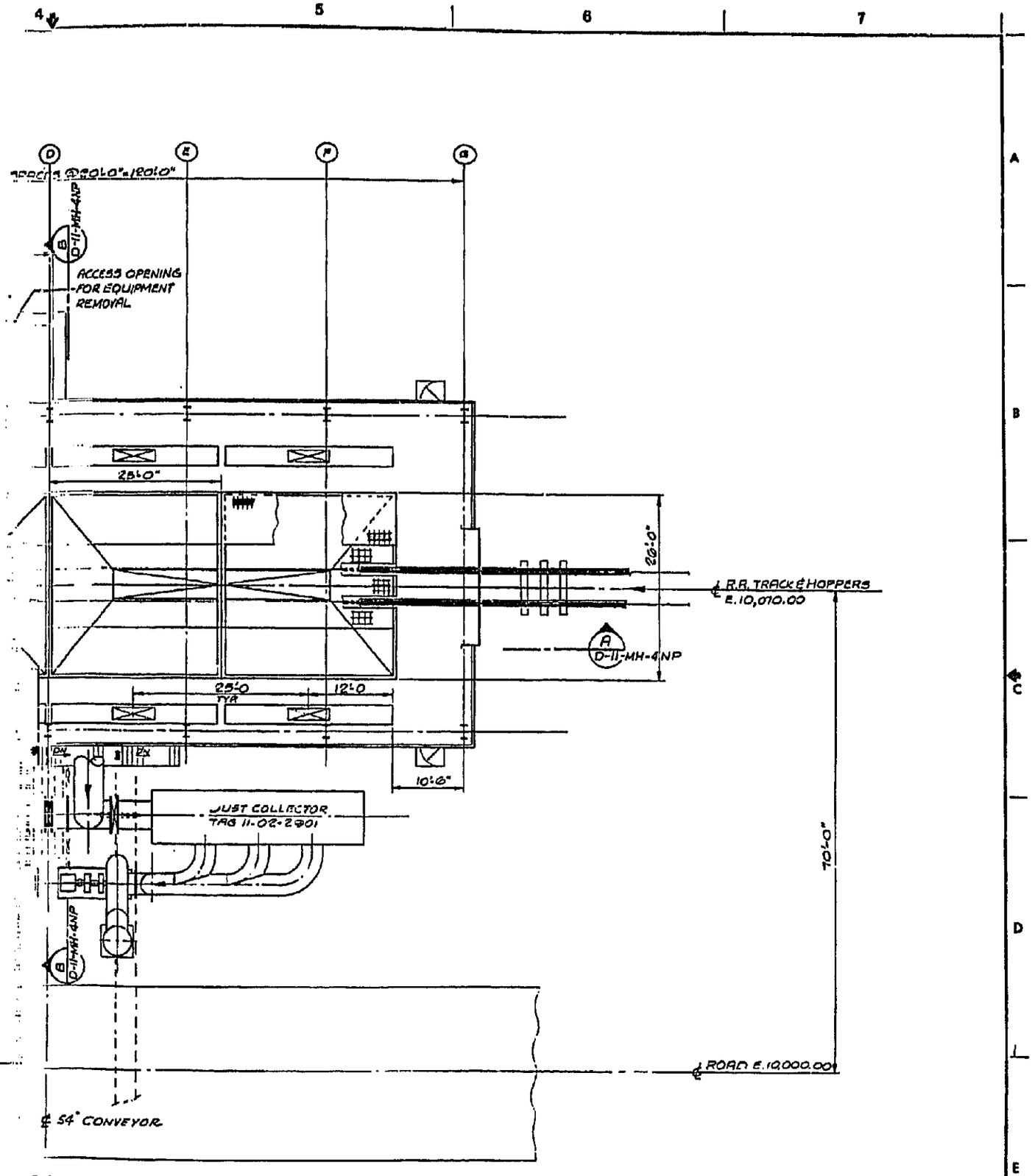
REFERENCES	
D-11-MH-4NP	TRAIN UNLOADING SECTIONS
D-13-MH-1NP	STACKING & RECLAIMING PLAN
DRAWING NO.	DESCRIPTION

REFERENCES	
DRAWING NO.	DESCRIPTION

REVISIONS							
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS								
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		
C	4-16-82	LBK	RS		SR			ISSUE
B	3-26-82	LBK	RS		SR			

ENG-GE-23 (12/79)



U.S. DEPARTMENT OF ENERGY

BASKETT — **W.R. GRACE & CO.** — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

DRAWN	LBK	5-26-82	
CHECKED	RS	6-7-82	
APVD SECT HD		6-7-82	
APVD PROJ MGR		6-8-82	
APVD CLIENT		6-25-82	

DESIGN REPORT

DESCRIPTION

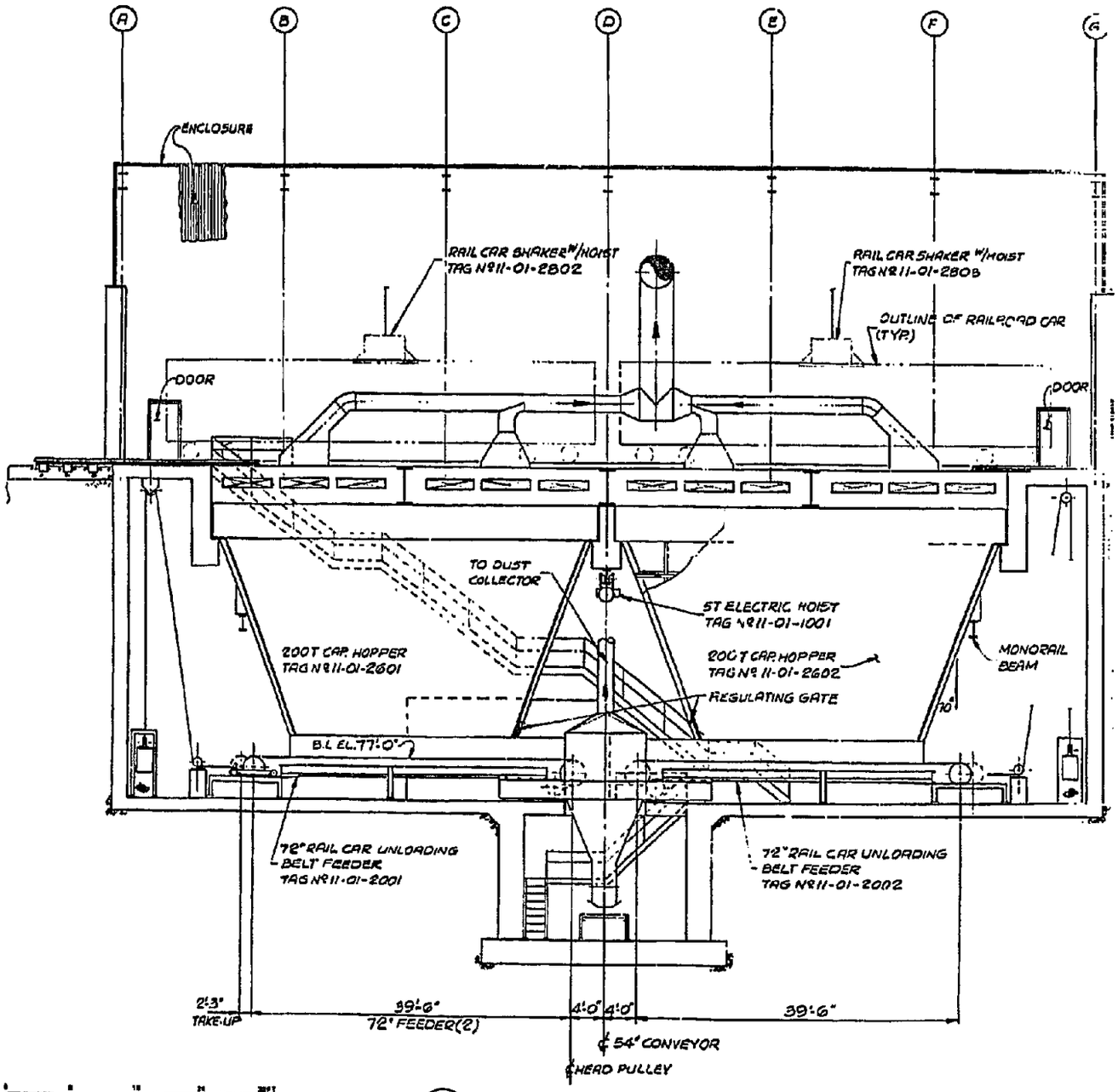
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

TITLE: GENERAL ARRANGEMENT
RECEIVING & UNLOADING - UNIT 11
RAIL UNLOADING - PLAN

SCALE: 1/8"=1'-0" | ACCOUNT NUMBER: 2000 | JOB NUMBER: 6182

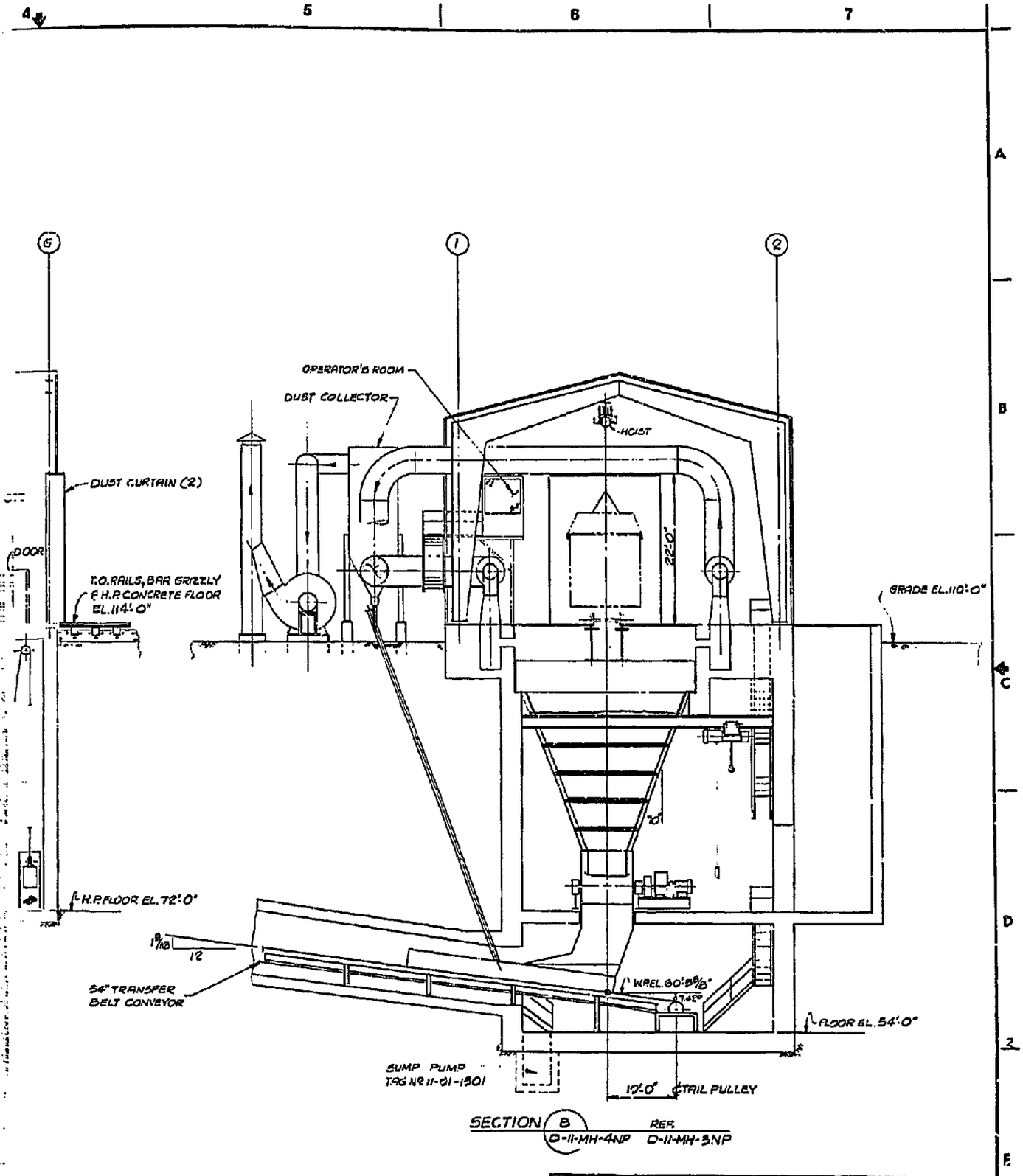
DOCUMENT NUMBER: D-11-MH-3NP

REVISION: C



SECTION (A) D-11-MH-4NP REF. D-11-MH-3NP

REFERENCES				REVISIONS																		
D-13-MH-1NP	STACKING & RECLAIMING PLAN																					
D-11-MH-5NP	TRAIN UNLOADING PLAN																					
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	C										
												B										



U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: GENERAL ARRANGEMENT
RECEIVING & UNLOADING - UNIT II
RAIL UNLOADING - SECTIONS

SCALE	ACCOUNT NUMBER	SUB-ACCOUNT NUMBER	REVISION
1/8"=1'-0"	2000	6182	C

DRAWING NUMBER: D-11-MH-4NP

	FOR		
	DRAWN	CEK	9-26-82
FOR DESIGN REPORT	CHECKED	RS	4-7-82
REDRAWN & REISSUED FOR CLIENT COMMENT. DRAWING NUMBER CHANGED FROM D-11-MH-3NP TO D-11-MH-4NP	APVD SECT MGR	[illegible]	4-7-82
	APVD PROJ MGR	S.H.R.	4-8-82
DESCRIPTION	APVD CLIENT	[illegible]	4-29-82

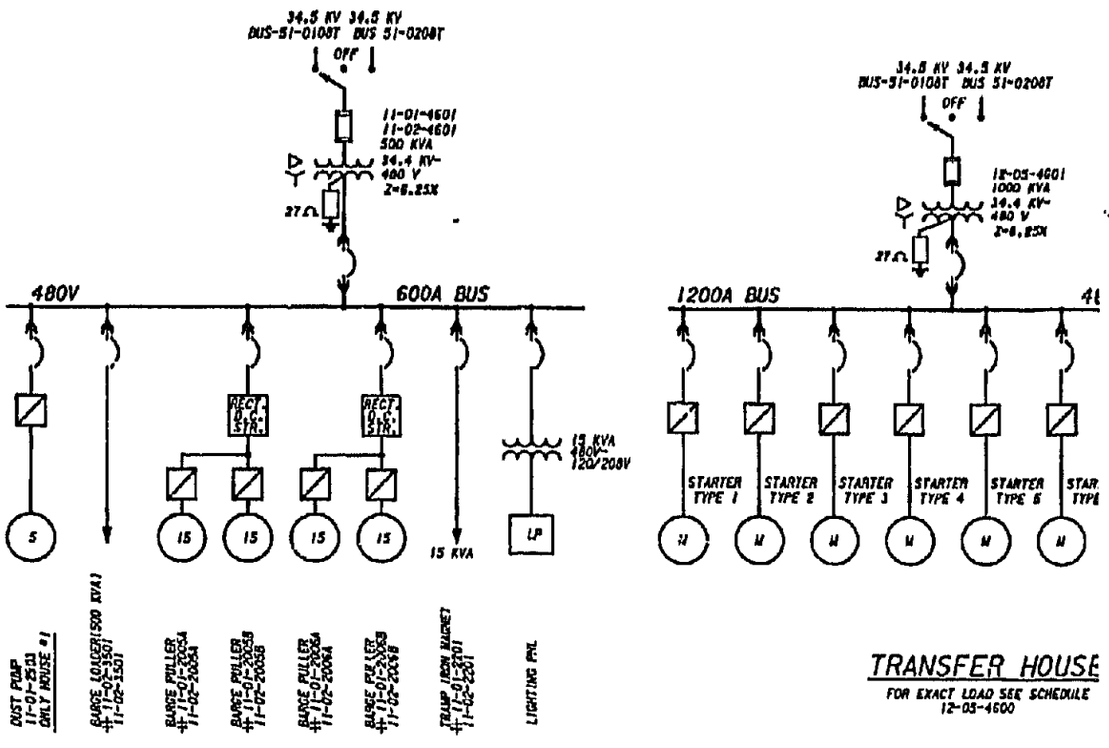
RMP

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

G. Single-Line Diagrams

Single-Line Diagrams for Coal Receiving and Unloading Unit 11 are as follows:

Drawing No.	Title
D-51-EE-2NP Sheet 1	Single-Line Diagram - Units 11, 12, and 13
D-51-EE-2NP Sheet 2	Single-Line Diagram - Units 11, 12, and 13
D-51-EE-2NP Sheet 3	Single-Line Diagram - Unit 14



TRANSFER HOUSE

FOR EXACT LOAD SEE SCHEDULE 12-05-4600

TRANSFER HOUSE #1
ALSO TYPICAL FOR TRANSFER HOUSE #2

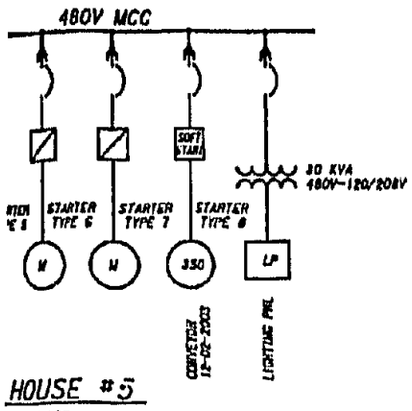
‡ TAG NO. FOR TRANSF. HOUSE #2

TRANSFER HOUSE #5 SCHEDULE 12-05-4600

TAG NO.	SERVICE	STR FOR TYPE	MOTOR HP	STR SIZE
12-02-0801	SAMPLE CUTTER	1	3/4	1
12-02-2006	CONVEYOR	1	1	1
12-02-0802	SAMPLE CUTTER	1	1/2	1
12-02-2007	CONVEYOR	1	1	1
12-02-2101	CRUSHER	1	10	1
12-02-0803	SAMPLE CUTTER	1	1/2	1
12-01-2001	CONVEYOR	8	350	2
12-01-0901	SAMPLE CUTTER	1	3/4	1
12-01-2006	CONVEYOR	1	1	1
12-01-2101	CRUSHER	1	10	1
12-01-2008	CONVEYOR	1	1	1
12-01-0902	SAMPLE CUTTER	1	3/4	1
12-01-2009	BUCKET ELEVATOR	1	5	1
12-01-2913	DUST COLLECTOR	1	5	2
12-01-2914	FAN	2	20	2

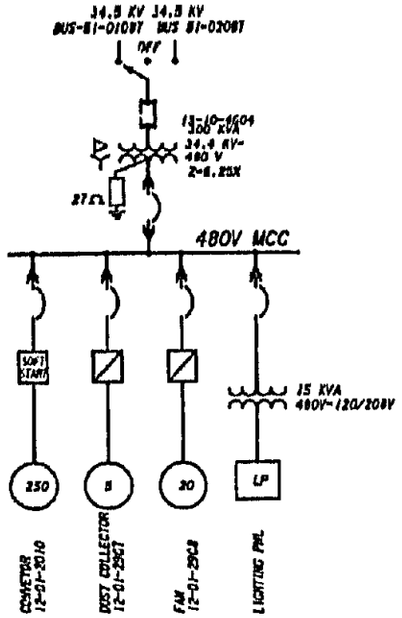
REFERENCES DRAWING NO.	DESCRIPTION	REFERENCES DRAWING NO.	DESCRIPTION	REVISIONS NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	
C	5-27-92	KT	T.I.	RTB			FOR DESIG
B	4-28-92	KT	T.I.	RTB			ISSUED FO
A	4-2-92	KT	T.I.	RTB			ISSUED FO

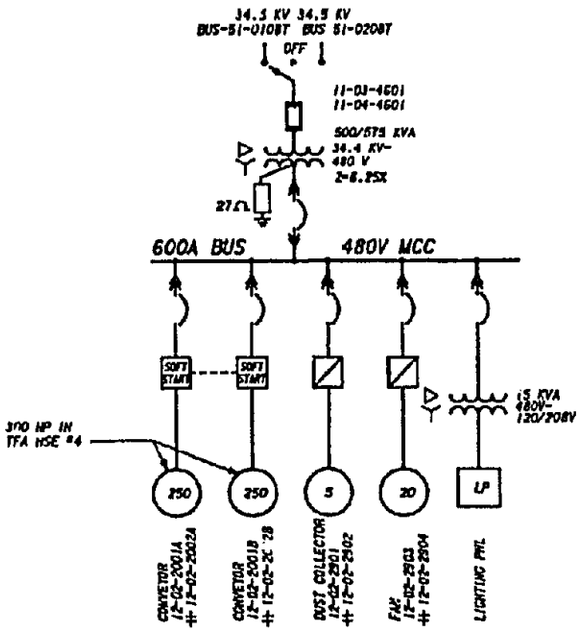


HOUSE #5

E SCHEDULE



TRANSFER HOUSE #6



TRANSFER HOUSE #3
ALSO TYPICAL FOR TRANSFER HOUSE #4

* TAG NO. FOR TRANSF. HOUSE #4

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

FOR DESIGN REPORT	DRAWN	HT
ISSUED FOR CLIENT APPROVAL	CHECKED	
ISSUED FOR CLIENT SIG. REVIEW	APPD PROJ MGR	
DESCRIPTION	APPD CLIENT	

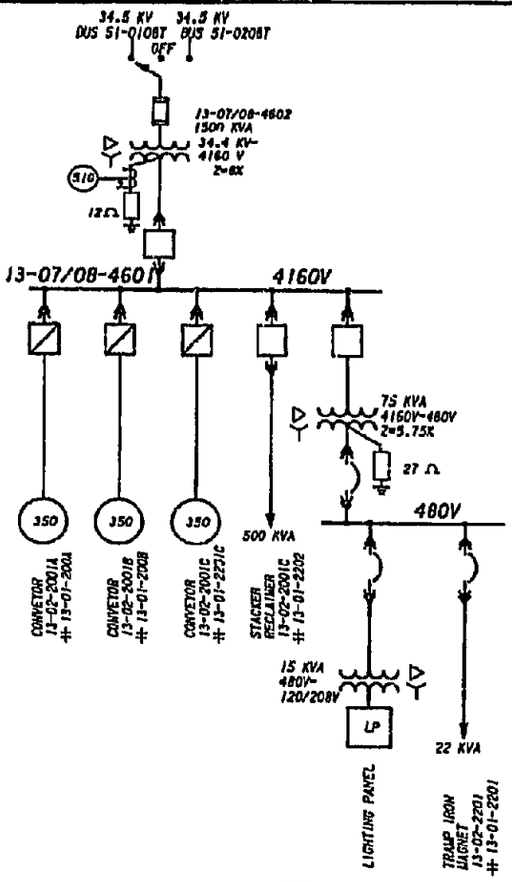
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

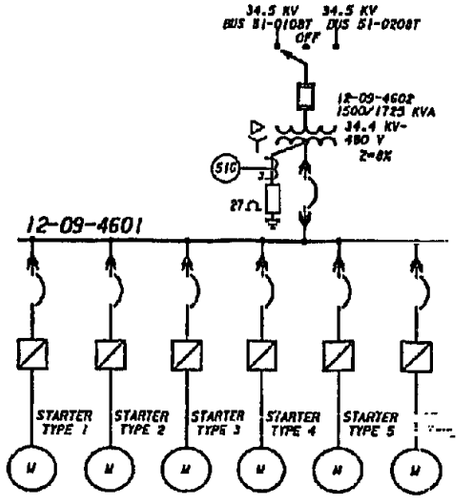
TITLE: SINGLE LINE DIAGRAM
RECEV. AND UNLOADING UNIT-11
CONV. AND STORAGE UNIT-12
STACKING AND RECLA. UNIT-13

SCALE: NONE | CONTRACT NUMBER: 4600 | JOB NUMBER: 6182

DOCUMENT NUMBER: D-51-EE-2NP SHT. 1 OF 3

REVISION: C





TRANSFER HOUSE
FOR EXACT LOAD SEE

TRANSFER HOUSE #7
ALSO TYPICAL FOR TRANSFER HOUSE #8

TAG NO. FOR TRANSF. HOUSE #8 13-07/08-4601

TRANSFER HOUSE #9 SCHD.

TAG NO.	SERVICE	STR FOR TYPE	MOTOR HP	STR SIZE	M. QTY
12-01-2011	CONVEYOR	6	350	6	1
12-02-2011	CONVEYOR	6	350	6	1
12-01-2911	DUST COLLECTOR	1	5	1	1
12-01-2912	FAN	2	20	2	1
12-01-1001	HOIST (SP)	1	1	1	1
12-01-5001	ELEVATOR	1	20	1	1
12-01-2915	DUST COLLECTOR	1	5	1	10
12-01-2916	FAN	2	20	2	10
12-01-2013	BELT TRIPPER	1	5	1	1
12-02-2013	BELT TRIPPER	1	5	1	1
12-01-0501	DISCH FEEDER	1	5	1	10
12-01-0502	DISCH FEEDER	1	5	1	10
12-01-2905	DUST COLLECTOR	1	5	1	10
12-01-2906	FAN	2	20	2	10
12-01-1501	SUMP PUMP	1	5	1	10
12-01-3801	WEIGHT SCALE	1	1	1	1
12-02-3801	WEIGHT SCALE	1	1	1	1
12-02-3802	WEIGHT SCALE	1	1	1	1
12-01-3803	WEIGHT SCALE	1	1	1	1
12-02-3803	WEIGHT SCALE	1	1	1	1

COAL SILO HOUSE SCHD.

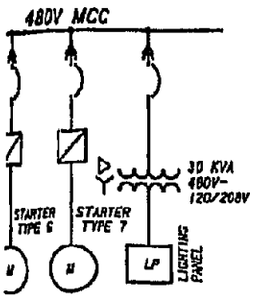
TAG NO.	SERVICE	STR FOR TYPE	MOTOR HP	STR SIZE	M. QTY
12-01-2012	CONVEYOR	8	150	5	1
12-02-2012	CONVEYOR	8	150	5	1
12-01-1002	HOIST	1	1	1	1
12-01-2014	BELT TRIPPER	1	5	1	1
12-02-2014	BELT TRIPPER	1	5	1	1
12-01-2919	DUST COLLECTOR	1	5	1	3
12-01-2920	DUST COLLECTOR	2	20	2	3
12-01-2922	DUST COLLECTOR FAN	2	20	2	3
12-01-2923	DUST COLLECTOR FAN	2	20	2	3
12-01-2924	DUST COLLECTOR FAN	2	20	2	3
12-01-2917	DUST COLLECTOR	1	5	1	3
12-01-2918	DUST COLLECTOR	1	5	1	8
12-01-2021	CONVEYOR	4	40	3	1
12-01-2022	SCREW FEEDER	1	1	1	3
12-01-2023	SCREW FEEDER	1	1	1	3
12-01-2024	SCREW FEEDER	1	1	1	3
12-01-2025	SCREW FEEDER	1	1	1	3
12-01-2921	DUST COLL. FAN	2	20	2	3

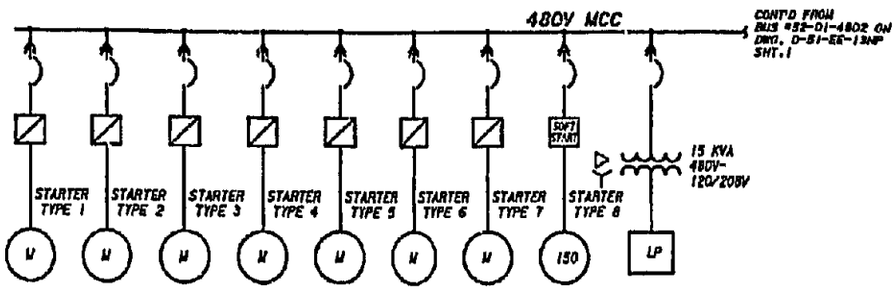
RAIL CAR UNLOADING

TAG NO.	SERVICE
11-01-1001	HOIST
11-01-2901	DUST COLLECTOR
11-02-2901	DUST COLLECTOR
11-01-2902	FAN
11-02-2902	FAN
11-01-2802A	CAR SHAKER
11-01-2802B	CAR SHAKER
11-01-2803A	CAR SHAKER
11-01-2803B	CAR SHAKER
11-01-1501	SUMP PUMP

REFERENCES		REFERENCES		REVISIONS									
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION		

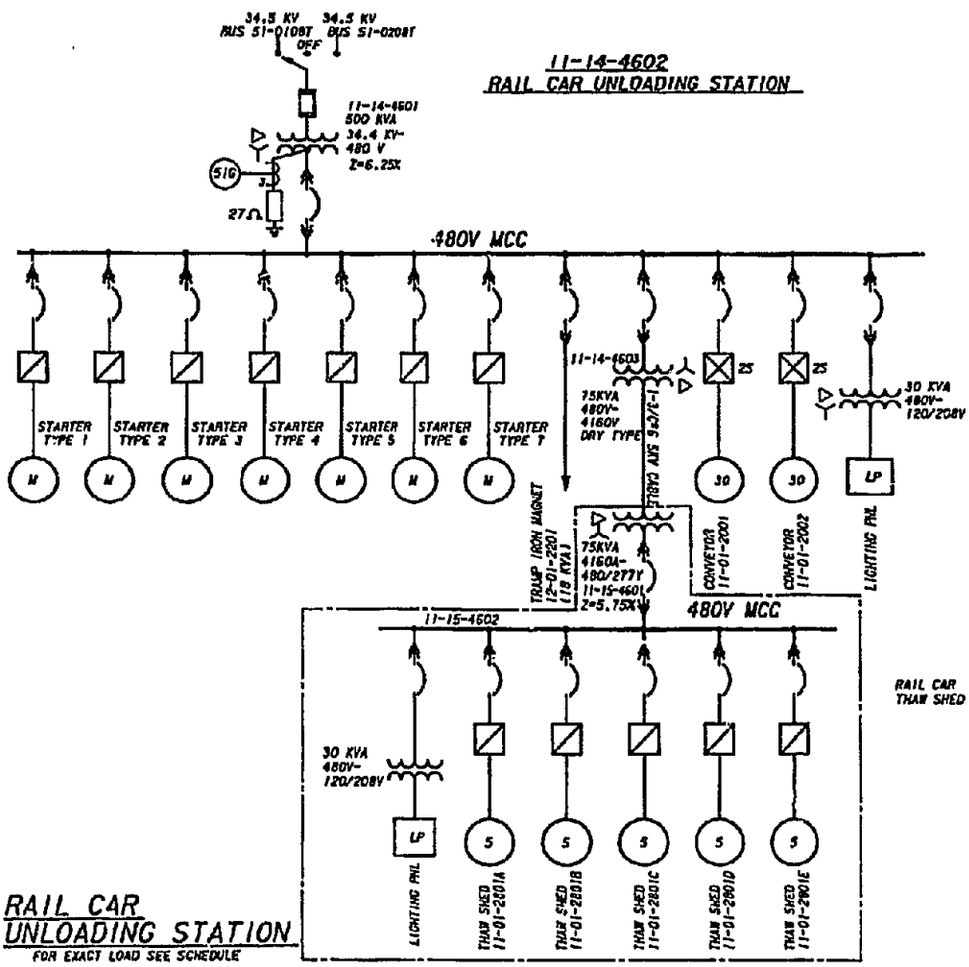
REVISIONS									
C	6-3-82	JT	T.I.	RTB	SJE				
B	4-2-82	JT	T.I.	RTB					
A	4-2-82	JT	T.I.	RTB					
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT			





COAL SILO HOUSE

FOR EXACT LOAD SEE SCHEDULE



11-14-4602 RAIL CAR UNLOADING STATION

RAIL CAR UNLOADING STATION

FOR EXACT LOAD SEE SCHEDULE

'NG STATION SCHD.

STR FOR TYPE	MOTOR HP	STR SIZE	W. QTY
1	1	1	
1	5	1	
1	5	1	
5	150	5	
5	150	5	
1	8	1	
2	20	2	
1	8	1	
2	20	2	
1	5	1	

...ION REPORT	FOR		
...NT APPROVAL	DRAWN	HT	
...T 50% REVIEW	CHECKED		
DESCRIPTION	APVD SECT NO		
	APVD PROJ MGR	S.H.	
	APVD CLIENT		

AMP

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

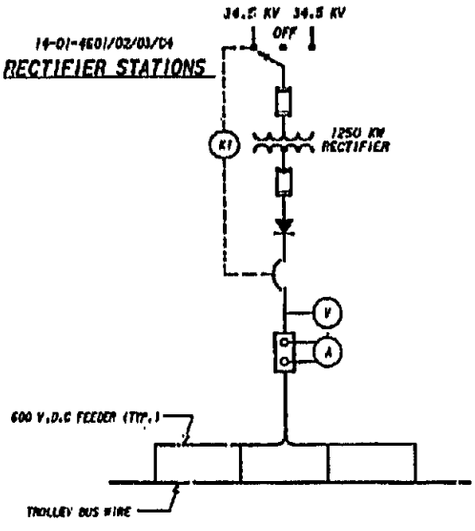
50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

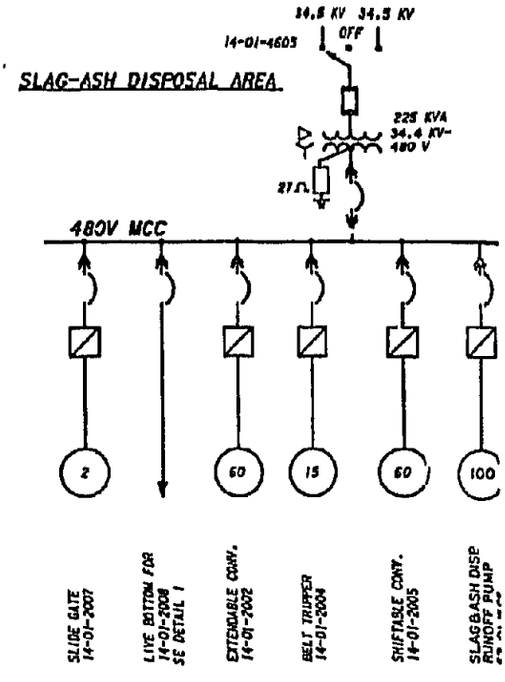
TITLE: SINGLE LINE DIAGRAM RECEV. AND UNLOADING UNIT-11 CONV. AND STORAGE UNIT-12 STACKING AND RECLA. UNIT 13

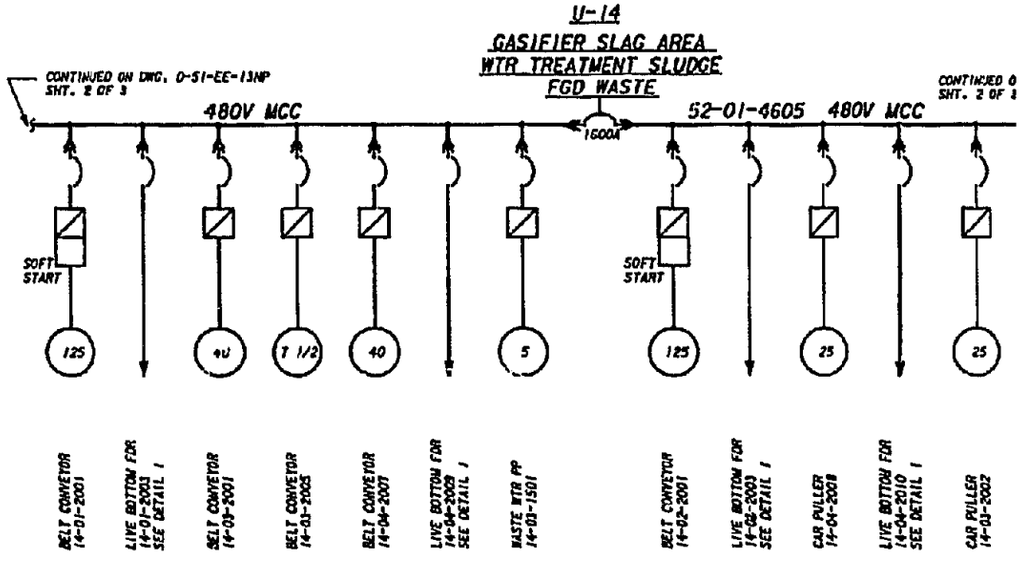
SCALE	ASSEMBLY NUMBER	DWG NUMBER	REVISION
NONE	4600	6182	

DOCUMENT NUMBER: D-51-EE-2NP SHT. 2 OF 3

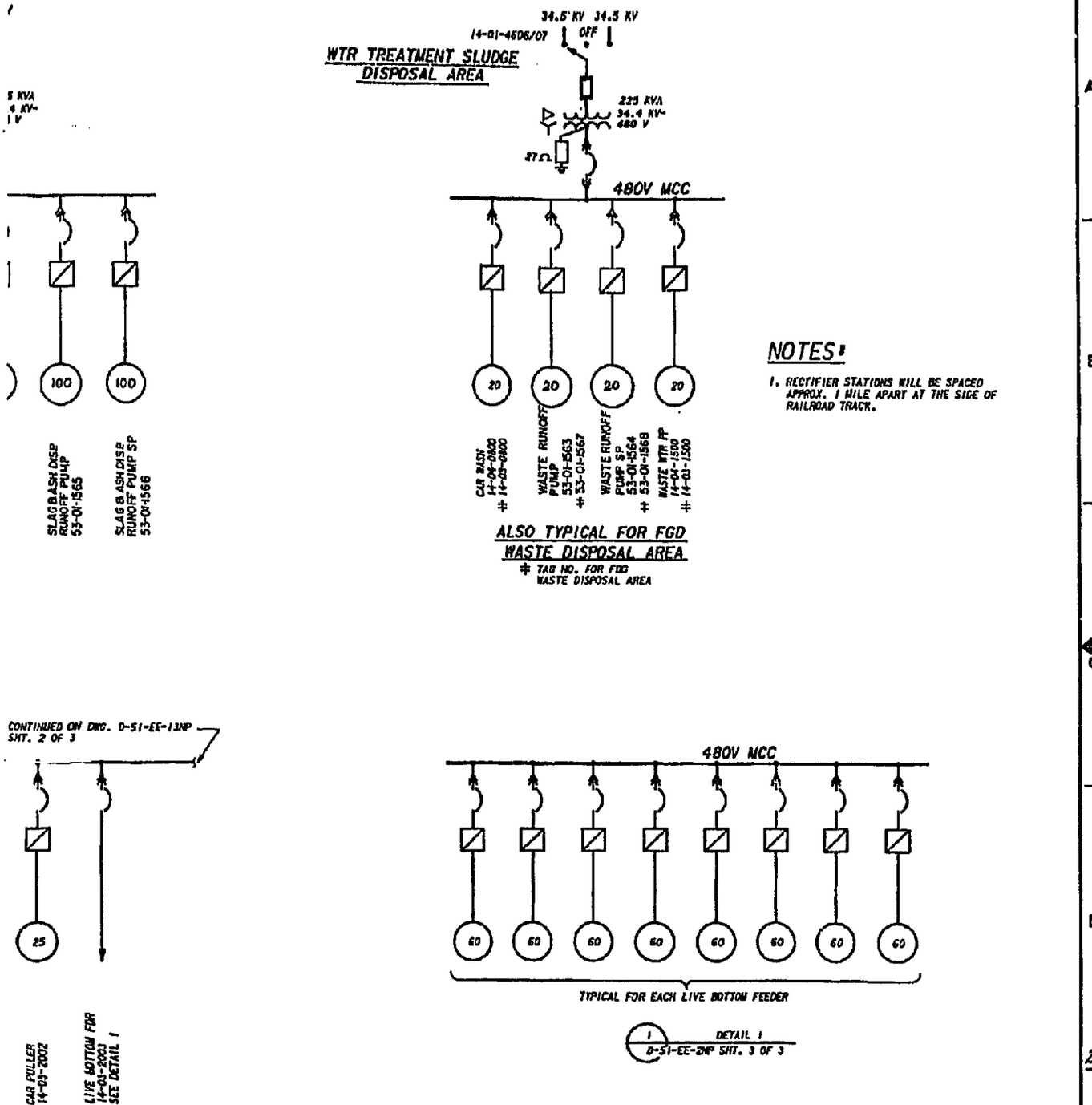


SLAG DISPOSAL RAILWAY
TROLLEY LOCOMOTIVE RECTIFIERS
TYPICAL FOR FOUR PLACES





REFERENCES		REFERENCES		REVISIONS								REVISIONS								
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	EIC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	
												B	5-1-82	MT	T.I.	RTB			ISSUED FO	
												A	5-14-82	MT	T.I.	RTB			ISSUED FOR	



NOTES:

1. RECTIFIER STATIONS WILL BE SPACED APPROX. 1 MILE APART AT THE SIDE OF RAILROAD TRACK.

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

DRAWN	NT	5-14-80
CHECKED	T.L.	5-14-80
APVD ENGT MB		5-14-80
APVD FGD MGR	S.K.R.	5-14-80
APVD CLIENT		

DESIGN REPORT
NT SIX REVIEW

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

TITLE: SINGLE LINE DIAGRAM SLAG AND FGD DISPOSAL UNIT-14

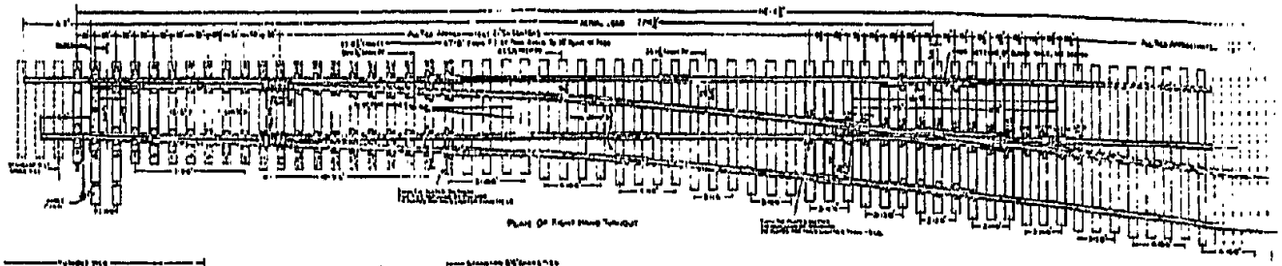
SCALE: NONE | 4600 | 6182

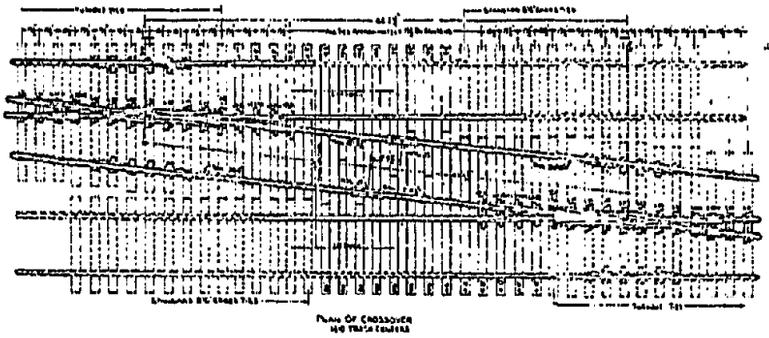
D-51-EE-2NP SHT. 3 OF 3

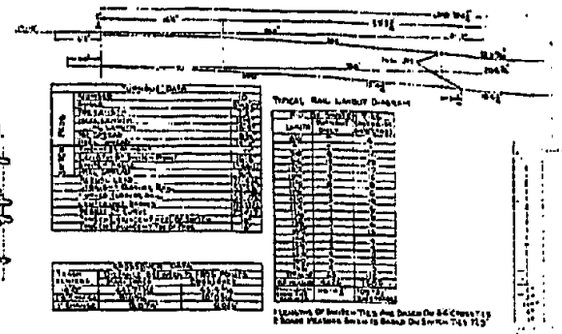
H. Civil Engineering Drawing

Civil Engineering Drawing for Coal Receiving and Unloading Unit 11 is as follows:

Drawing No.	Title
D-11-CE-1NP	Railroad - Sections and Details

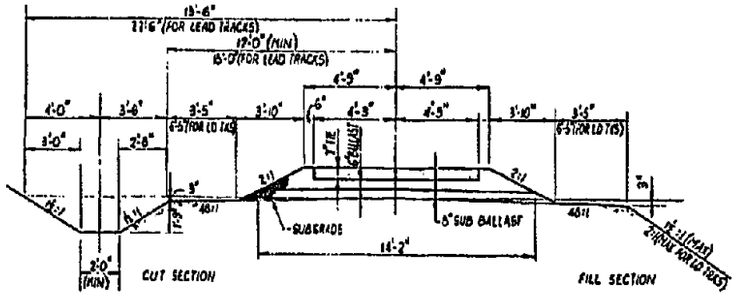






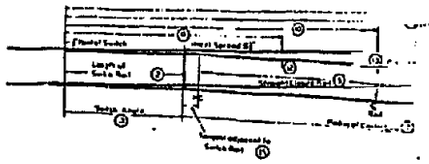
A.R.E.A. NO 10 TURNOUT & CROSSOVER

NTS



BALLAST SECTION

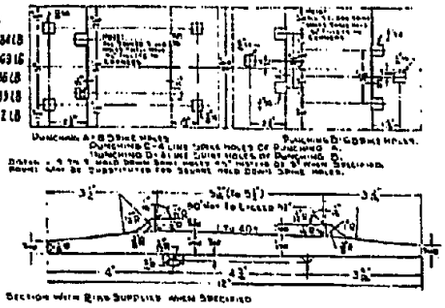
$\frac{1}{4}" = 1'$



	Properties of Section			Closure Dimensions		Lead Curve					
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Frog Number	Length of Switch Rail	Switch Angle	Actual Lead	Straight Closure Rail	Curved Closure Rail	Radius of Curve	Degree Curve				
	Ft. In.	Degrees Min.	Ft. In.	In. In.	Ft. In.	Feet	Degrees Min.	Ft. In.	Ft.		
5	11-0	11°-24'	23-0	28-0	34-0	171.60	33°-40'	18-0	2		
6	11-0	9°-30'	27-0	32-0	33-0	229.0	25°-11'-30"	19-0	2		
7	11-6	8°-10'	27-1	40-00	41-10	286.50	20°-0'-10"	19-0	2		
8	12-6	7°-10'	32-0	40-0	46-10	401.70	14°-17'	21-0	3		
9	13-6	6°-20'	37-3	45-0	53-7	573.00	10°-0'-30"	21-0	3		
10	15-0	5°-40'	42-0	50-0	58-0	716.20	8°-0'-10"	21-0	4		
11	22-0	5°-10'	51-10	54-10	63-0	842.22	6°-50'	31-0	5		
12	22-0	4°-47'	56-0	64-10	67-0	1146.83	5°-10'	30-0	5		
14	22-0	4°-15'	67-0	76-11	76-0	1591.20	3°-30'	41-0	7		
16	30-0	3°-50'	76-11	89-11	87-0	2292.11	2°-30'	51-0	7		
18	30-0	3°-30'	86-11	101-11	97-0	3183.25	1°-50'	53-0	9		
20	30-0	3°-10'	96-11	113-11	107-0	4583.33	1°-25'	53-0	9		

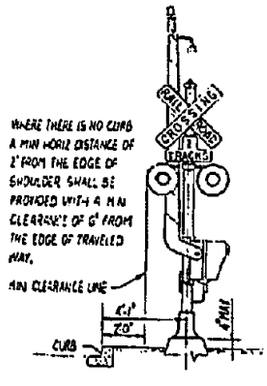
A.R.E.A. TURNOUT

"ESTIMATED WEIGHTS
PER FOOT ——— 25.84 LB
PER 7½" ——— 16.63 LB
PUNCHED 8 SPIKE HOLES — 15.36 LB
PUNCHED 6 SPIKE HOLES — 15.59 LB
PUNCHED 4 SPIKE HOLES — 16.12 LB
ADD .34 LB TO FT WT 6
.22 LB TO FIN WTS
WHEN SUPPLIED WITH RIBS



A.R.E.A. TIE PLATE

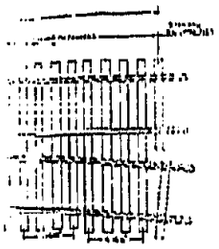
NTS

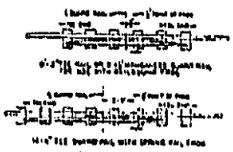


RAILROAD CROSSING SIGNAL

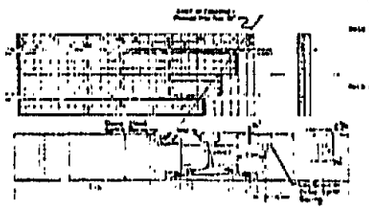
NTS

REFERENCES		REFERENCES		REVISIONS								REVISIONS							
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	
												C	5-20-82	MK					15
												B	5-5-82	MK					10
												A	4-9-82	MK					CLIENT



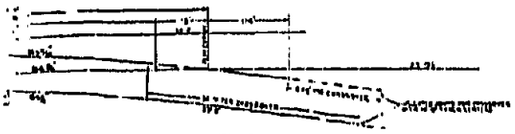


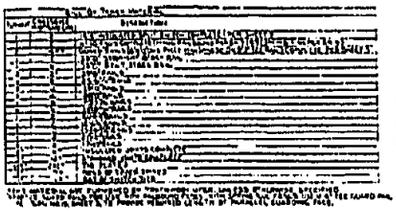
GUARD RAIL SETTINGS



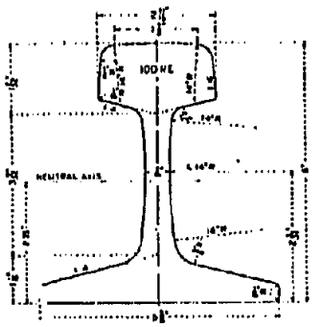
WOOD PLANK ROAD CROSSING

NTS





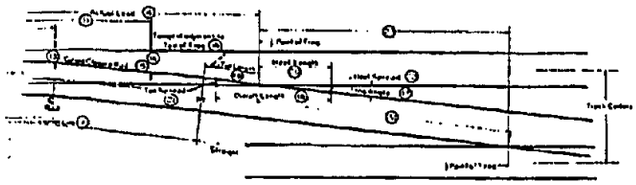
NOTES



	Area sq in	Percent	
Head	3.00	33.7	Moment of inertia
Web	2.35	27.0	Section modulus, head
Base	3.55	39.3	Section modulus, base
			Radius of gyration
			Radius of gyration, head to axis
Total	9.02	100.0	Rail height to head
			Calculated weight, lb per yd

100 RE RAIL SECTION

NTS



NOTES

NOTES:

1. THE MINIMUM SIZE TURNOUT FROM ALL MAIN TRACKS, LOOP & FAST LOAD TRACKS SHALL BE NO 10 PER C&N RAILROAD SPECIFICATIONS FOR COAL LOADING TRACKS.
2. THE MINIMUM SIZE FOR ALL SECONDARY TURNOUTS FOR CONVENTIONAL LOAD TRACKS SHALL BE NO 8 PER C&N RAILROAD SPECIFICATIONS FOR COAL LOADING TRACKS.

TURNOUT AND CROSSOVER DATA

Frog Line Offsets						Properties of Frogs										Data for Crossovers			
																13'-0" Track Centers		For change of 13'-0" in Track Centers	
																Straight Track	Crossover Tracks	Straight Track	Crossover Tracks

& CROSSOVER DATA FOR STRAIGHT SPLIT SWITCHES

NTS

1.2.2 COAL CONVEYING AND STORAGE - UNIT 12

A. Basis of Design

The coal conveying and storage systems employ commercially known technology normally used in utility and mining industries of similar capacities. Belt conveyor malfunctions and/or failures are known to be relatively low when compared with their utilization. Barring accidents, an effective preventive maintenance program and availability of vital spares can prevent major plant shutdowns caused by conveyor failures.

All conveyors are designed to convey the coal at the rates shown on the Process Flow Control Diagrams. Design requirements and standards are in accordance with industry standard engineering practices and as described in the Material Handling Design Criteria, CRT-01-MH-01, and Coal Area Design Criteria, CRT-10-PR-1, Volume I, Section 9.

Coal storage capacities are sized to provide sufficient quantities of surge at each intermediate location to overcome the interruptions in coal supplies or demand. The active surge capacities are sized based on the reliability of handling equipment and the probability of breakdowns. Since the plant operation cannot tolerate long unscheduled interruptions caused by equipment breakdown, the system has built-in redundancy provided by standby equipment to serve in emergencies where necessary.

B. System Selection Rationale

The coal conveying and storage system is designed for the plant annual requirement and standard engineering practices in related industries of comparable size. The conveyors connecting the barge and train unloading stations to the main yard coal storage area are in single trains. The breakdown of one unloading station does not affect the other unloading station; this allows the continuous use of one of the two unloading facilities. Conveyors connecting the main coal storage yard to the plant feed silos are provided in two parallel trains. This is a common practice in

continuous process operation facilities where intermediate surge storage at the plant is limited. The total storage capacity of the day storage bins is sufficient for 24 hours of operation. This storage capacity is replenished when the supply is less than 8 hours. In normal operation, both trains of the silo feed conveyors can be working at full capacity 12 hours a day. In case one train fails, the second train furnishes the total plant requirement operating for 24 hours.

Coal is stored in open-yard live stockpiles for a nominal 20-day plant requirement to ensure feed to the plant in case of transport delays and temporary failures in the unloading equipment. Dead storage of a 40-day supply of coal is provided in the stockpiles to safeguard against a prolonged interruption in coal receipts. An additional 30 days of temporary storage can be provided without additional capital cost to the storage system by increasing the height of dead stockpiles.

Though the main yard coal storage is a safeguard for a prolonged interruption of coal supply or plant breakdown, short-term storage is essential to provide a more homogeneous mixture of coal feed and better feed rate control to individual grinding mills. Furthermore, the short-term coal storage is protected from weather, providing more uniformity in quality of coal feed.

Two basic approaches to the transportation and storage system were considered:

(1) Provision of a single belt conveyor line from main storage and sufficient short-term storage for a maximum of 3 days of operation. The normal operating range would be from one-third to two-thirds full.

(2) Provision of two transport conveyor lines and lesser short-term storage capacity for a maximum of one day of operation. The normal operating level in this approach also would vary between one-third and two-thirds full.

In conjunction with the above two design approaches, two types of storage facilities were considered:

(1) A cluster of tall silos.

(2) An A-frame building built over a slot discharge storage structure.

A detailed evaluation of the two types of storage under the two concepts determined that the system with two conveyor feed lines and 1-day plant capacity storage is the most suitable one for the project. For further details, see Volume V, Report on the Rationale of Short-Term Coal Storage System.

C. System Description

The coal conveying and storage system consists of belt conveyors connecting barge and railroad unloading stations with the yard coal storage system and the yard coal storage system to the day storage silos at the process area and bunkers in the utilities area.

The coal unloaded at the barge unloading stations is collected by a 60-inch-wide belt conveyor and conveyed to Transfer House No. 3. Two more 60-inch-wide belt conveyors convey the coal from Transfer House No. 3 through Transfer House No. 4 to the sampling station at Transfer House No. 5.

The coal unloaded at the train unloading station is conveyed to Transfer House No. 5 on a 54-inch-wide belt conveyor. All coal received at the barge and/or at the railroad unloading station is weighed by belt scales on their respective conveyor belts. There are two automatic sampling systems at Transfer House No. 5 that take samples of as-received coal separately for each unloading system. From the sample station, the coal is conveyed in two parallel trains to the coal storage yard and stacked by automatic stackers. The two yard belt conveyors receive coal from either of the two reclaimers and transfer it in two parallel trains to the plant day

storage silos or the boiler feed bunkers. The two 48-inch-wide belts feeding the day storage silos and the boiler feed bunkers have traveling belt trippers that supply the silos/bunkers according to the plant feed demand automatically set by the coal levels in the silos. The coal being conveyed to the plant and/or boilers is weighed on belt scales provided on the 48-inch-wide plant feed conveyors.

All coal conveying is remotely controlled from a central coal area control room. The plant feed is distributed automatically into the feed silos according to the process train demand. Instrumentation philosophy and details of the centralized control system are described in Volume V. Conveyor descriptions and the coal flows are shown in the process flow control diagram included in this subsection.

D. Risk Assessment

The coal conveying and storage system uses the commercially proven and economically preferred system. No high risk areas associated with this system or equipment have been identified. The equipment selection and the conveyor design have a minimum service factor of 1.25 in conformity with the latest applicable editions of federal, state, and local codes.

In assessing operational risks involved, two significant factors are considered:

(1) Breakdown of coal supplies to the plantsite.

(2) Unscheduled shutdown of the process plant.

A coal stockpile is maintained at the project site to act as a buffer for the plant in case suppliers fail to deliver. Similarly, in case the plant shuts down unexpectedly, there is sufficient capacity available in the coal yard to receive the contracted amount of daily supply of all coal in transit. The reliability of the unloading stations is improved by providing two unloaders at the barge slip and independent unloading conveyors all the way to the sampling station.

The risk of long unscheduled breakdowns of single train conveyors is reduced further by providing a complete spare drive train assembly (drive pully, shaft, bearings, couplings, reducer, and motor) in warehouse stores for quick replacement. All such conveyor drives are standardized to reduce the number of spare assemblies in the warehouse.

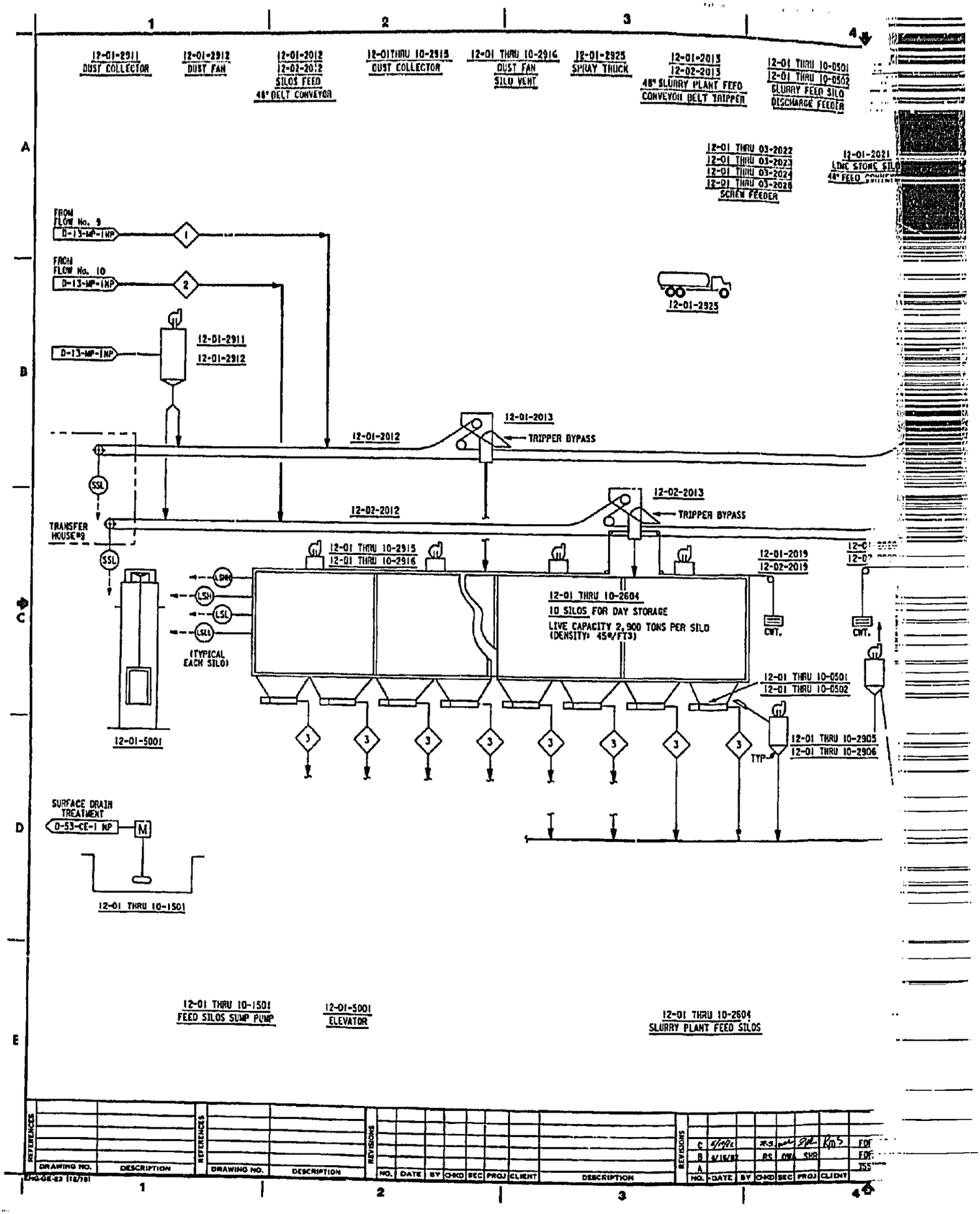
High raliability is maintained in the coal yard by providing two trains of yard belt conveyors and two stacker/reclaimer machines. Each machine and its conveyor fulfills the total operational requirement of the plant working 24 hours a day should the other be out of service. In a normal operation, each machine works 12 hours, sharing the load and reducing the operating hours of the equipment. The reclaiming conveyor systems also are provided with two parallel trains complete with belt trippers and silos dischargers. Thus, high reliability and flexibility in operations are maintained in the conveyor systems through redundancy to feed the plant while one train is inoperative.

Human errors are minimized by central control room monitoring and safety release controls operated from two independent positions. Fire safety is provided by a temperature sensing and fire alarm system along the length of the conveyors. Coal silos and bunkers have methane detection devices that automatically release a nitrogen purging system and warn the central control room of an incident. All enclosed conveyor transfers have dust collectors to reduce the chance of accumulating combustible coal dust in the chutes. The conveyor galleries have open grating to maintain air circulation and reduce the chimney effect in the elevated section of the conveyors. For other detailed safety features, refer to CRT-01-MH-1, CRT-10-PR-1, CRT-01-EN-2, and CRT-01-FP-1.

E. Process Flow and Control Diagram (Including Material Balance)

Process Flow and Control Diagram for Coal Conveying and Storage Unit 12 is as follows:

Drawing No.	Title
D-12-MP-1NP	PFCD Coal Area Unit 12 - One-Day Storage



REFERENCES		REFERENCES		REVISIONS								REVISIONS								
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	
												C	5/19/92		RS					FOR
												B	8/16/82		RS	OWA	SHR			FOR
												A								ISS

ENG-06-83 (10/78)

12-01-2905 THRU
12-10-2905
SILO DISCHARGE
DUST COLLECTOR

12-01-2906 THRU
12-10-2906
SILO DUST FAN

12-01-2014
12-02-2014
48" BOILER HOUSE
FEED CONVEYOR
BELT TRIPPER

12-01-2927
DUST FAN

12-01-2926
DUST COLLECTOR

12-01-2021
LIME STONE SILO
48" FEED CONVEYOR

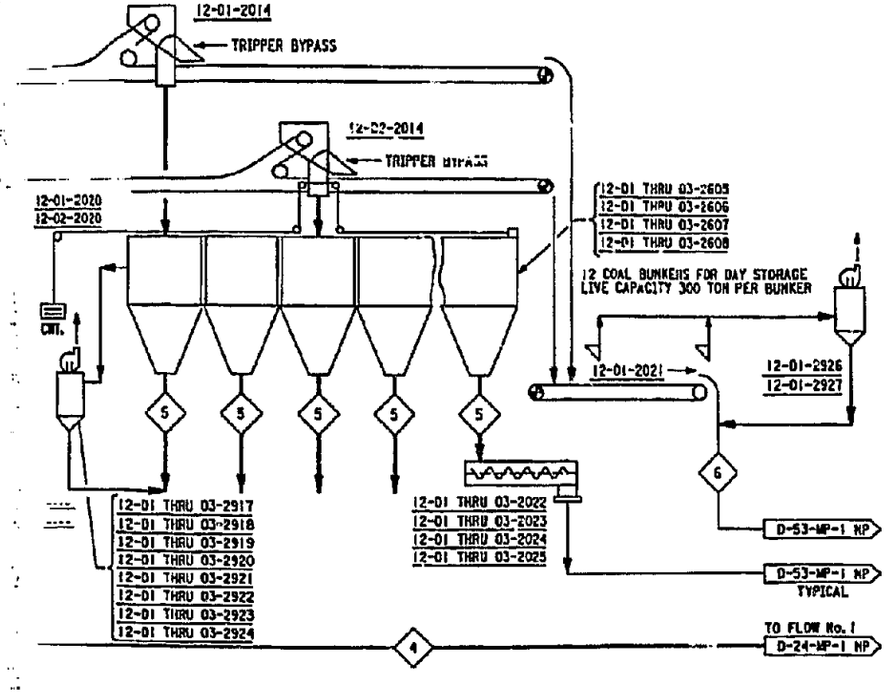
12-01 THRU 03 2921
12-01 THRU 03 2922
12-01 THRU 03 2923
12-01 THRU 03 2924
DUST COLLECTORS FANS

12-01 THRU 03-2917
12-01 THRU 03-2918
12-01 THRU 03-2919
12-01 THRU 03-2920
DUST COLLECTORS BUNKERS

12-01 THRU 03-2605
12-01 THRU 03-2606
12-01 THRU 03-2607
12-01 THRU 03-2608
COAL BUNKER

NOTES:

1. BARGES TO BE UNLOADED IN 12 HOURS. MAX. FEED RATE 30,000 TPD÷12 HOURS=2500 TPH.
2. ITEMS MARKED THUS ⊕ ARE DRIVE PULLEYS.
3. ITEMS MARKED THUS ⊕ ARE PULLEYS WHERE MOTION DETECTOR SWITCHES ARE TO BE LOCATED.
4. WORK THIS DRAWING WITH DRAWINGS D-10-MP-1NP, D-11-MP-1NP, D-11-MP-2NP, & D-13-MP-1NP.
5. ALL BELT CONVEYORS SHALL HAVE A 10 SECOND DELAY START TIED-IN TO A LOCALLY PLACED ALARM.
6. ALL BELT CONVEYORS SHALL HAVE EMERGENCY PULL CORD SWITCHES.
7. RAILROAD CARS TO BE UNLOADED IN 10 HRS. FEED RATE 18,000 TPD/10 H = 1,800 TPH.



12-01-2019
12-02-2019
SEAL BELT
SILO TRIPPER

12-01-2020
12-02-2020
SEAL BELT
BUNKER TRIPPER

D12MP1NP.DGA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

FOR DESIGN REPORT	FOR		
FOR CLIENT APPROVAL	DRAWN		
ISSUED AS D-12-FS-1	CHECKED	R.G.	4-21-81
DESCRIPTION	APVD SECT MGR		4-21-81
	APVD PROJ MGR		4-21-81
	APVD CLIENT		

PMP

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

TITLE: PROCESS FLOW & CONTROL DIAGRAM
COAL AREA - UNIT 12
ONE DAY STORAGE

SCALE: NONE | ACCOUNT NUMBER: 2000 | JOB NUMBER: 6182

DOCUMENT NUMBER: D-12-MP-1 NP

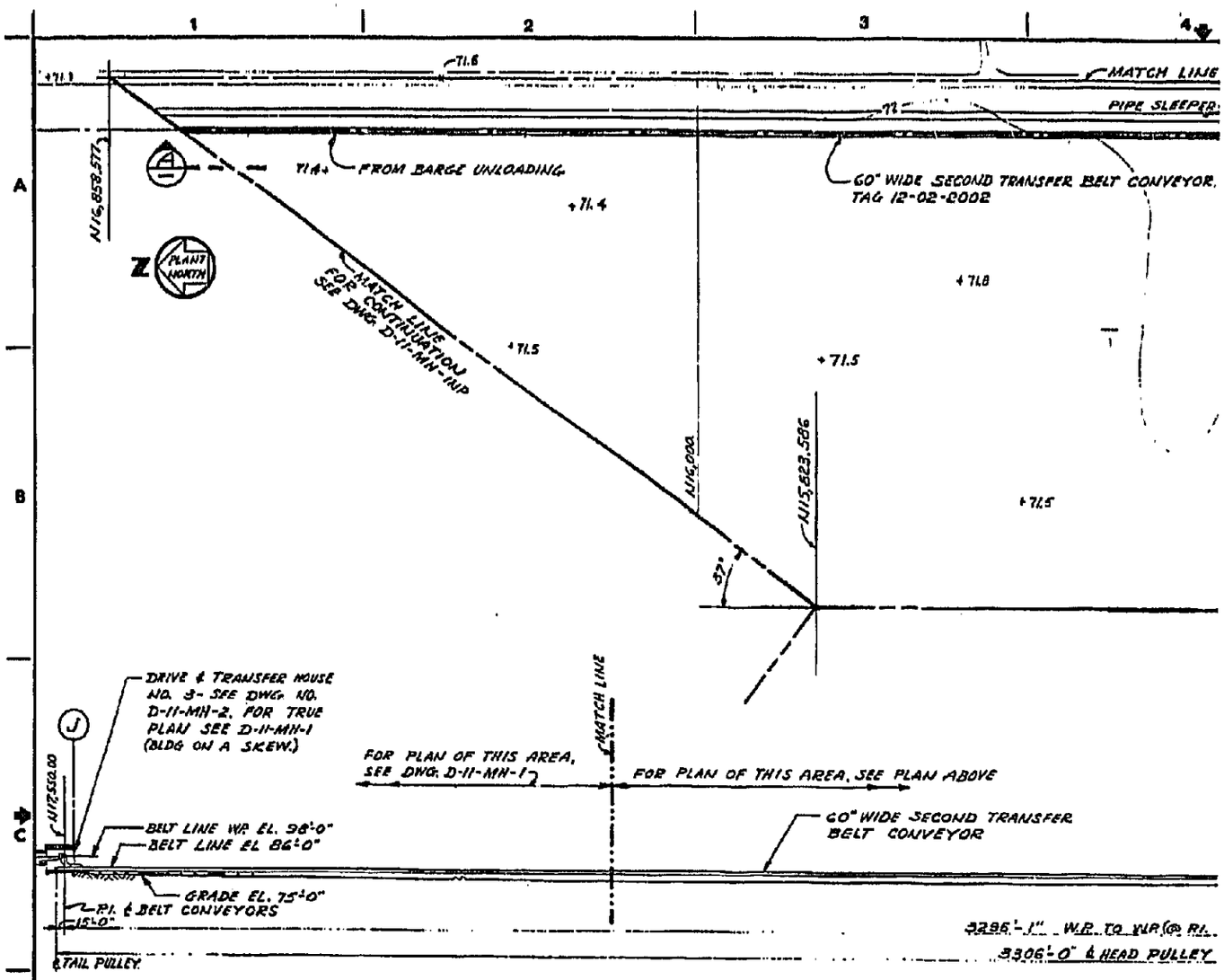
REVISIONS: C

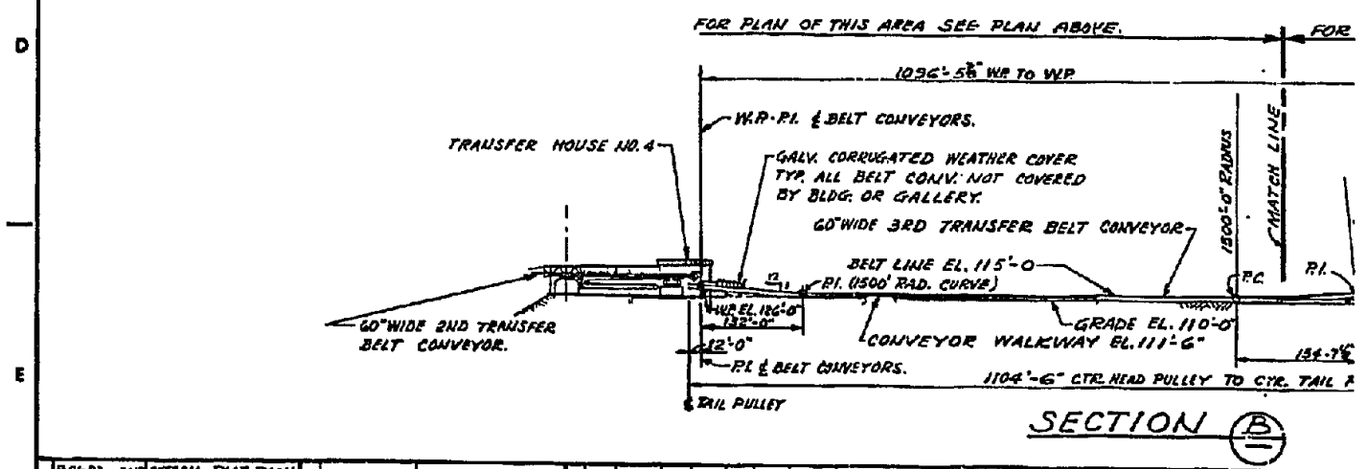
F. Plot Plan/General Arrangement Drawings

Plot Plan/General Arrangement Drawings for Coal Conveying and Storage Unit 12 are as follows:

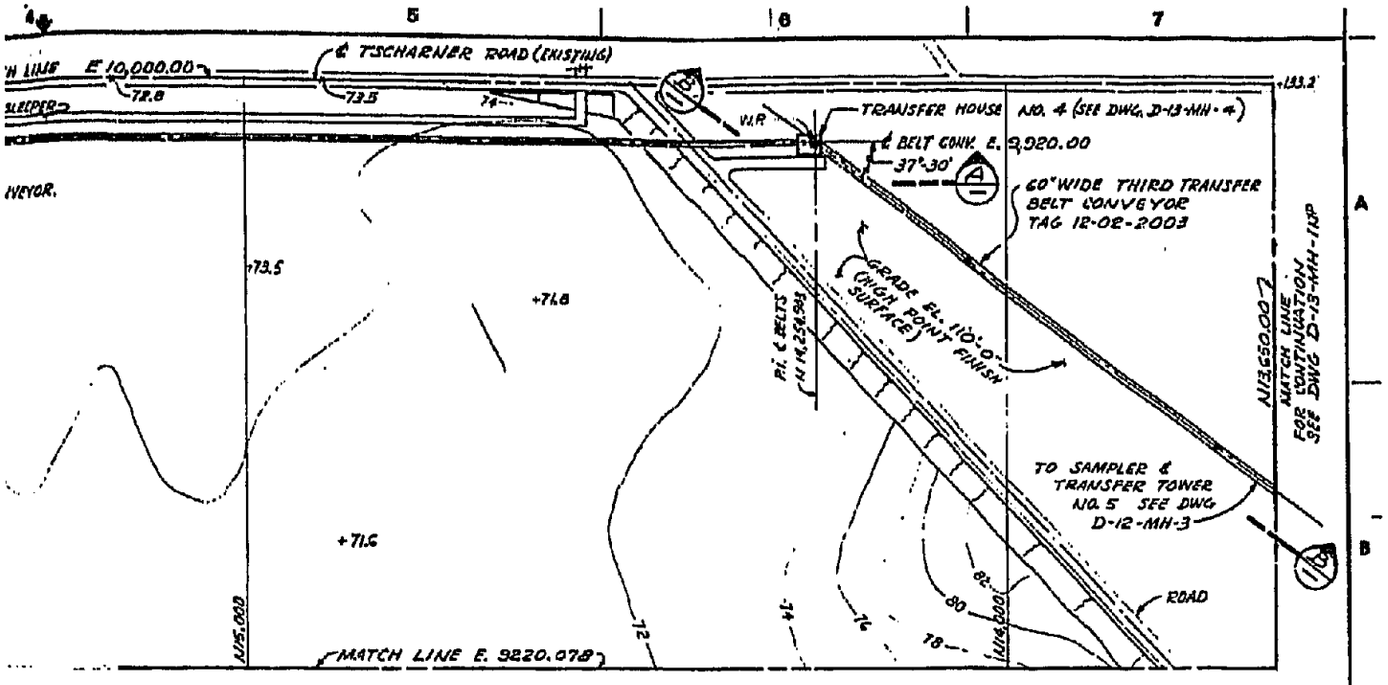
Drawing No.	Title
D-12-MH-1NP	General Arrangement - Conveying and Storage - Unit 12 Barge Unloading Conveyors - Plan and Sections
D-12-MH-3NP	General Arrangement - Conveying and Storage - Unit 12 Sampler and Transfer Tower No. 5 - Plans
D-12-MH-4NP	General Arrangement - Conveying and Storage - Unit 12 Sampler and Transfer Tower No. 5 - Sections

Also, see Drawings D-13-MH-3NP, -5NP, and -7NP in Volume II, 1.2.3(F).

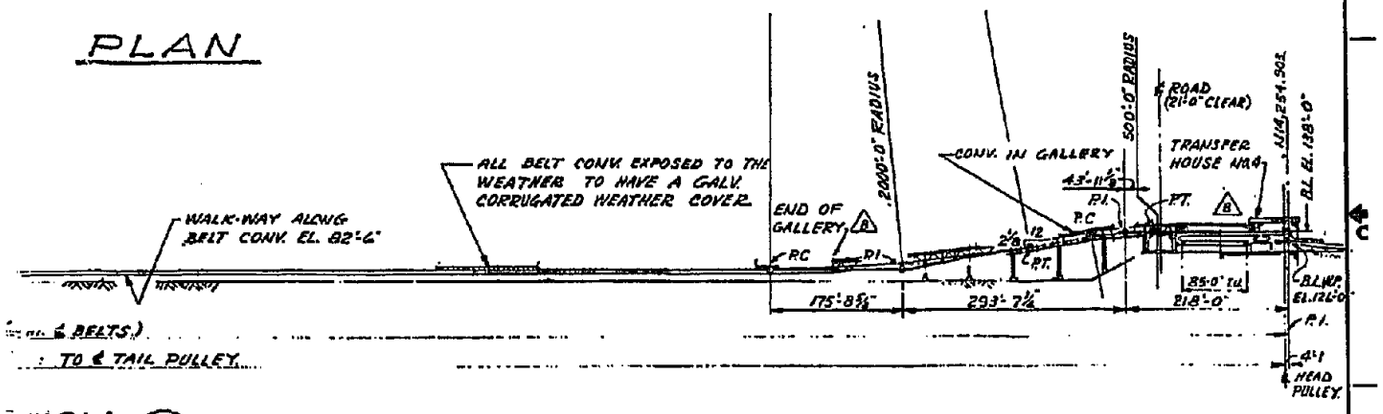




REFERENCES		REFERENCES		REVISIONS								REVISIONS					
D-01-P3-1NP	OVERALL PLOT PLAN																
D-11-MH-1NP	BARGE UNLOADING - PLAN																
D-12-MH-3NP	SAMPLE & TRANSF. TOWER #3																
D-13-MH-1NP	STACK & BOILERS PLAN																
DRAWING NO.	DESCRIPTION	DRAWING NO	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	

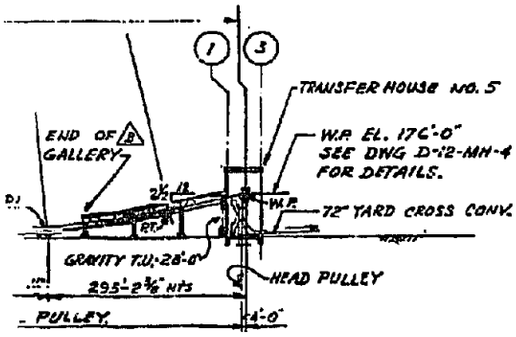


PLAN



TION A

FOR PLAN OF THIS AREA SEE DWG. D-13-MH-1



NOTE: DATUM EL. 100'-0"
ACTUAL EL. 400'-0"

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

GENERAL ARRANGEMENT
CONVEYING & STORAGE UNIT 12
BARGE UNLOADING CONVEYORS
PLAN & SECTIONS

1"=100'-0" | 2000 | 6182

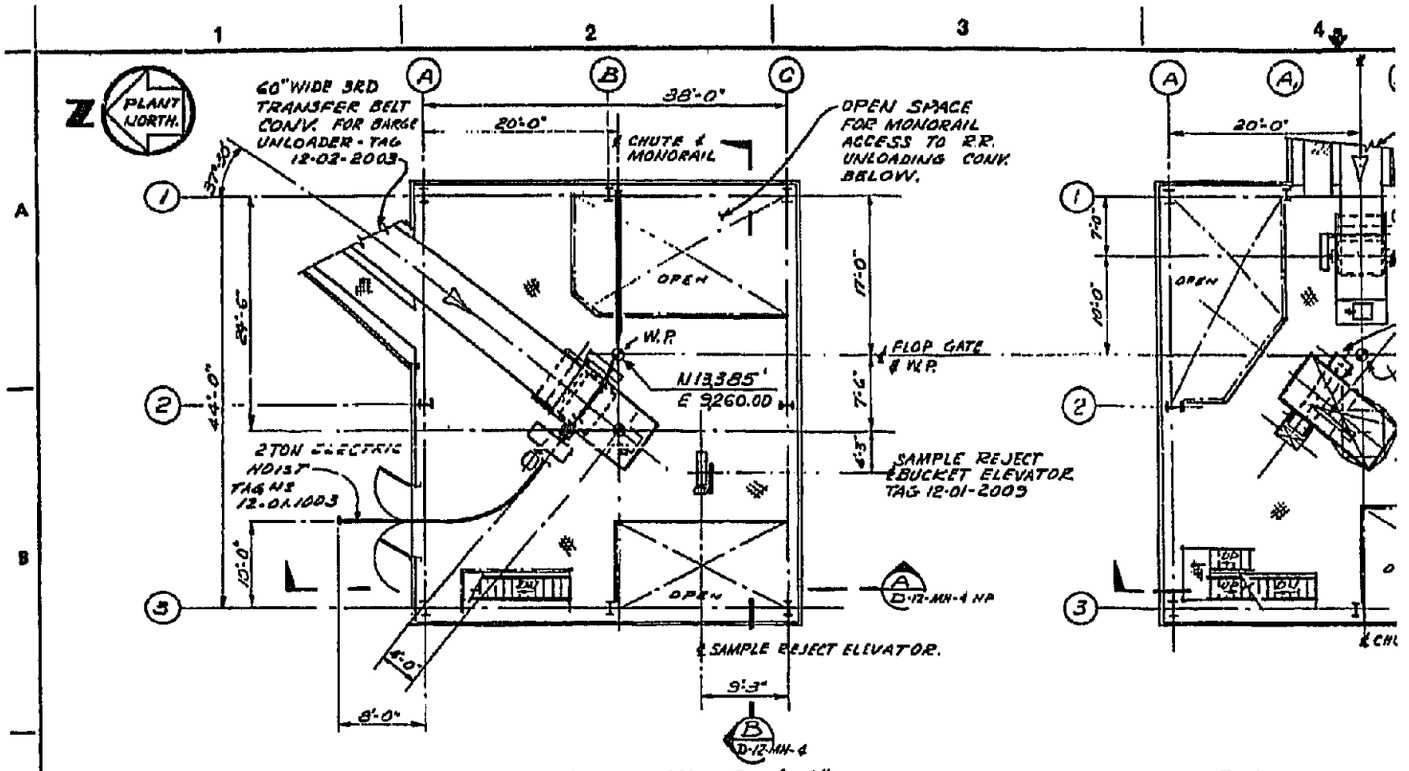
D — 12 — MH — INP

C

	DRAWN		2-13-82
	CHECKED	B.S.	2-18-82
	APVD DIRECT SUP		2-18-82
	APVD PROJ MGR		2-18-82
	APVD CLIENT		2-19-82

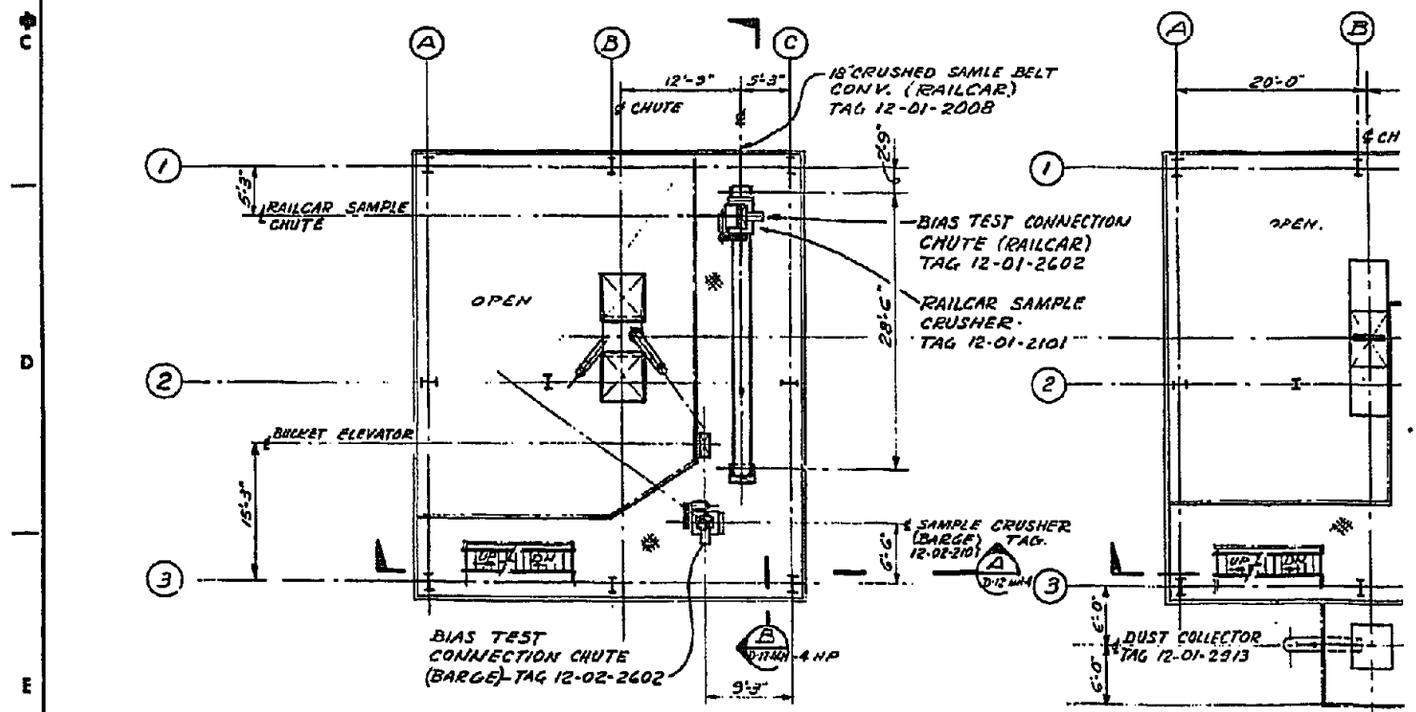
HIGH REPORT
ISSUED FOR CLIENT APPROVAL
CLIENT 30% REVIEW
DESCRIPTION

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA



PLAN AT EL. 172'-0"

PLAN AT



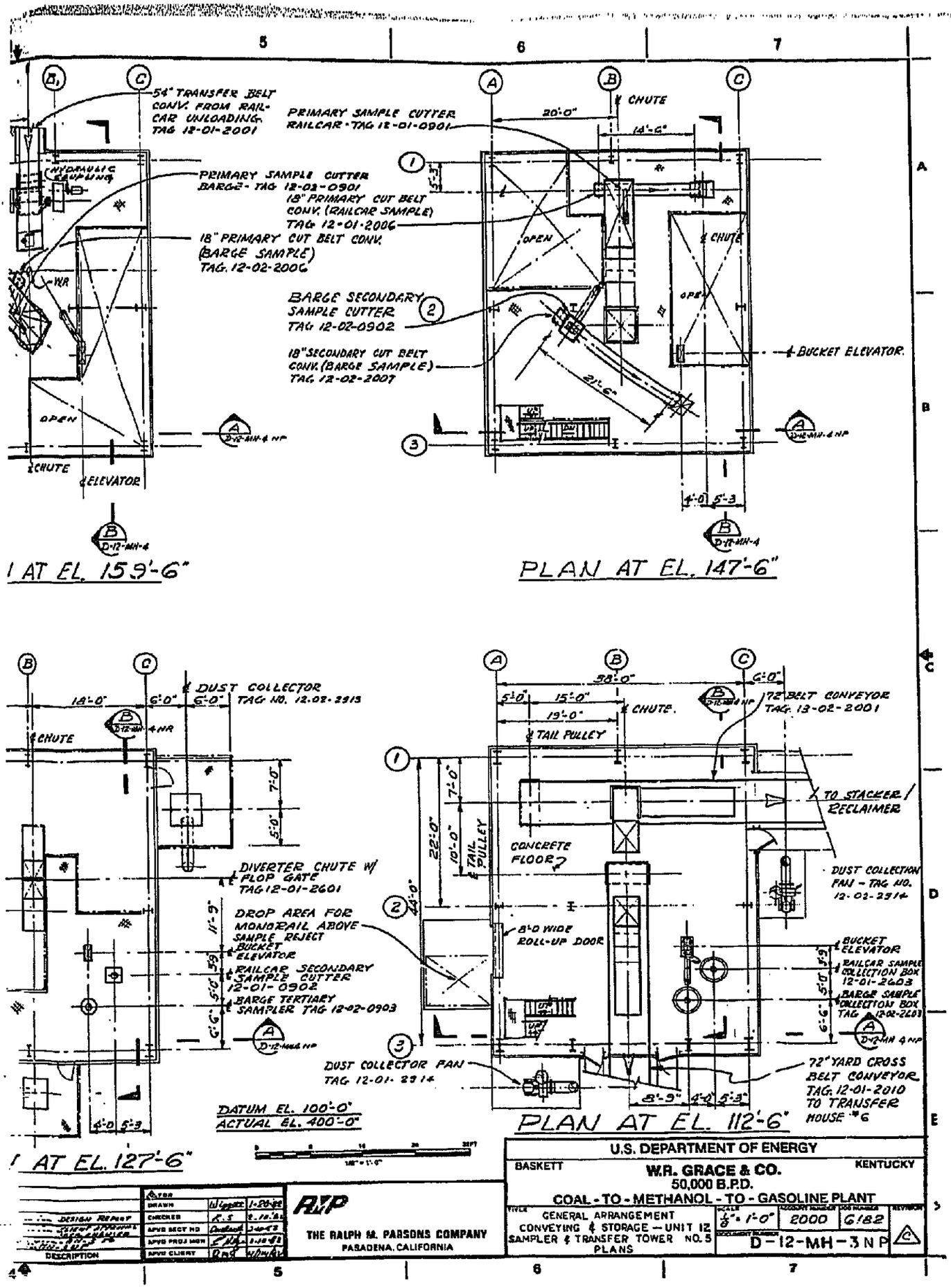
PLAN AT EL. 136'-6"

PLAN AT

REFERENCES		REFERENCES		REVISIONS								REVISIONS								
1-01-PD-3NP	PLOT PLAN											C	4-11-81	WJ	RS	WHP	SK	RWS		ISSUED FOR
D-12-MH-4NP	SAMPLE TOWER SECT.											B	5-26-81	WJ	WHP	WHP	SK			ISSUED FOR
												A	2-10-81	RS			SK			
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		DE

ENG-GE-23 (12/78)

1



U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: GENERAL ARRANGEMENT CONVEYING & STORAGE — UNIT 12 SAMPLER & TRANSFER TOWER NO. 5 PLANS

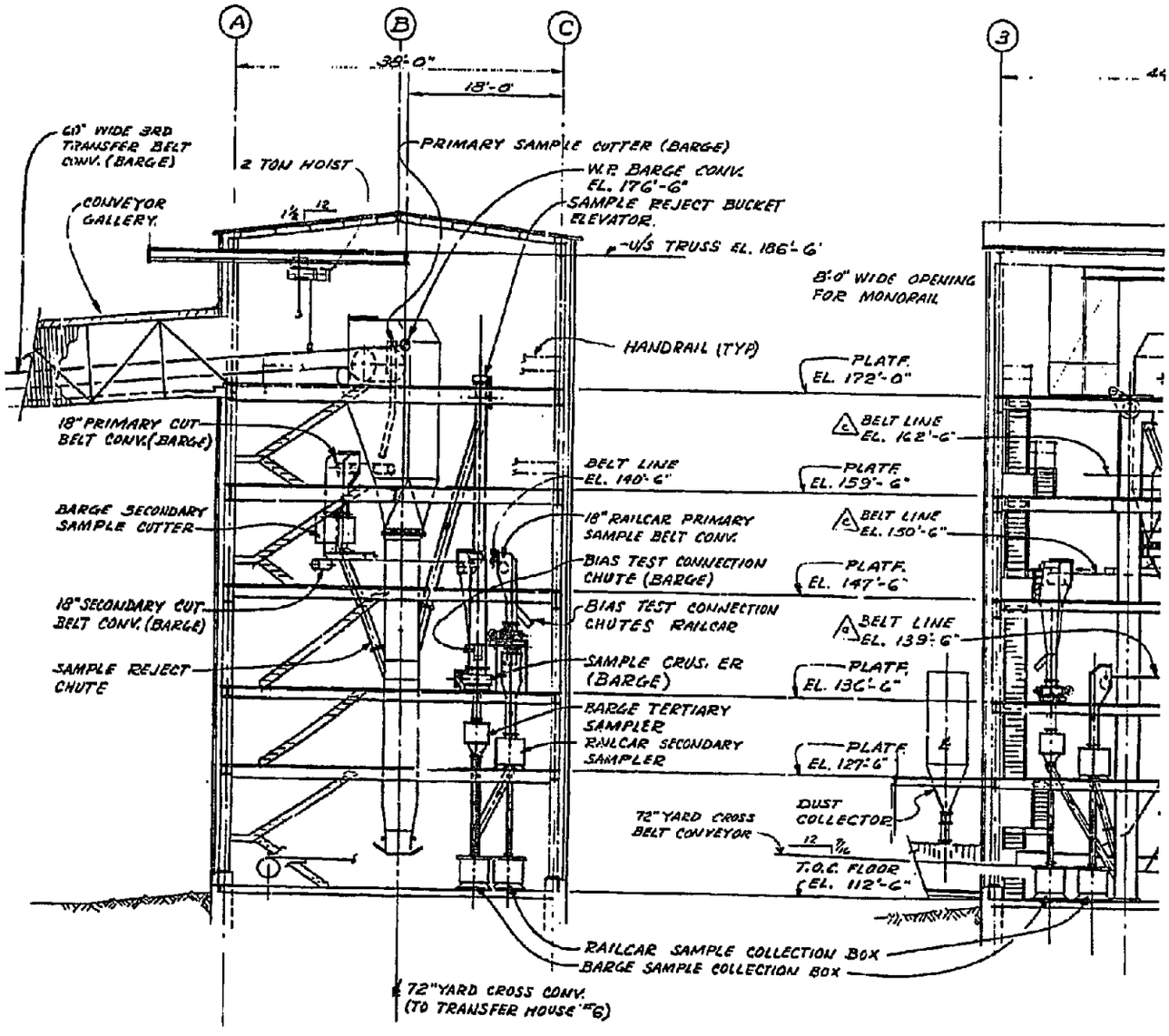
SCALE: 1/8" = 1'-0" | ACCOUNT NUMBER: 2000 | JOB NUMBER: 6182 | REVISION: C

DOCUMENT NUMBER: D-12-MH-3NP

DRAWN		1-28-82
CHECKED	K.S.	2-10-82
APVD SECT HD		2-10-82
APVD PROJ MGR		2-10-82
APVD CLIENT		

DESCRIPTION

RMP — THE RALPH M. PARSONS COMPANY, PASADENA, CALIFORNIA



SECTION (A) REF. MH-3NP
D-12-MH-4NP

SECTI

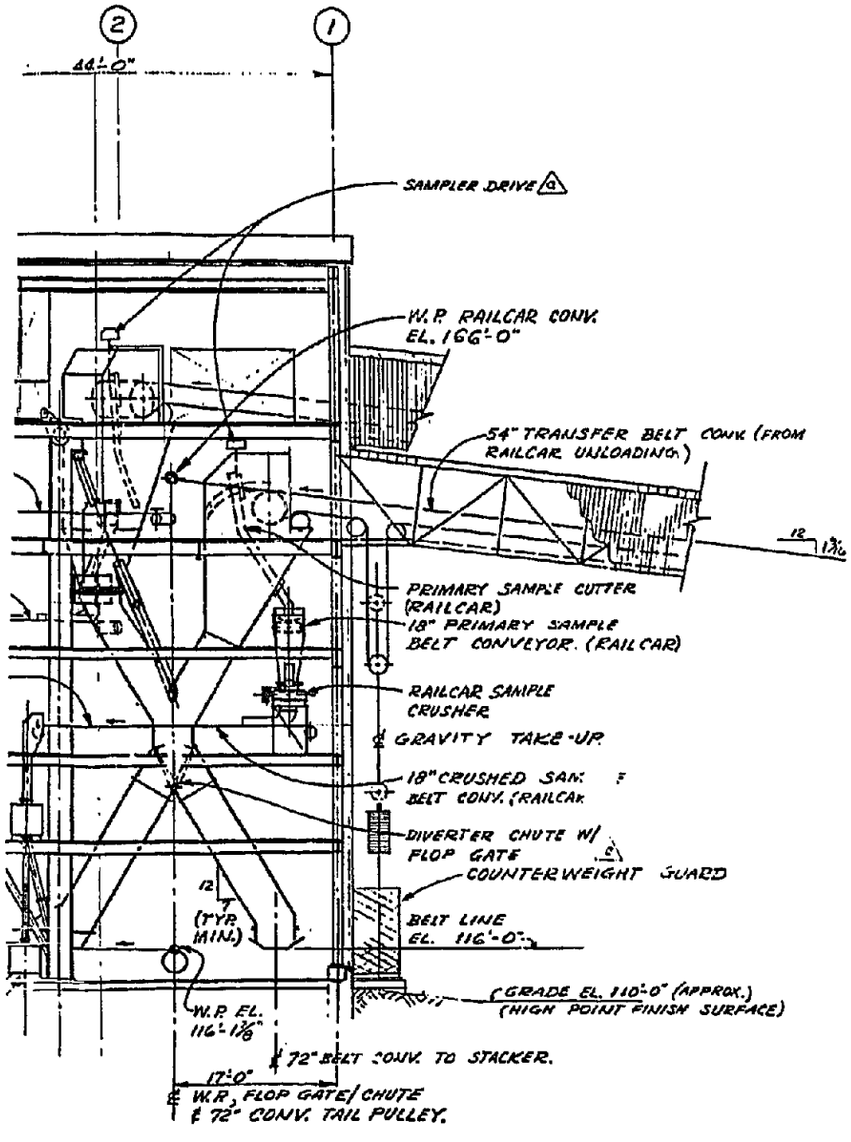
REFERENCES	DRAWING NO.	DESCRIPTION
	A-01-PD-3NP	PLOT PLAN
	D-12-MH-3NP	SAMPLER TOWER-PLAN

REFERENCES	DRAWING NO.	DESCRIPTION

REVISIONS	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS	NO.	DATE	BY	CHKD	SEC	PROJ		
	C	4-12-82	W.J.	R.S.			SP	RMS
	B	5-13-81	R.S.				SAL	
	A	2-16-81	R.S.				CPR	

ISSUED FOR



DATUM EL. 100'-0"
ACTUAL EL. 400'-0"

SECTION (B) REF. MH-3NP
D-12-MH-4NP

	FOR		
	DRAWN		1-27-81
	CHECKED		2-16-81
	APVD SECT MGR		2-16-81
	APVD PROJ MGR		2-16-81
	APVD CLIENT		4-24-81
DESIGN REPORT ISSUED FOR DESIGN APPROVAL DRAWING CHANGES INCLUDED FROM "D" 12-16-80 TO "E" 4-24-81			
DESCRIPTION			

RMP
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: GENERAL ARRANGEMENT CONVEYING & STORAGE — UNIT 12 SAMPLER & TRANSFER TOWER NO. 5 SECTIONS.

SCALE: 1/8" = 1'-0" | ACCOUNT NUMBER: 2000 | JOB NUMBER: 6182

DOCUMENT NUMBER: D-12-MH-4NP | REVISION: C

G. Single-Line Diagram

See Volume II, 1.2.1(G) for Coal Conveying and Storage Unit 12 Single-Line Diagram.

1.2.3 COAL STACKING AND RECLAIMING - UNIT 13

A. Basis of Design

The coal stacking and reclaiming system is matched with the feed and reclaim conveying systems, which are upstream and downstream of Unit 13. The system has machines capable of serving the live pile as well as building inactive storage without affecting the process plant normal operational requirement.

The stacking and reclaiming rates of equipment are determined by the required maximum coal unloading rate and the maximum coal demand rate from process and utility plants. The stacking boom length is established by the live coal stack height and the active reclaim reach of the boom. The machine linear travel is based on the total active quantity of coal to be stored so that one-third of the active pile length will always be available for coal unloading.

The total coal pile volume was determined by normal practices used in the area by plants of comparable sizes. The live pile size is based on the normal material handling practice of keeping a minimum of 7 days of coal requirements in the active pile, 7 days of empty space for receiving the coal, and 7 days of turnover capacity in the "moving storage." Thus, a total of 20 nominal days of coal requirements will be kept in the live pile. In case of unusually long interruptions in the coal supply, space is available to temporarily store coal up to a 90-day supply by increasing the height of the dead pile.

Two stackers/reclaimers on two parallel yard conveyors provide complete two-train availability. A single train, working 24 hours, is able to furnish the total feed required by the plant. However, one train is only available for 80% of the time. Therefore, the addition of a second train at the same availability (reliability) increases the combined overall availability to 96% in a 24-hour working schedule.

Two parallel conveyor systems, complete with belt trippers and feeders, are provided downstream of the coal yard conveyors. These reclaim (coal feed) conveyors, supplying the coal to the plant, are designed to serve the total plant capacity with only one conveyor line working. Thus, the reliability of the reclaim coal feed system is increased by the redundancy of the parallel spare conveyor system.

B. System Selection Rationale

A detailed study was performed to select the coal yard stacking and reclaiming system, based on project general design criteria and barge/train unloading rates, as well as to satisfy plant feed requirements.

Various arrangements of coal storage belt conveyors and stacking and reclaiming schemes were evaluated. These can be summarized in three basic functional categories (for details, see Volume V):

(1) Combination stacker/reclaimers, using common yard conveyor for both input and output.

(2) Separate stackers and reclaimers using common input and output conveyors.

(3) Separate stackers and reclaimers using separate input and output conveyors.

Different arrangements and types of equipment were studied in each of the above categories. The most suitable were selected for detailed evaluation. Although the maximum total yard storage capacity was specified by W.R. Grace & Co., the split between active and inactive yard storage was determined according to plant need and reliability of coal supply and unloading systems.

Considering the advantages and drawbacks of each scheme, including environmental impact, system availability, reliability, and capital and operating costs, it was concluded that the system with two common yard belt conveyors and combined stacker/reclaimer machines is best suited for this project. A copy of the full report on the rationale of the selection is included in Volume V of this document.

C. System Description

There are two track-mounted, single luffing boom traveling bucketwheel stacker/reclaimers. Each stacker/reclaimer travels on its own yard conveyor for a distance needed to provide required live storage (2,000 ft). Each machine has a nominal stacking rate of 5,000 stph and a nominal reclaim rate of 2,500 stph.

Both the coal stacked and reclaimed is weighed on automatic belt scales and a central integrator printer gives the inventory of coal in the stockpiles.

A tramp iron magnet and metal detector ensures that no metallic objects are picked up from the stockpile and taken to the coal feed preparation plant.

Mobile equipment (bulldozers and front-end loaders) is provided to move coal from the live stockpile to and from the dead stockpile.

Parameters for the selection of combination stacker/reclaimer systems, including dozers for working adjacent dead piles, are as follows:

(1) Major equipment including two rail-mounted combination stacker/reclaimers (each having a nominal average stacking rate of 5,000 tph and a nominal average reclaiming rate of 2,500 tph) and four 400-horsepower tractor dozers.

(2) Two 72-inch-wide yard belt conveyors, approximately 2,800 feet long, designed to carry coal at a combined maximum rate of train unloading and barge unloading at 4,500 tph.

(3) Coal yard storage in three stockpiles with the following capacities:

- Total active storage space for a maximum of 600,000 tons (20 days of plant feed) accessible to stacker/reclaimers.

- Inactive storage piles, beyond the reach of stacker/reclaimers, capacity of 1,200,000 tons (40 days of plant feed).

- Total yard stockpile capacity of 1,800,000 tons (60 days of plant feed), which can be increased temporarily to a maximum of 2,700,000 tons.

(4) Dust suppression systems on the stacker/reclaimer and a water tank truck equipped to spray coating on the inactive storage piles.

The two coal yard belt conveyors receive the coal from the unloading stations and feed the stackers. The stackers/reclaimers have the capability of performing three functions:

(1) Stacking the coal on the live pile.

(2) Reclaiming the stacked coal from the live pile.

(3) Receiving the coal from the unloading stations, stacking part of it on the stockpile and feeding the remainder to the plant, bypassing the stockpile.

These functions are performed by the stacker/reclaimer operator and monitored by the supervisor in the central control room. A detailed explanation of the controls is given in Volume V.

D. Risk Assessment

The philosophy used in selection of the stacking/reclaiming systems has been to choose proven, environmentally acceptable, and economical equipment. Furthermore, the basis of selection and design of the system was established to ensure efficient use of the equipment, provide flexibility of operation, and supply built-in reserve capacities for surges in the coal unloading, loading rates. This philosophy was carried over in the determination of the number of trains, modules, and spare equipment. Equipment startup, turndown capability, maintenance, access to equipment, and interchangeability of parts were assessed for risk.

The bucketwheel stacker/reclaimers selected for this project are designed with some overcapacity in order to provide additional reliability above the 80% onstream time normally assigned to such equipment. These machines have been used in operations handling more abrasive ores and much larger lump size material. The conveyor design will conform to the design factors detailed in CRT-01-MH-1.

In the assessment of operational risks, two factors have significant effects on the system reliability:

(1) Stacker/reclaimer reliability (equipment and personnel).

(2) Systems reliability to match incoming and outgoing systems.

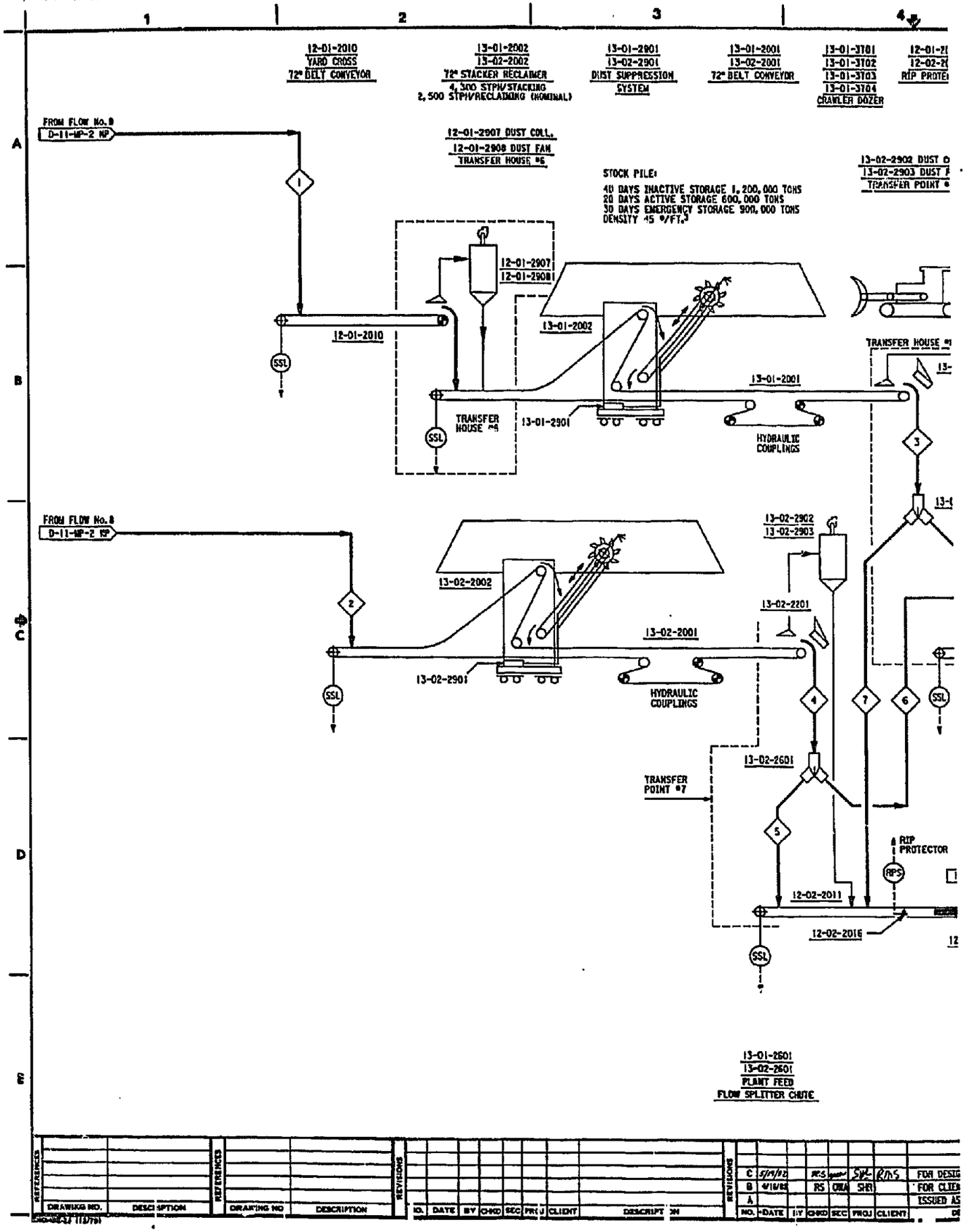
Stacker/reclaimers selected are of standard design and size. They are proved to have individual availability (reliability) of over 80%. The belt conveyor availability is 95% because the stacker/reclaimer trippers run on the yard belt. The two factors combined (in series) reduce the overall single train availability (reliability) to 76%. Since there are two parallel trains of stacker/reclaimers and yard conveyors, the combined reliability of the two parallel trains is 94%.

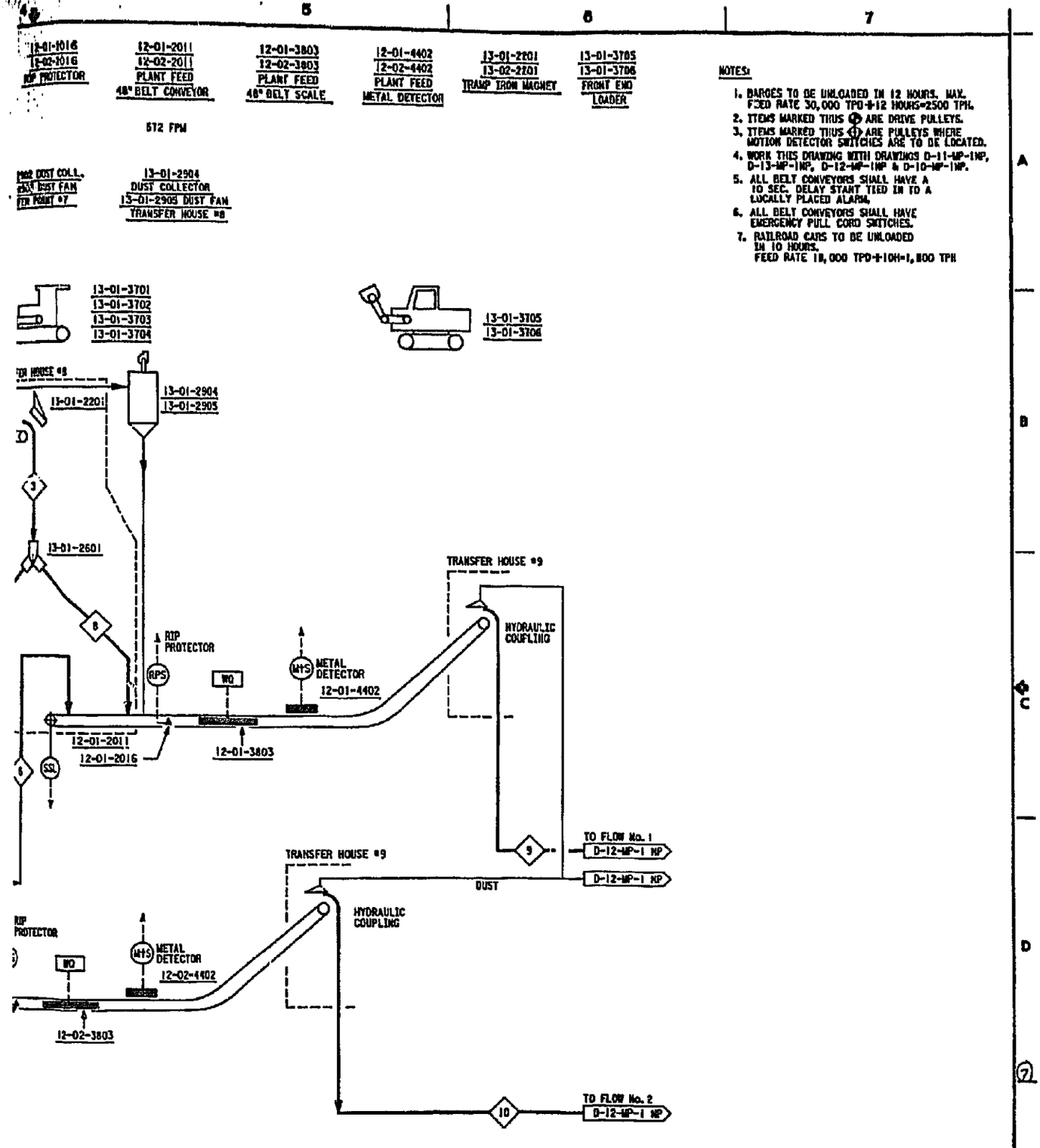
The stacking/reclaiming systems were designed to operate with one train handling the total plant capacity by working 24 hours a day. The nominal stacking rate of 5,000 stph was selected to handle the combined coal unloading rates of both barge and railroad stations working simultaneously. The coal reclaiming rate of 2,500 stph per machine allows one machine to feed the plant in approximately 12 hours while the other machine can be stacking the incoming coal simultaneously. These high rates of stacking and reclaiming allow the stackers to be available to empty the coal with one train and handle limestone for the FGD removal system with the other. Thus, limestone can be received at the plant by railcars or barge once a week and be stored in the open stockpile at one end of the live stockpile (see Drawing D-13-MH-1NP). Further details of the system reliability are discussed in the rationale report included in Volume V.

E. Process Flow and Control Diagram (Including Material Balance)

Process Flow and Control Diagram for the Coal Stacking and Reclaiming Unit 13 is as follows:

Drawing No.	Title
D-13-MP-1NP	PFCD Coal Area Unit 13 - Stacking and Reclaiming


12-01-2010
YARD CROSS
72" BELT CONVEYOR
13-01-2002
13-02-2002
72" STACKER RECLAIMER
4,500 STPH/STACKING
2,500 STPH/RECLAIMING (NOMINAL)
13-01-2901
13-02-2901
DUST SUPPRESSION
SYSTEM
13-01-2001
13-02-2001
72" BELT CONVEYOR
13-01-3701
13-01-3702
13-01-3703
13-01-3704
CRAWLER DOZER
FROM FLOW No. 8
D-11-MP-2 NP
12-01-2907 DUST COLL.
12-01-2908 DUST FAN
TRANSFER HOUSE #6
STOCK PILE:
40 DAYS INACTIVE STORAGE 1,200,000 TONS
20 DAYS ACTIVE STORAGE 600,000 TONS
30 DAYS EMERGENCY STORAGE 900,000 TONS
DENSITY 45 #/FT.3
13-02-2902 DUST C
13-02-2903 DUST F
TRANSFER POINT #
12-01-2907
12-01-2908
13-01-2002
12-01-2010
TRANSFER HOUSE #1
13-01-2001
TRANSFER HOUSE #4
13-01-2901
HYDRAULIC COUPLINGS
FROM FLOW No. 8
D-11-MP-2 NP
13-02-2902
13-02-2903
13-02-2002
13-02-2201
13-02-2001
13-02-2901
HYDRAULIC COUPLINGS
13-02-2601
TRANSFER POINT #7
RIP PROTECTOR
12-02-2011
12-02-2016
13-01-2601
13-02-2601
PLANT FEED
FLOW SPLITTER CHUTE
C 5/19/92 RS RS SH RMS FOR DESIG
B 4/16/92 RS DRA SHT FOR CLIE
A ISSUED AS
REFERENCES
DRAWING NO. DESCRIPTION
REVISIONS
NO. DATE BY CHKD SEC PROJ CLIENT DESCRIPTION



NOTES:

1. BARGES TO BE UNLOADED IN 12 HOURS. MAX. FEED RATE 30,000 TPD÷12 HOURS=2500 TPH.
2. ITEMS MARKED THUS ⊕ ARE DRIVE PULLEYS.
3. ITEMS MARKED THUS ⊖ ARE PULLEYS WHERE MOTION DETECTOR SWITCHES ARE TO BE LOCATED.
4. WORK THIS DRAWING WITH DRAWINGS D-11-MP-1NP, D-13-MP-1NP, D-12-MP-1NP & D-10-MP-1NP.
5. ALL BELT CONVEYORS SHALL HAVE A 10 SEC. DELAY START TIED IN TO A LOCALLY PLACED ALARM.
6. ALL BELT CONVEYORS SHALL HAVE EMERGENCY PULL CORD SWITCHES.
7. RAILROAD CARS TO BE UNLOADED IN 10 HOURS. FEED RATE 18,000 TPD÷10H=1,800 TPH

D13MP1NP.DGA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

PROCESS FLOW & CONTROL DIAGRAM
COAL AREA-UNITS 12 & 13
STACKING & RECLAIMING

SCALE: NONE | 2000 | 6182-1

D-13-MP-1 NP

REVISION: C

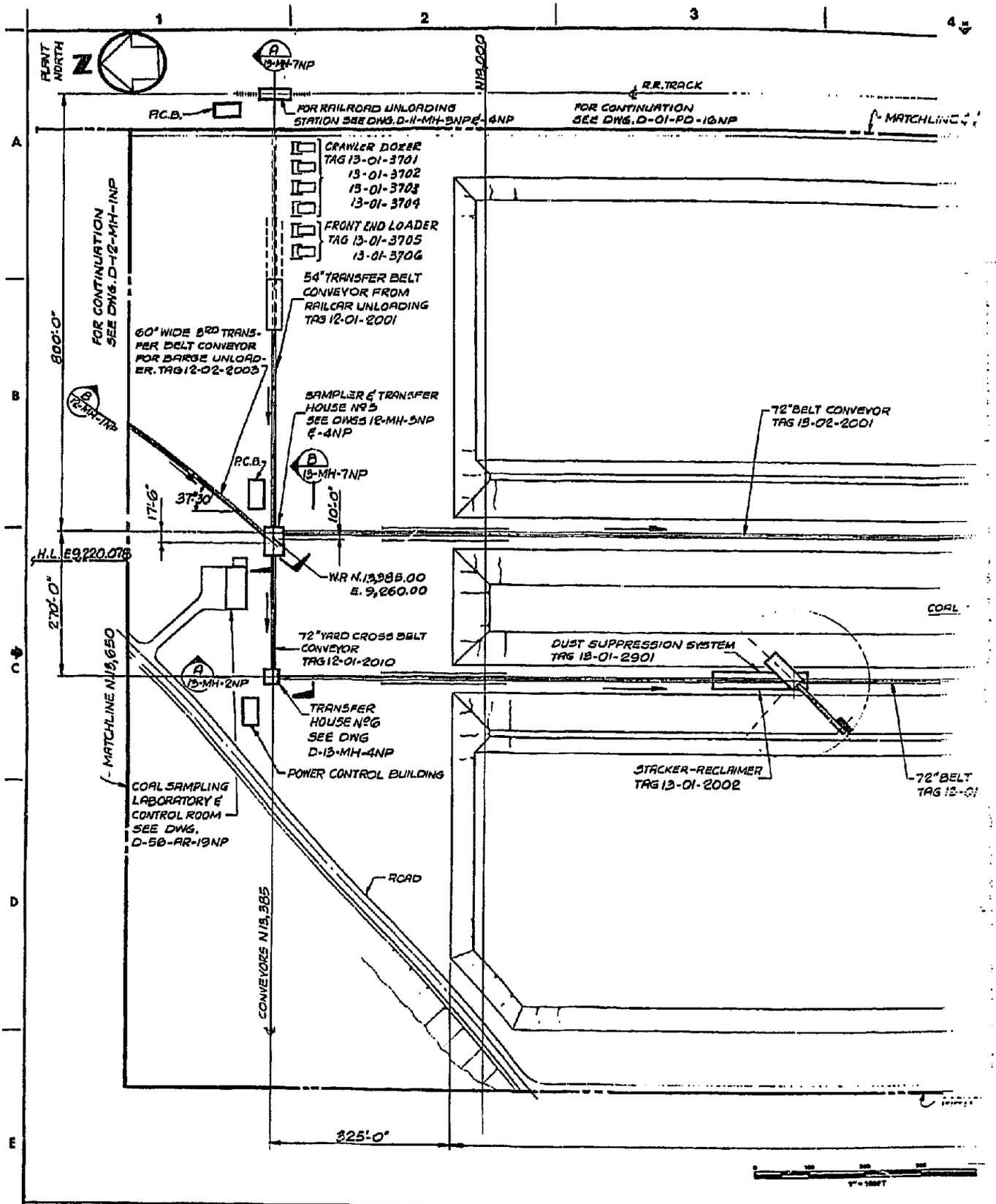
DESCRIPTION	
FOR DESIGN REPORT	
FOR CLIENT APPROVAL	
ISSUED AS D-13-FS-1	

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

F. Plot Plan/General Arrangement Drawings

Plot Plan/General Arrangement Drawings for Coal Stacking and Reclaiming Unit 13 are as follows:

Drawing No.	Title
D-13-MH-1NP	General Arrangement - Stacking and Reclaiming - Unit 13 Stacking and Reclaiming - Plan
D-13-MH-2NP	General Arrangement - Stacking and Reclaiming - Unit 13 Stacking and Reclaiming - Elevations
D-13-MH-3NP	General Arrangement - Stacking and Reclaiming - Unit 13 Transfer Houses 1, 2, and 3 - Plans, Elevations, and Sections
D-13-MH-4NP	General Arrangement - Stacking and Reclaiming - Unit 13 Transfer Houses 4, 6, 7, and 8 - Plans, Elevations, and Sections
D-13-MH-5NP	General Arrangement - Stacking and Reclaiming - Unit 13 Slurry Preparation - Storage Silos - Plan and Elevations
D-13-MH-6NP	General Arrangement - Stacking and Reclaiming - Unit 13 Power Plant Storage Bunkers - Plan and Sections
D-13-MH-7NP	General Arrangement - Stacking and Reclaiming - Unit 13 Stacking and Reclaiming Conveyors - Conveyor Sections



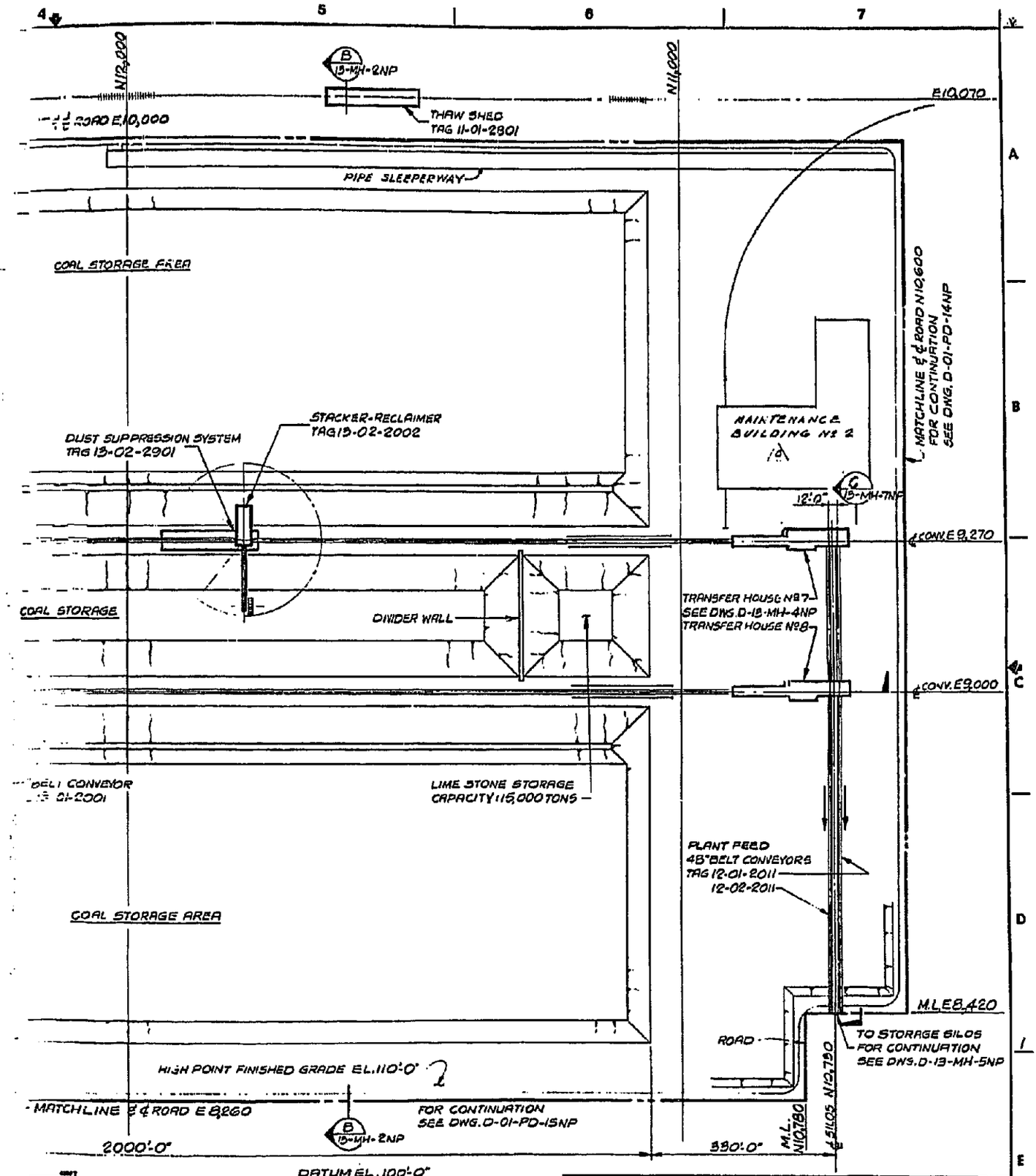
REFERENCES	DRAWING NO.	DESCRIPTION
	D-01-PD-3NP	PLOT PLAN
	C-13-MH-2NP	STACK/RECLAIM-ELEV'N
	C-13-MH-1NP	STACK/RECLAIM-SECT.

REFERENCES	DRAWING NO.	DESCRIPTION

REVISIONS	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT
	E	5/17/6	R.S.	AMC	PMC	STR	
	D	6/6/6	R.S.	AMC	SMR	SSK	
	C	4-13-82	RW	RS	SMR	FR	PMG
	B	3-22-82	LBK	R.S.	SMR	FR	
	A						

ENG-DE-23 (12/79)



U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

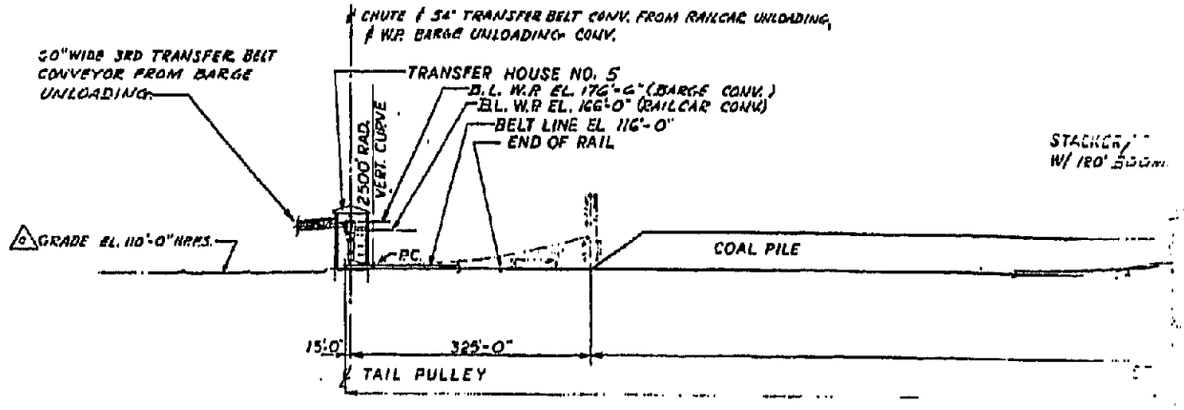
TITLE: GENERAL ARRANGEMENT STACKING & RECLAIMING — UNIT 13 STACKING & RECLAIMING PLAN	SCALE: 1" = 100'-0"	ACCOUNT NUMBER: 2000	JOB NUMBER: 6182
	DOCUMENT NUMBER: D - 13 - MH - INP		REVISION: 1

DESCRIPTION			
RE-ISSUED FOR DESIGN REPORT	FOR		
RE-ISSUED FOR CLIENT APPROVAL	DRAWN	LBK	8-22-81
R. DESIGN REPORT	CHECKED	RS	8-28-81
REDRAWN & ISSUED FOR CLIENT APPROVAL DWG. NWS D-13-MH-1 ON REV. A	APVD DEPT HD		8-28-81
	APVD PROJ MGR	SH Eq	8-28-81
	APVD CLIENT	RMS	8-28-81

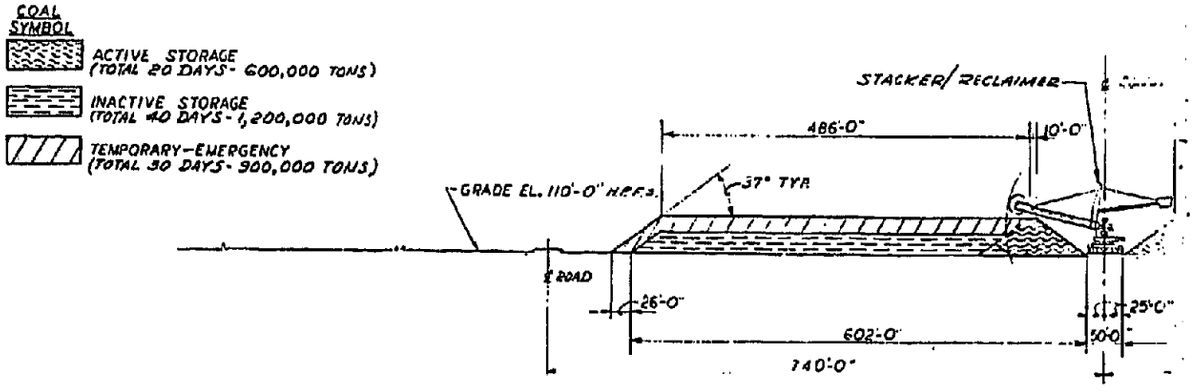
RMP

THE RALPH M. PARSONS COMPANY

PASADENA, CALIFORNIA



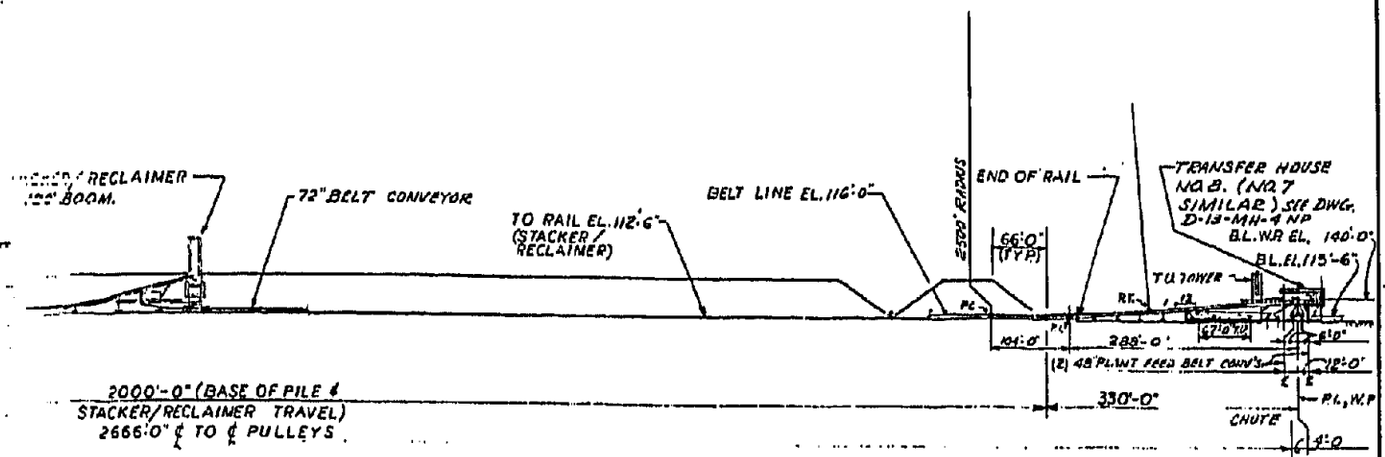
SECTION



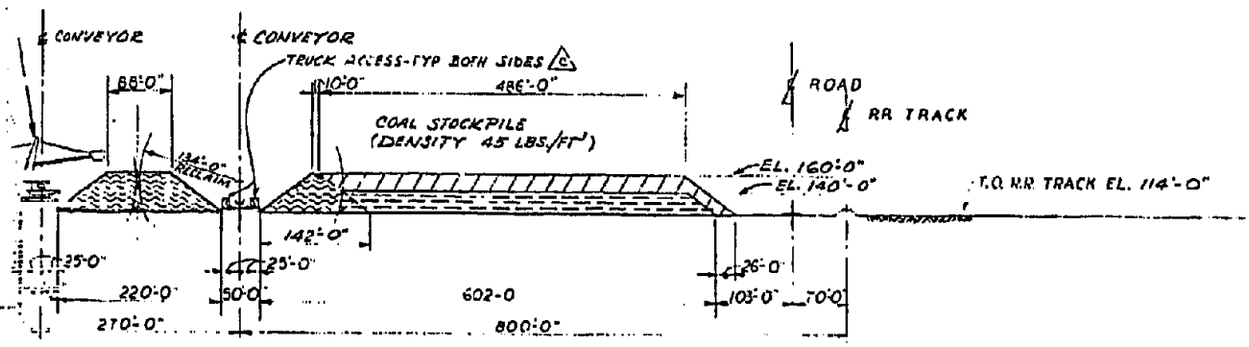
SECTION

REFERENCES			REFERENCES			REVISIONS									REVISIONS								
F-01-PO-SN-A	OVERALL PLOT PLAN															C	4-13-82	W.				Rev.	ISSUED
D-13-MH-01-A	STACK/RECLAIM - PLAN															B	3-17-81	G.S.					
D-13-MH-01-A	STACK/RECLAIM-SECT.															A	12-7-81	G.S.					
DRAWING NO	DESCRIPTION		DRAWING NO.	DESCRIPTION		NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION			NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	

ENG-GE-23 (12/79)



SECTION (A) REF. MH-1 NP
13-MH-2 NP



SECTION (B) REF. MH-1 NP
13-MH-2 NP

DATUM EL. 100'-0"
ACTUAL EL. 490'-0" M.S.L.

1" = 100'-0"

	FOR DESIGN REPORT		
	ISSUED FOR CLIENT APPROVAL		
	ISSUED FOR CLIENT REVIEW		
	DESCRIPTION		

FOR		
DRAWN	W. GRANT	11/20/81
CHECKED	R.S.	11/20/81
APVD DSGN MGR	Dual	11/25/81
APVD PROJ MGR	S.J.E.	11/4/81
APVD CLIENT		

RMP
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

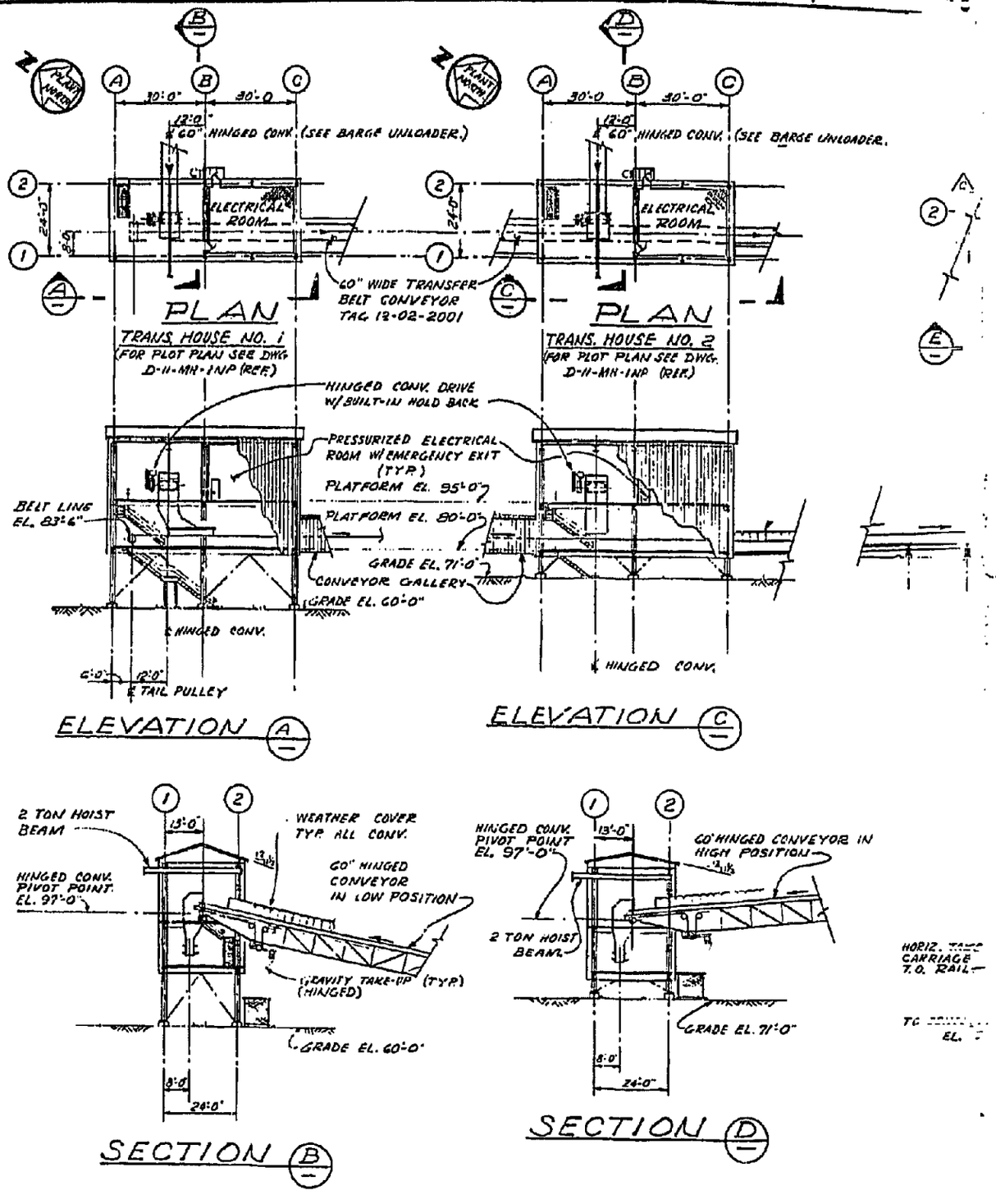
U.S. DEPARTMENT OF ENERGY

BASKETT — **W.R. GRACE & CO.** — KENTUCKY

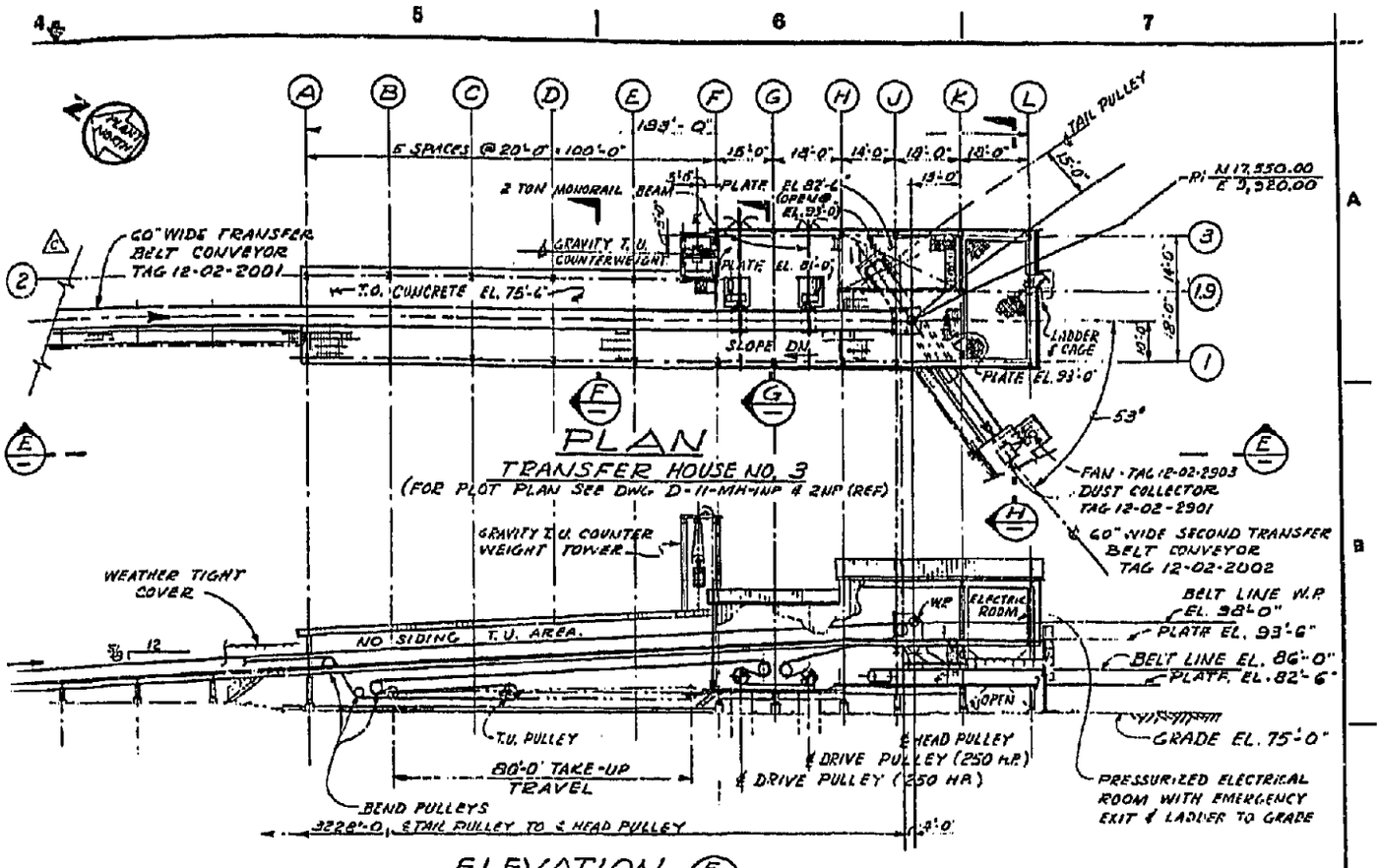
50,000 B.P.D.

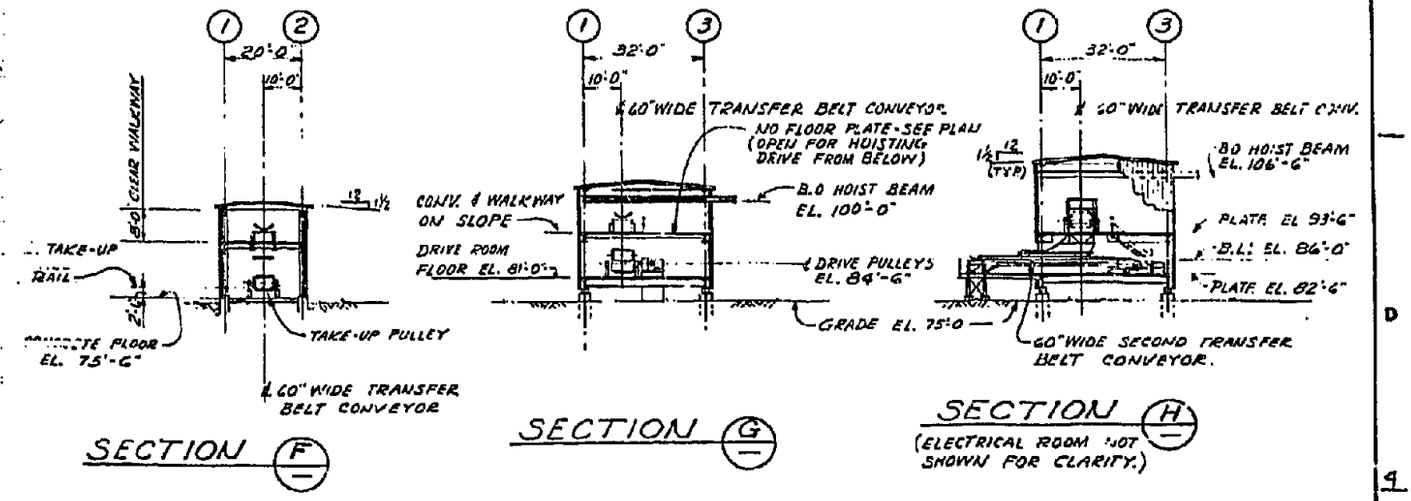
COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE	SCALE	ACCOUNT NUMBER	JOB NUMBER	REVISION
GENERAL ARRANGEMENT STACKING & RECLAIMING - UNIT 13 STACKING & RECLAIMING ELEV.	1" = 100'-0"	2000	6182	C
	DRAWING NUMBER: D-13-MH-2NP			



REFERENCES		REFERENCES		REVISIONS								REVISIONS								
9-01-PO-3NP	PLOT PLAN																			
D-11-MH-1NP	BARGE UNLOAD. PLAN																			
D-12-MH-1NP	CONV.-PLAN & SECT.																			
D-13-MH-1NP	TRANS. HOUSE-PLAN-SECT.																			
DRAWING NO.	DESCRIPTION	DRAWING NO	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		
												D	4/12/82	WJ	RS					
												C	4/19/82	WJ	RS					
												B	3-4-81	AA						





NOTE
DATUM EL. 100'-0"
ACTUAL EL. 400'-0" M.S.L.

	FOR BROWN	Wagner	8/26/82
3 FOR DESIGN REPORT	CHECKED	B.S.	8-26-82
ISSUED FOR CLIENT APPROVAL	APVD SECT MGR	Barlow	8-26-82
DESCRIPTION	APVD PROJ MGR		8-26-82
	APVD CLIENT		8-26-82

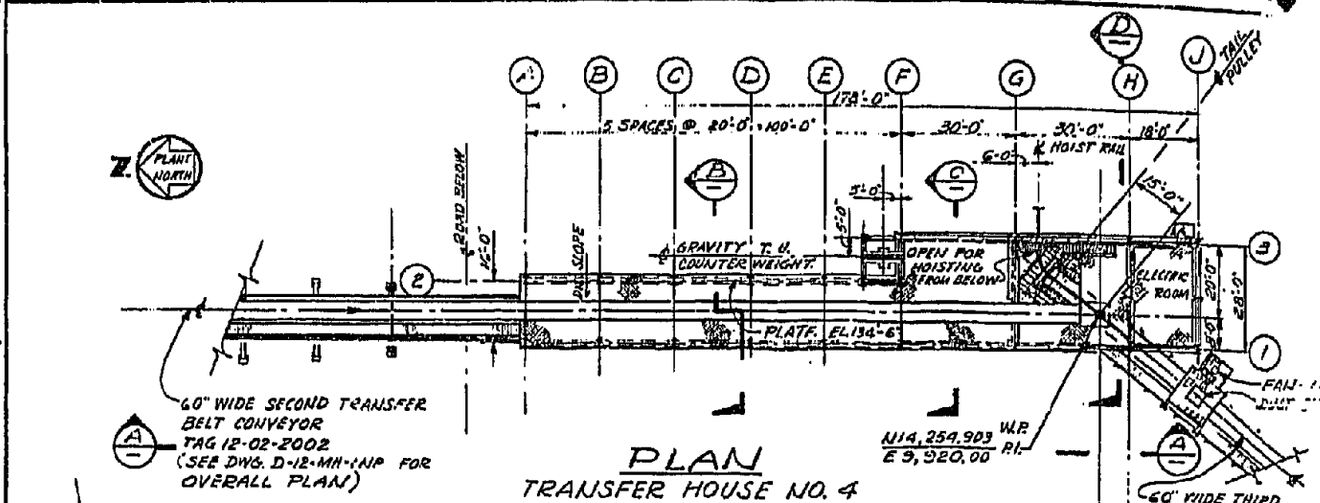
RMP
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

U.S. DEPARTMENT OF ENERGY
BASKETT — W.R. GRACE & CO. — KENTUCKY
50,000 B.P.D.
COAL - TO - METHANOL - TO - GASOLINE PLANT

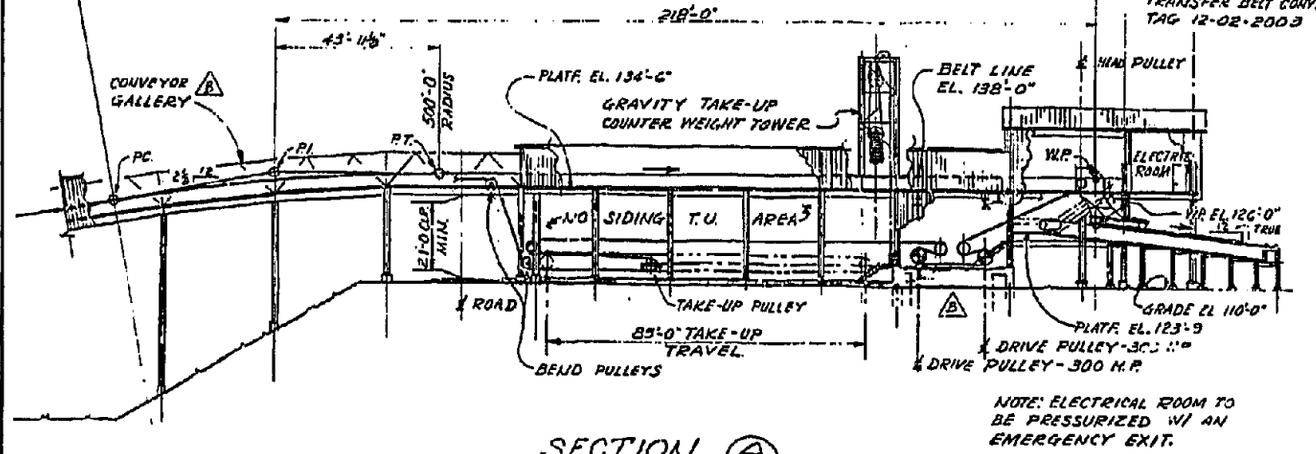
TITLE: GENERAL ARRANGEMENT
STACKING & RECLAIMING — UNIT 13
TRANSFER HOUSE NO. 1, 2 & 3
PLANS, ELEVATIONS & SECTIONS

SCALE: 1" = 20'-0" | DOCUMENT NUMBER: 2000 | JOB NUMBER: 6182 | REVISION: D

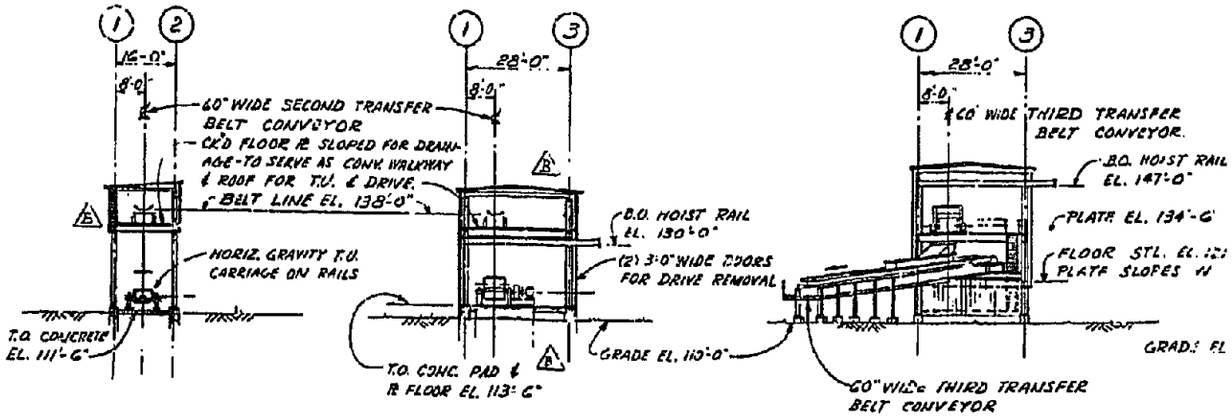
DOCUMENT NUMBER: D-13-MH-3NP



PLAN
TRANSFER HOUSE NO. 4



SECTION A



SECTION B

SECTION C
GRAVITY T.U. TOWER NOT SHOWN

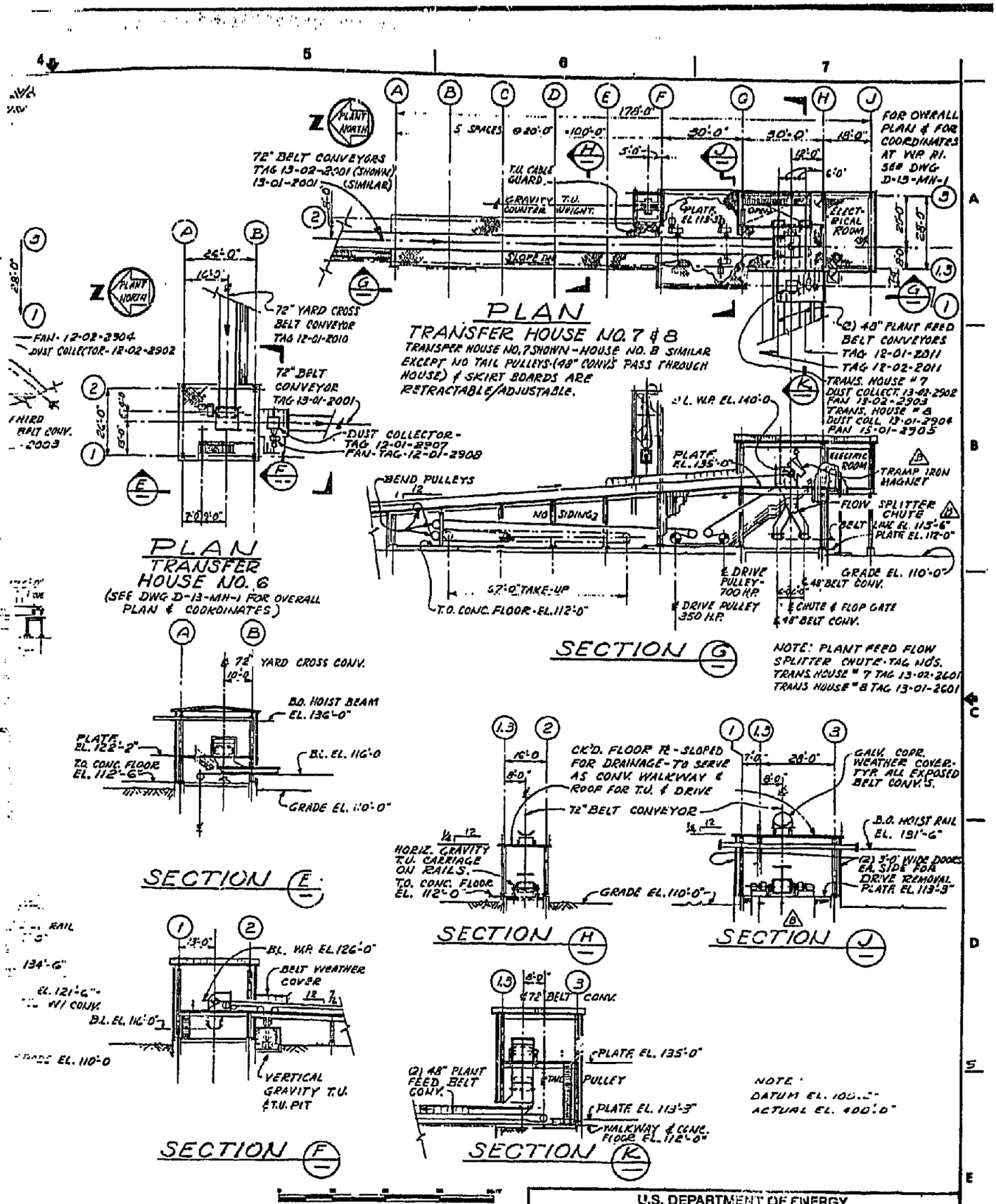
SECTION D

REFERENCES		REFERENCES	
D-01-PD-3NP	OVERALL PLOT PLAN		
D-11-MH-1NP	BARGE UNLOADING PLAN		
D-12-MH-1NP	CONVEYORS - PLAN & SECTION		
D-13-MH-4NP	TRANS. HOUSE - PLAN & SECTION		
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION

REVISIONS							
NO.	DATE	BY	CKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS								
C	4/3/72	WW	RD					
B	4/14/71	WW						ISSUED
A	3-4-81							CLIENT
NO.	DATE	BY	CKD	SEC	PROJ	CLIENT		

12-02-23 (12/78)



	DRAWN		3-10-82
	CHECKED	B.S.	3-11-82
ISSUED FOR CLIENT APPROVAL:	APVD DEPT HD		3-11-82
CLIENT 50% REVIEW	APVD PROJ MGR		3-12-82
DESCRIPTION	APVD CLIENT		

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

60,000 B.P.D.

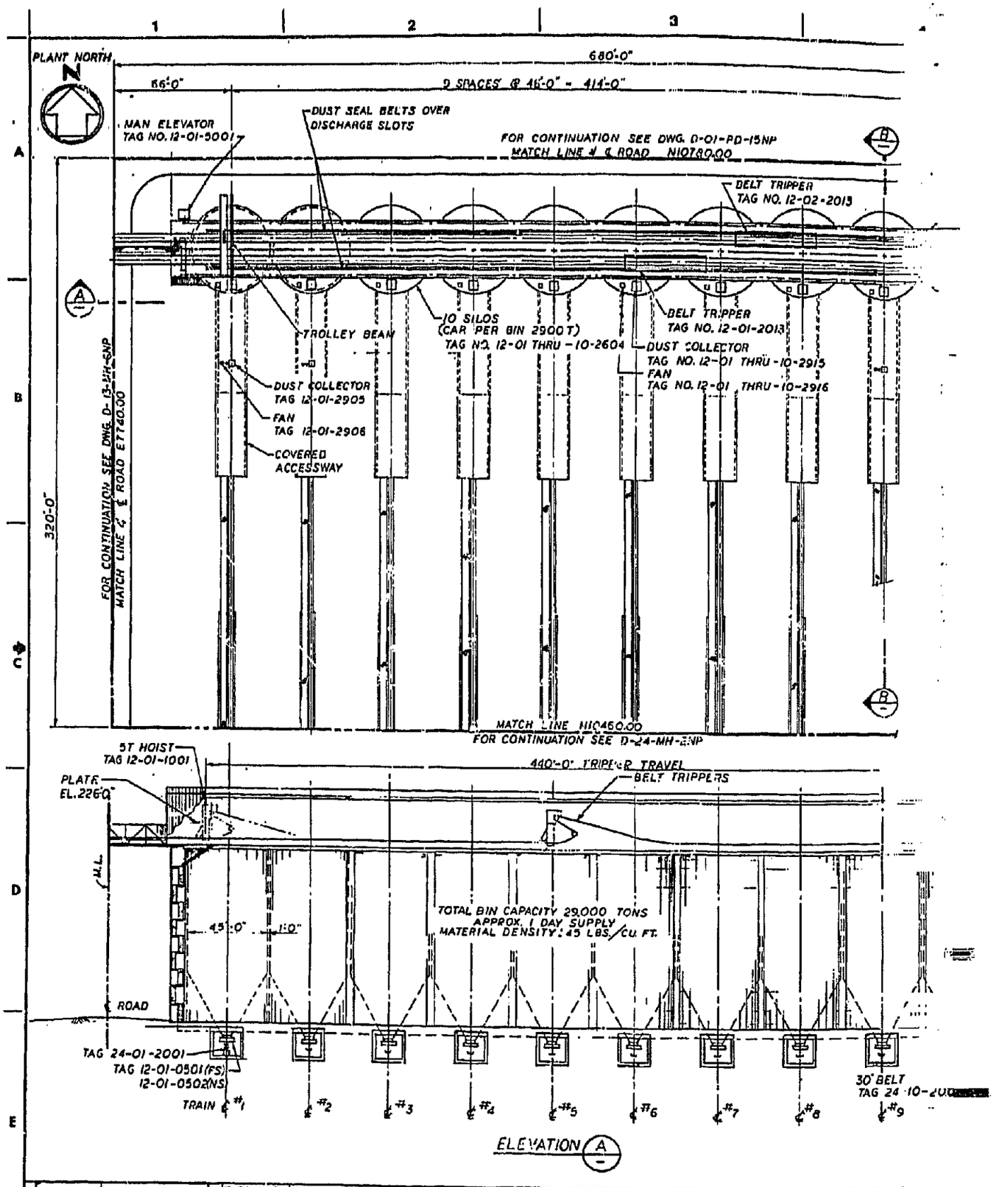
COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: GENERAL ARRANGEMENT STACKING & RECLAIMING -- UNIT 13 TRANSFER HOUSES - NO. 4,6,7 & 8 PLANS, ELEVATIONS & SECTIONS

SCALE: 1" = 20'-0" | ABSOLUTE NUMBER: 2000 | JOB NUMBER: 6162

D-13-MH-4NP

REV. NOTE: E



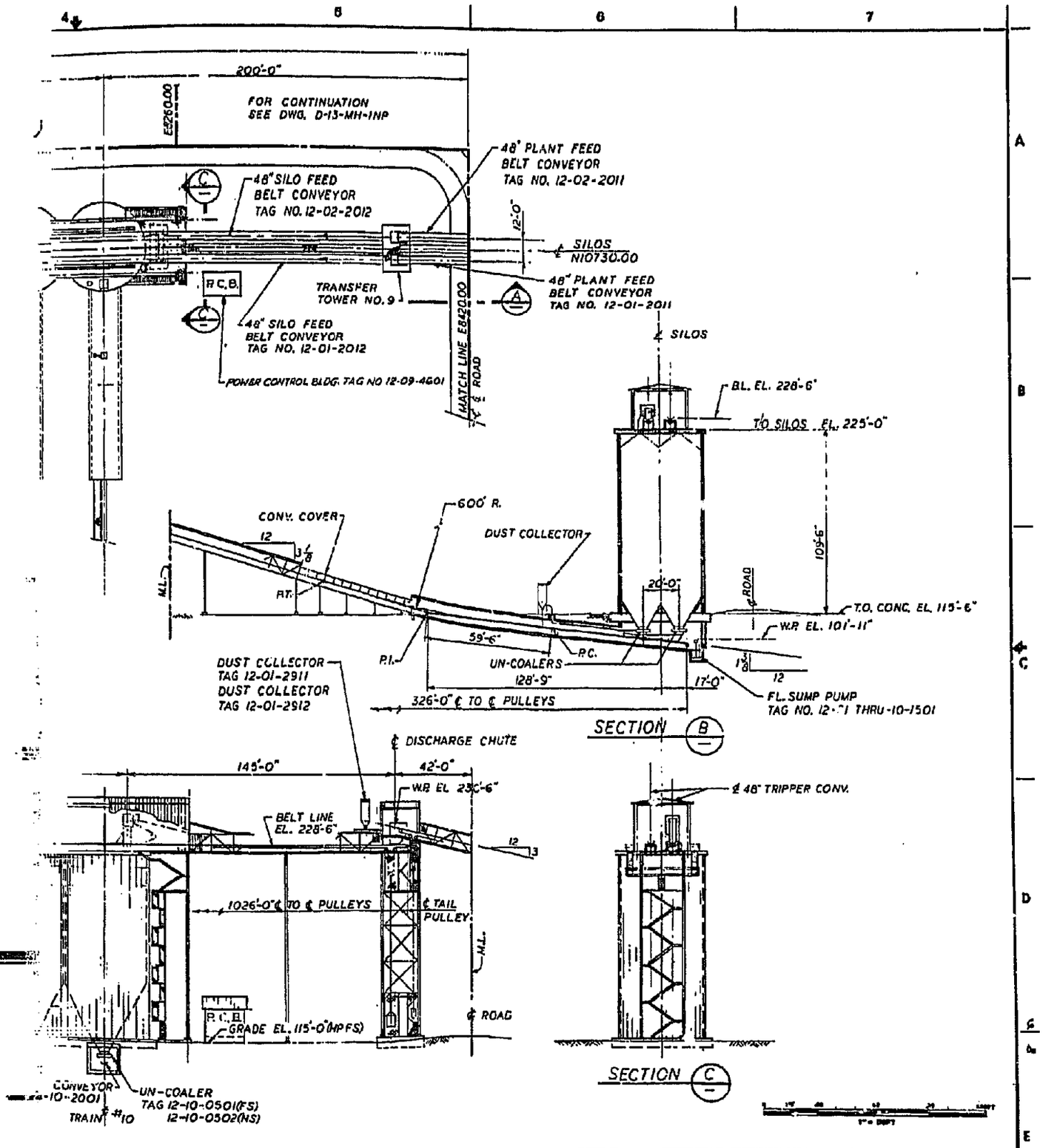
REFERENCES	
D-13-MH-6NP	STACK/RECLAIM-PLAN
D-13-MH-01NP	STACK/RECLAIM-ELEV.
D-13-MH-02NP	STACK/RECLAIM-SECT.
D-01-PD-16NP	PLOT PLAN-B
DRAWING NO.	DESCRIPTION

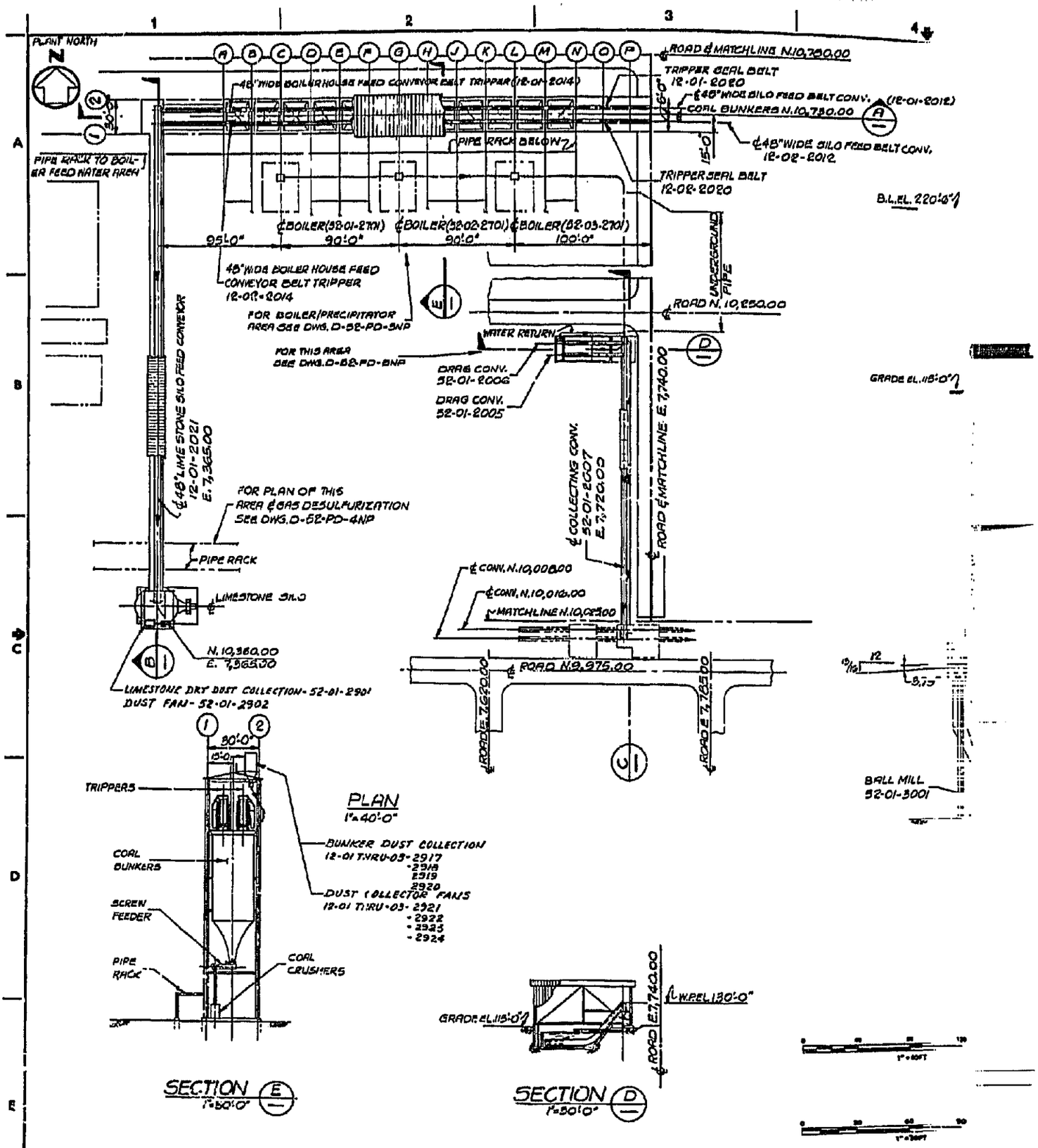
REFERENCES	
D-24-MH-2NP	SLURRY PREP BLDG PLAN
D-52-MH-1NP	STEAM GENERATION PLAN
DRAWING NO	DESCRIPTION

REVISIONS							
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS							
C	4-29-82	N.W.	R.S.				
B	4-8-82	N.W.	R.S.				
		BY	CHKD	SEC	PROJ	CLIENT	

ENG-QE-23 (12/79)


200'-0"
FOR CONTINUATION SEE DWG. D-13-MH-1NP
48" PLANT FEED BELT CONVEYOR TAG NO. 12-02-2011
48" SILO FEED BELT CONVEYOR TAG NO. 12-02-2012
SILOS N10730.00
TRANSFER TOWER NO. 9
48" PLANT FEED BELT CONVEYOR TAG NO. 12-01-2011
48" SILO FEED BELT CONVEYOR TAG NO. 12-01-2012
POWER CONTROL BLDG. TAG NO 12-09-4601
MATCH LINE E8420.00
SILOS
BL. EL. 228'-6"
T/O SILOS EL. 225'-0"
CONV. COVER
600' R.
DUST COLLECTOR
109'-6"
20'-0"
T.O. CONC. EL. 115'-6"
W.R. EL. 101'-11"
59'-6"
UN-COALERS
128'-9"
17'-0"
326'-0" ℄ TO ℄ PULLEYS
DUST COLLECTOR TAG 12-01-2911
DUST COLLECTOR TAG 12-01-2912
FL. SUMP PUMP TAG NO. 12-01 THRU-10-1501
SECTION B
℄ DISCHARGE CHUTE
145'-0"
42'-0"
W.R. EL. 23C'-6"
BELT LINE EL. 228'-6"
1026'-0" ℄ TO ℄ PULLEYS
℄ TAIL PULLEY
℄ ROAD
GRADE EL. 115'-0" (MPFS)
CONVEYOR 10-2001
UN-COALER TAG 12-10-0501(FS) 12-10-0502(NS)
TRAIN #10
℄ 48" TRIPPER CONV.
SECTION C
U.S. DEPARTMENT OF ENERGY
BASKETT
W.R. GRACE & CO.
KENTUCKY
50,000 B.P.D.
COAL - TO - METHANOL - TO - GASOLINE PLANT
GENERAL ARRANGEMENT
STACKING RECLAIMING UNIT 13
SLURRY PREPARATION SILOS
1"=30'-0"
2000
6182
THE RALPH PARSONS COMPANY



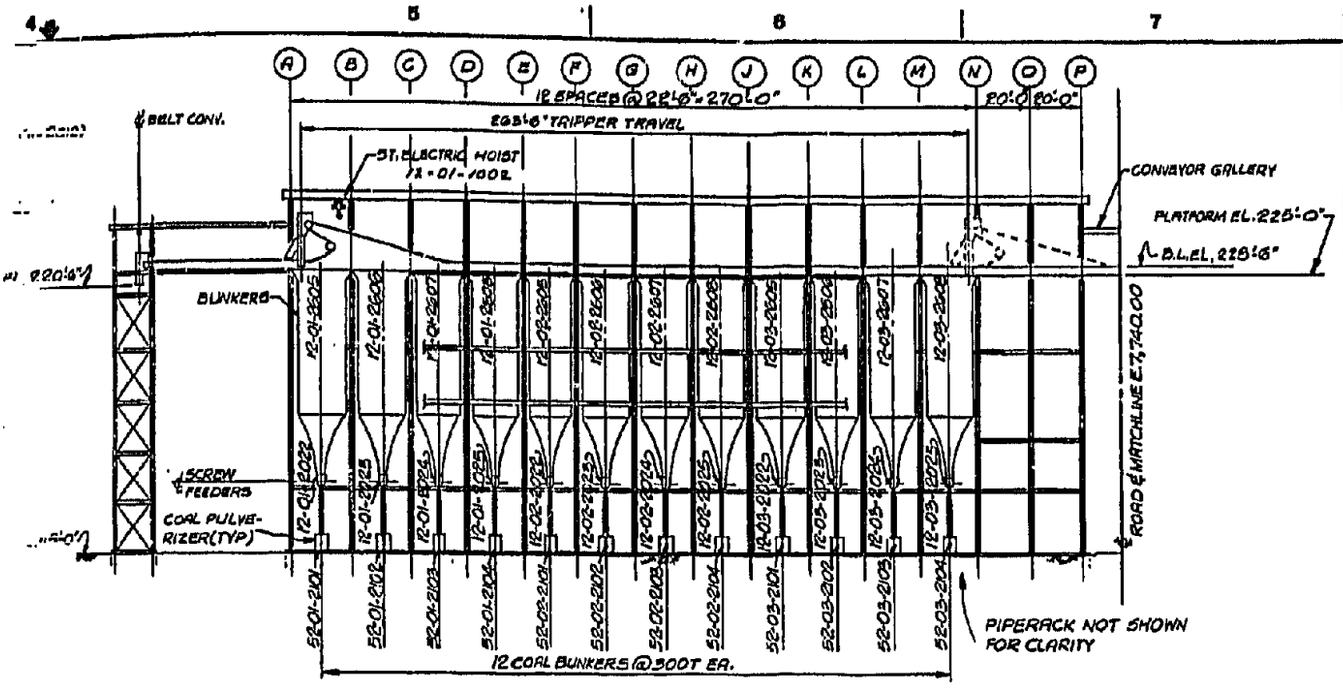
REFERENCES	
R-C-PD-8NP	OVERALL PLOT PLAN
D-52-PD-3NP	STEAM BOILER AREA
D-52-PD-4NP	GAS DESULFURIZATION
D-01-PD-1&NP	PLOT PLAN NES
DRAWING NO.	DESCRIPTION

REFERENCES	
DRAWING NO	DESCRIPTION

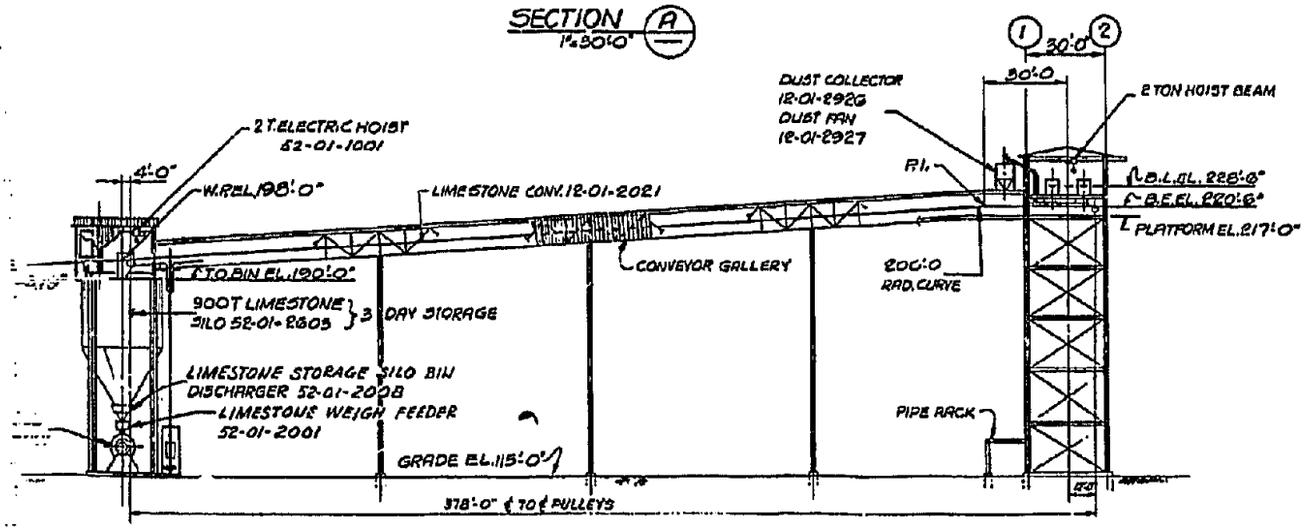
REVISIONS							
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS								
C	5/11/81	W	R.S		WS			
B	5/10/81	W	R.S		SW			
A	4-29-81	LSK	W		SW			
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		

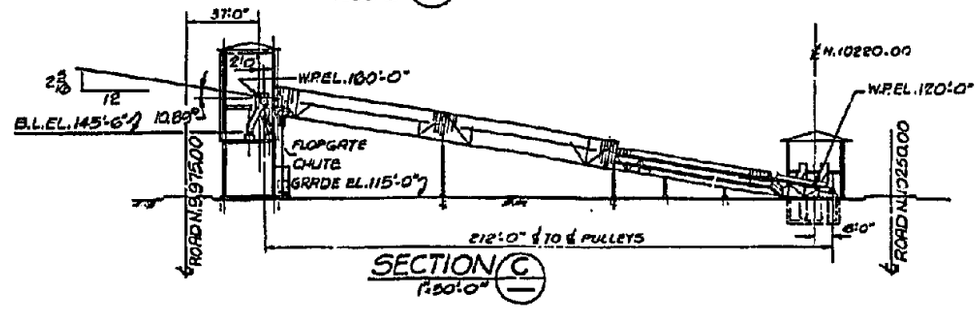
60-02-33 (12/78)



SECTION A
1" = 30'-0"



SECTION B
1" = 30'-0"



SECTION C
1" = 30'-0"

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

ISSUED FOR DESIGN REPORT	FOR		
ISSUE FOR APPROVAL	DRAWN	LBK	4-28-82
ISSUED FOR CLIENT 50% REVIEW	CHECKED	TW	4-29-82
DESCRIPTION	APVD SECT MGR		4-29-82
	APVD PROJ MGR		4-29-82
	APVD CLIENT		

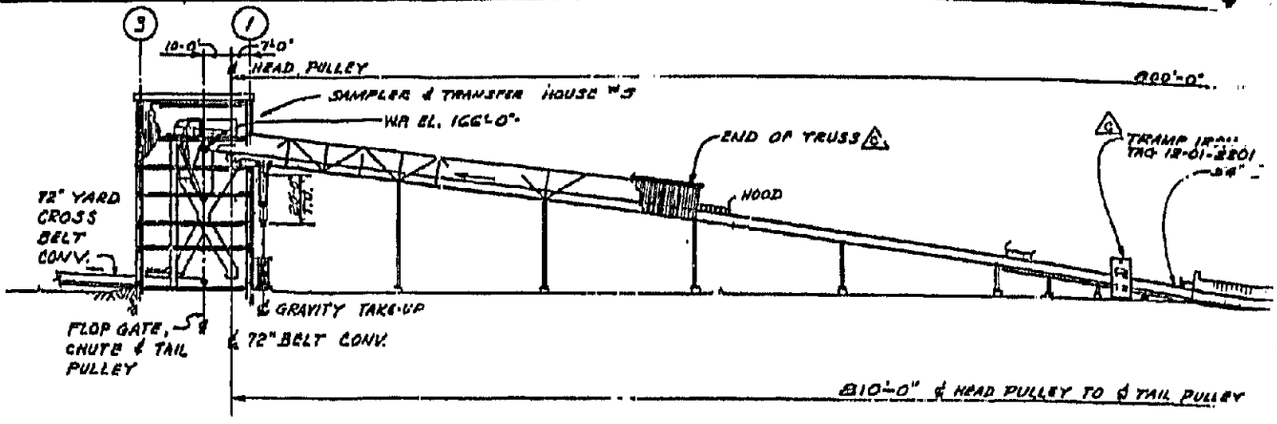
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

TITLE: GENERAL ARRANGEMENT STACKING & RECLAIMING-UNIT 13 POWER PLANT STORAGE BUNKERS PLAN & SECTIONS

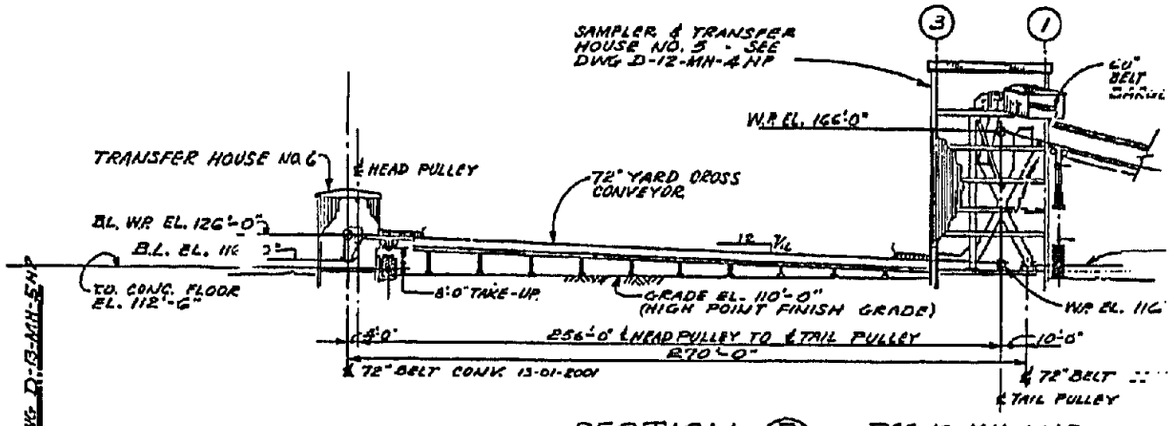
SCALE: AS NOTED | ACCOUNT NUMBER: 2000 | JOB NUMBER: 6182

DOCUMENT NUMBER: D-13-MH-6NP

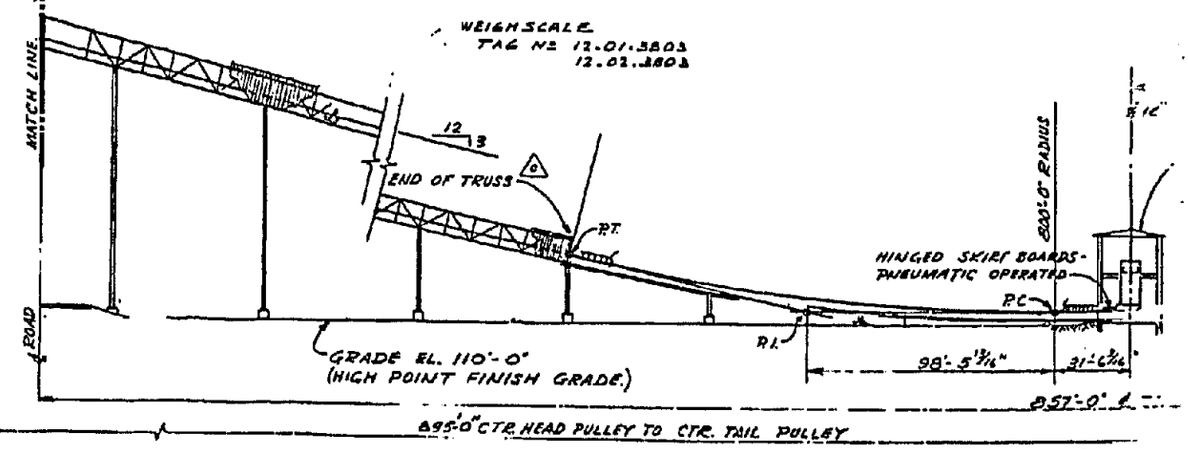
REVISION: C



SECTION (



SECTION (B) REF. 13-MH-1NP
13-MH-7NP

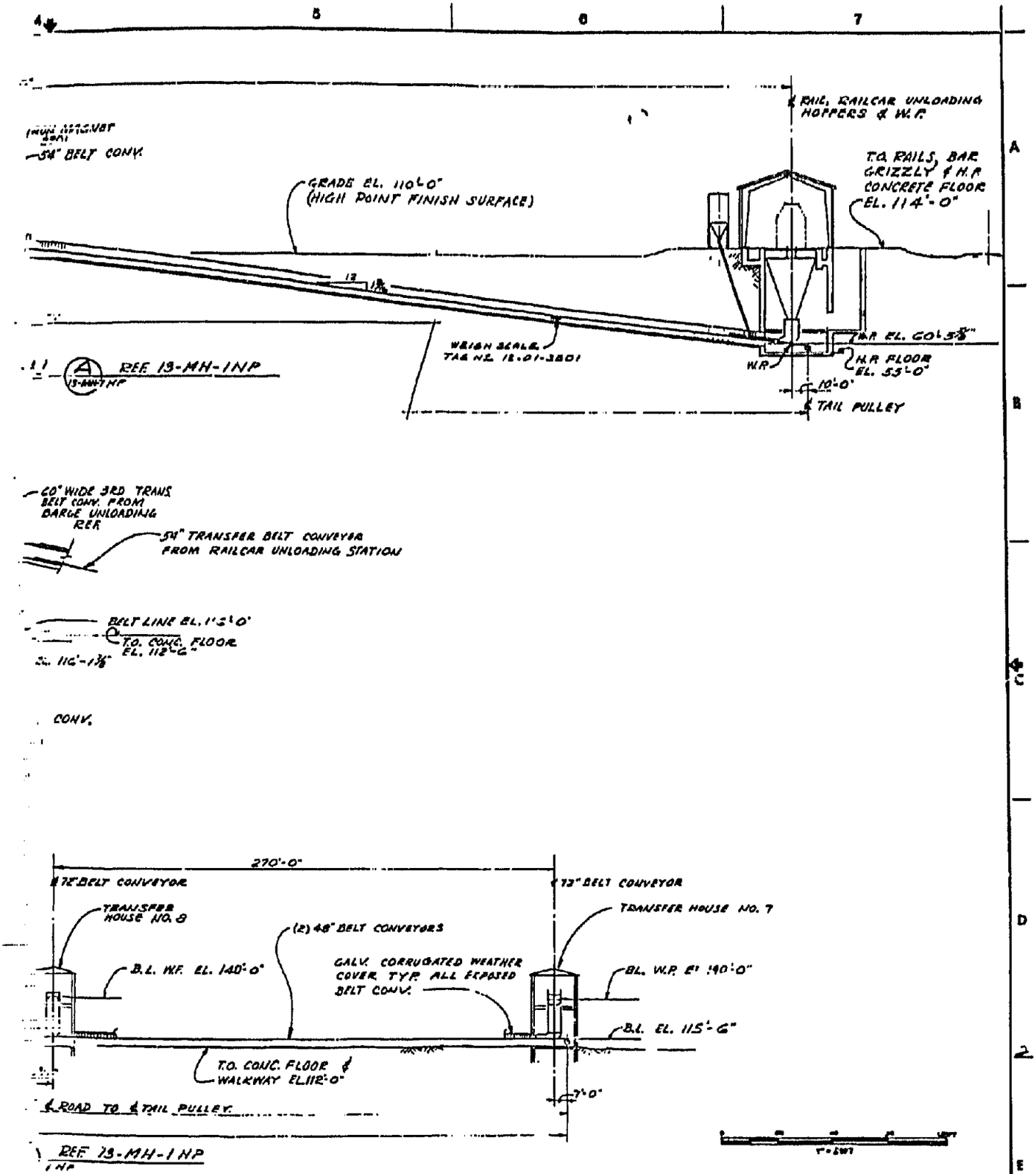


SECTION (C)
13-MH-7NP

REFERENCES			REFERENCES			REVISIONS									REVISIONS									
A-01-PD-3NP	OVERALL PLOT PLAN															C	4/12/82	WJ	A.S.				ISSUED	
D-13-MH-1NP	STACK/RECLAIM-PLAN															B	9-24-81							
D-13-MH-5NP	STACK/RECLAIM-ELEV.																							
DRAWING NO.	DESCRIPTION		DRAWING NO.	DESCRIPTION		NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION			NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		

ENG-GE-33 (12/78)

1



U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

GENERAL ARRANGEMENT STACKING & RECLAIMING — UNIT 13 CONVEYORS SECTIONS	1"=30'-0"	1:000	6182
	D-13-MH-7NP		

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

DESCRIPTION	FOR		
	DRAWN		
	CHECKED		
	APVD DSGN MGR		
	APVD PROJ MGR		
	APVD CLIENT		

G. Single-Line Diagrams

See Volume II, 1.2.1(G) for Coal Stacking and Reclaiming Unit 13 Single-Line Diagrams.

1.2.4 SOLID WASTE COLLECTION AND DISPOSAL - UNIT 14

A. Basis of Design

The solid waste collection and disposal system consists of the equipment needed to receive and carry the plant waste from where generated in the process and utility areas to selected waste disposal areas. The solid wastes are combined into three categories, depending on the source and potential toxicity of the material. Disposal areas for the three wastes are segregated and their leachate and rainwater runoff are treated separately. The free moisture of these wastes is reduced to the greatest practical degree, so that the leachate from each landfill area is minimized.

The design of the system takes into account environmental factors such as air and water quality, noise, public health and safety, land use, and aesthetics of the area. The disposal methods comply with applicable sections of Commonwealth of Kentucky regulations prepared by the Department of Natural Resources and Environmental Protection. A detailed evaluation of the above factors were carried out and documented in the waste disposal system analysis report in Volume V.

Since the largest amount of solid waste will be the gasifier slag, this quantity was a prime factor in establishing the method of collection and disposal. The gasifier slag and boiler bottom slag are collected at the base of the gasifiers and the boilers by a wet collection method. The wastes are dewatered and conveyed to a common railway load bin for transport by a dedicated string of railway cars. Since the gasifier slag and boiler bottom ash are of similar chemical and physical qualities, they are disposed of in the same landfill.

The solid waste generated in the Flue Gas Desulfurization (FGD) process is collected by wet scrubber, stablilized with lime, and mixed with fly ash to be transported by another dedicated string of railway cars.

The process water treatment solids are dewatered and stabilized for transportation by still another dedicated string of railway cars. These wastes are considered hazardous and are to be disposed in a facility designed and operated according to the terms of a hazardous waste landfill permit.

The three types of railway cars will be distinguishable by their mode of loading and unloading and are designed so that the solid waste materials cannot be mixed at either end of the tracks or in transit. All conveying system components are designed in accordance with industry standard engineering practices and as described in Coal Area Design Criteria CRT-10-PR-1 and Material Handling Design Criteria CRT-01-MH-01 in Volume I.

Two gasifier slag collection conveyors are provided, one for standby operation. A large surge capacity in the train loading bins is provided to safeguard against any temporary interruption in the conveying or train transport systems. Two trains normally operate between the plant and the disposal sites; however, one train is able to dispose of all slag without affecting the plant production. A single train hauls FGD solid waste designed to operate only during the daytime.

B. System Selection Rationale

The design of the solid waste collection and disposal system is based on material characteristics, the need to keep the three types of waste segregated, the disposal site topography, and waste quantities.

Various methods conveying the solid wastes to the disposal area were considered. Plant surveys were conducted, some site visitations were carried out, and equipment vendors were contacted to evaluate competing systems. The capital and operating cost for each practical system was estimated. The reliability and flexibility of operation for each scheme was studied. A report of this study is enclosed in Volume V, which determined that a common railway system with dedicated railcars disposing waste to segregated areas is best suited for the project.

C. System Description

Solid waste collection and disposal systems are described in three parts: solid waste collection, solid waste transport, and solid waste disposal.

1. Solid Waste Collection. Solid waste material is collected from the units where generated by different methods. The largest amount of solid waste will be the gasifier slag (5,315 stpd). The slag material discharged from the gasifiers is crushed and screened. The oversize material from the screen is loaded onto one of two belt conveyors that takes the material to one of two train loadout bins.

The bottom slag from the utility boilers is discharged into wet bottom disposal hoppers. The slag is crushed into less than 2-inch nominal size to be transported by wet slurry eductors to a bottom ash settling basin, where two flight chain conveyors drag the slag from the bottom, dewater it, and load it onto the gasifier slag conveyor.

The sulfur components present in the flue gas from the utility boilers are removed by the Research-Cottrell double-loop limestone flue gas desulfurization (FGD) process. The gypsum product is conveyed as wet sludge to a Conversions Systems Incorporated fixation unit. Here the FGD solid waste is mixed with dry fly ash from the electrostatic precipitators and dry lime and converted into a stabilized solid waste. Since the stabilization process needs 2 to 5 days to allow completion of the reaction, an aging pile is provided prior to hauling the material to the waste disposal area. The area of the aging pile is paved and curbed to retain rainwater runoff and contain any leachate. FGD solid wastes are picked up from the aging pile by a front-end loader and transported to dedicated railcars.

The material from the raw water treatment area and the biosludge from the aerobic digesters are inert solid wastes suitable for landfill or as a soil conditioner for plant landscaping. These materials are dewatered by belt presses and conveyed by a separate belt conveyor to a bin at the railcar loading station. They are transported in dedicated railcars.

The solid waste materials from the process water treatment areas pass through filter presses and the solid cakes drop onto belt conveyors running below the filters. The cake will be conveyed to two loadout bins at the train unloading station.

2. Solid Waste Transport. The three different types of solid waste are loaded into segregated strings of railcars and transported on a common track to their respective destinations. The gasifier slag and boiler bottom slag are transported in bottom dump type cars. The FGD waste and the process water treatment wastes are loaded into side-dump cars designed for dumping the right side and left side, respectively.

The trains are pulled by electric locomotives on welded narrow gauge tracks to minimize noise pollution. Two 10-car trains of 10-ton nominal capacity cars each make one round trip every hour for the gasifier slag and bottom slag transport. The spreading of slag at the disposal area is performed 24 hours a day by noise-attenuated belt conveyor.

A 10-car train carrying the FGD and raw water treatment wastes and process water treatment wastes makes six trips during daylight hours. The railcars are coded to automatically change the track switches for spotting to their respective loading and unloading stations. Each locomotive is manned by an operator. In the event of human error or failure of the track switching mechanism, whereby a train could be directed to a wrong unloading/loading station, a secondary safety device is provided at these stations so that the loading and unloading trip mechanism does not trip the railcars not destined for that disposal area.

3. Solid Waste Disposal. There are three segregated disposal areas in the southeast section of the plantsite. The solid wastes brought to these areas are handled by two different methods.

The gasifiers and boiler bottoms slag are brought to the disposal site for those materials by two 10-car trains, each train making 24

trips in a 24-hour period. When driven over the unloading hoppers, the railcars' bottom doors open and discharge the material into a 100-ton unloading bin. This bin feeds the waste onto a 36-inch-wide fixed belt conveyor. The fixed conveyor transports the waste about 1,200 feet to a 36-inch-wide shiftable belt conveyor. The shiftable conveyor is 1,800 feet long and has a traveling belt tripper with a 45-foot-long stacker boom. The slag received by this belt is transferred over the tripper onto the stacker boom to be discharged into an existing valley. The tripper-stacker combination moves to a new position when the waste fills up to the required elevation at the unloading location. When the spot is rough-leveled, the earthmoving equipment finish-level and compact the waste stack and place a 3-foot-thick final cover, allowing the stacker to be moved to a new location. When the adjacent area along the entire length of the shiftable conveyor is filled, three side-boom dozers lift the shiftable conveyor and reposition it to the new location to repeat the waste disposal procedure as described above. While the conveyor is being shifted, a second dump hopper receives the slag for later transfer into the adjacent valley by earthmoving equipment.

The wastes from the FGD and raw water treatment plants are brought by a separate train to the disposal site. Here, the side-dump railcars discharge the wastes at the unloading area. Bulldozers and front-end loaders place and compact the wastes into the surface depression for the first 2 years. After 2 to 4 years, when the disposal area close to the train unloading station is filled and covered with a 3-foot final cover, a set of lift conveyors or dump trucks is used to carry the wastes across the filled area next to the unloading station to the new fill area.

The process water treatment solid wastes are transported by a third string of dedicated cars, which brings that waste to the third disposal area. The unloading station there is similar to the FGD and raw water wastes handling station, except that it will trip the cars meant only for this disposal area.

Rainwater runoff ponds collect the leachate and contaminated rainwater runoff from each of the three waste disposal sites. The ponds have floating pumps to transfer the accumulated water in two return water mains, taking the water to their respective treatment plants.

The topsoil scraped from the barge slip area is temporarily stacked along the perimeter of the existing valleys and used for the solid waste landfill cover. The topsoil will be planted with fast growing grasses to minimize windblown dust from the pile. The solid waste is spread as evenly as possible by the bulldozers to the elevations shown in Drawing D-14-CE-3NP.

The slag waste is disposed at the site by a conveyor-stacker combination system. The waste disposal valley is filled from one side of its ridge. In approximately 3 months, adequate area is filled to finished grade so that the stacked topsoil can be spread on the slag waste fill to a thickness allowed by the "Permit to Construct a Residual Landfill." The finished landfill is compacted, finish graded, cultivated, and revegetated with indigenous grasses.

The solid wastes quantities from the raw water treatment (231 stpd) and process water treatment (633 stpd) are far less than those from the gasifiers. Thus, this landfill operation needs to be performed during the daylight hours. In the case of process water treatment solid wastes, the reclaimed land is covered by a temporary cover of a minimum 6-inch thickness of topsoil at the end of the daily operations. At the end of a 6-month period, a portion of the valley that has reached the final grade is covered by topsoil, cultivated, and revegetated.

D. Risk Assessment

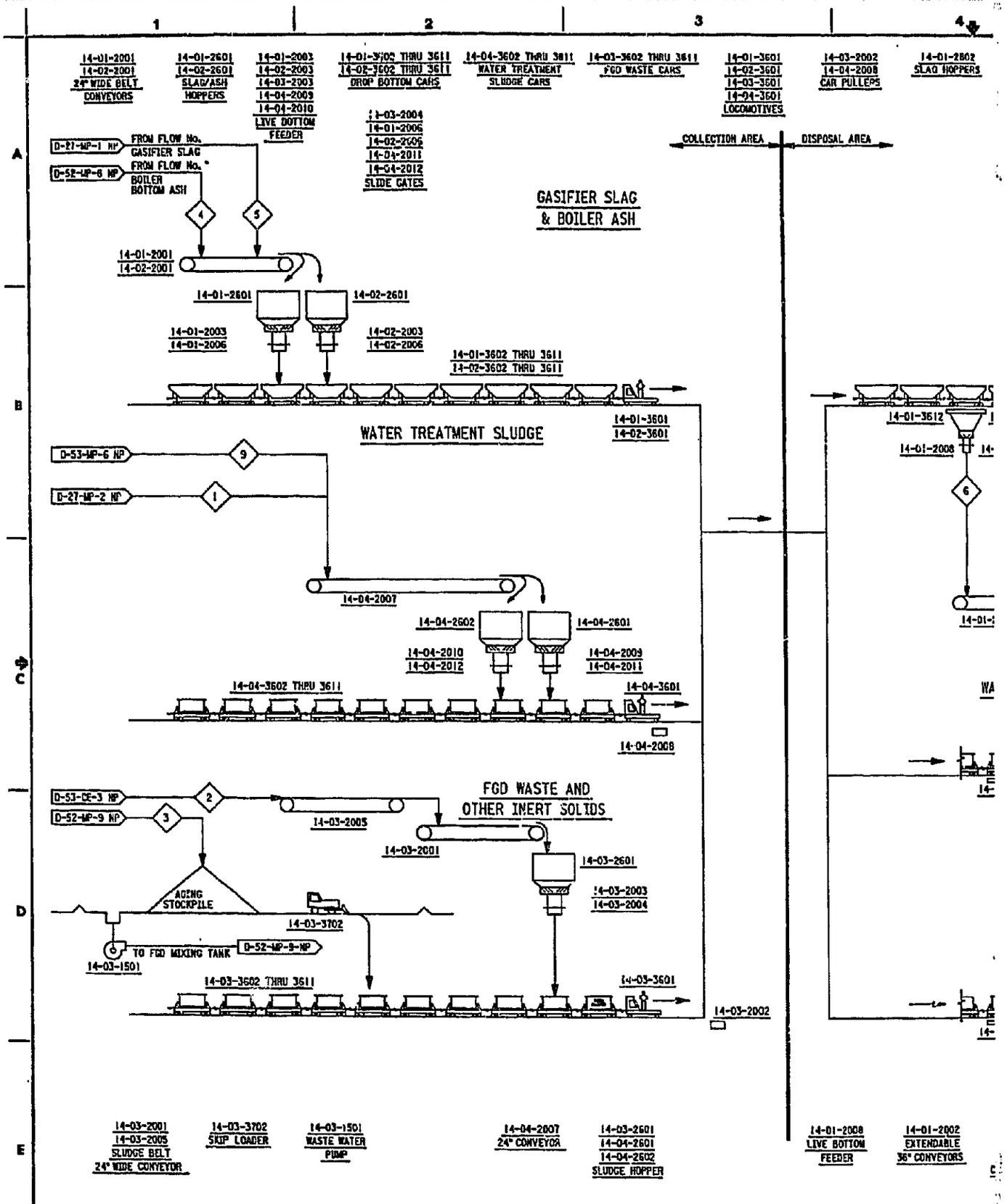
The solid waste collection, transportation, and disposal systems utilize standard and commercially proven equipment; no prototypes are to be employed. The transportation and discharge of wastes, although primarily automated, is backed up with manual controls. Segregation of the disposal areas is conducive to good environmental controls.

The risk involved of individual conveyor failure is minimized by nature of the design of the equipment and the safety features detailed in CRT-01-MH-1. The surge capacities in intermediate hoppers and bins permit the transfer of wastes from a continuous operating plant to the batch train loading and unloading facilities. The risk of the gasifier operation upset is reduced by providing two parallel waste slag collecting conveyors, each capable of carrying the total plant capacity. Similarly, the slag transport trains run in two strings, each able to carry the total plant waste by either increasing the load in the cars or increasing the trips of the train.

E. Process Flow and Control Diagrams (Including Material Balance)

Process Flow and Control Diagrams for Solid Waste Collection and Disposal Unit 14 are as follows:

Drawing No.	Title
D-14-MP-1NP	PFCD Coal Area - Unit 14 Solid Waste Disposal Systems
D-14-MP-2NP	Material Balance - Solid Waste Collection and Disposal System - Unit 14



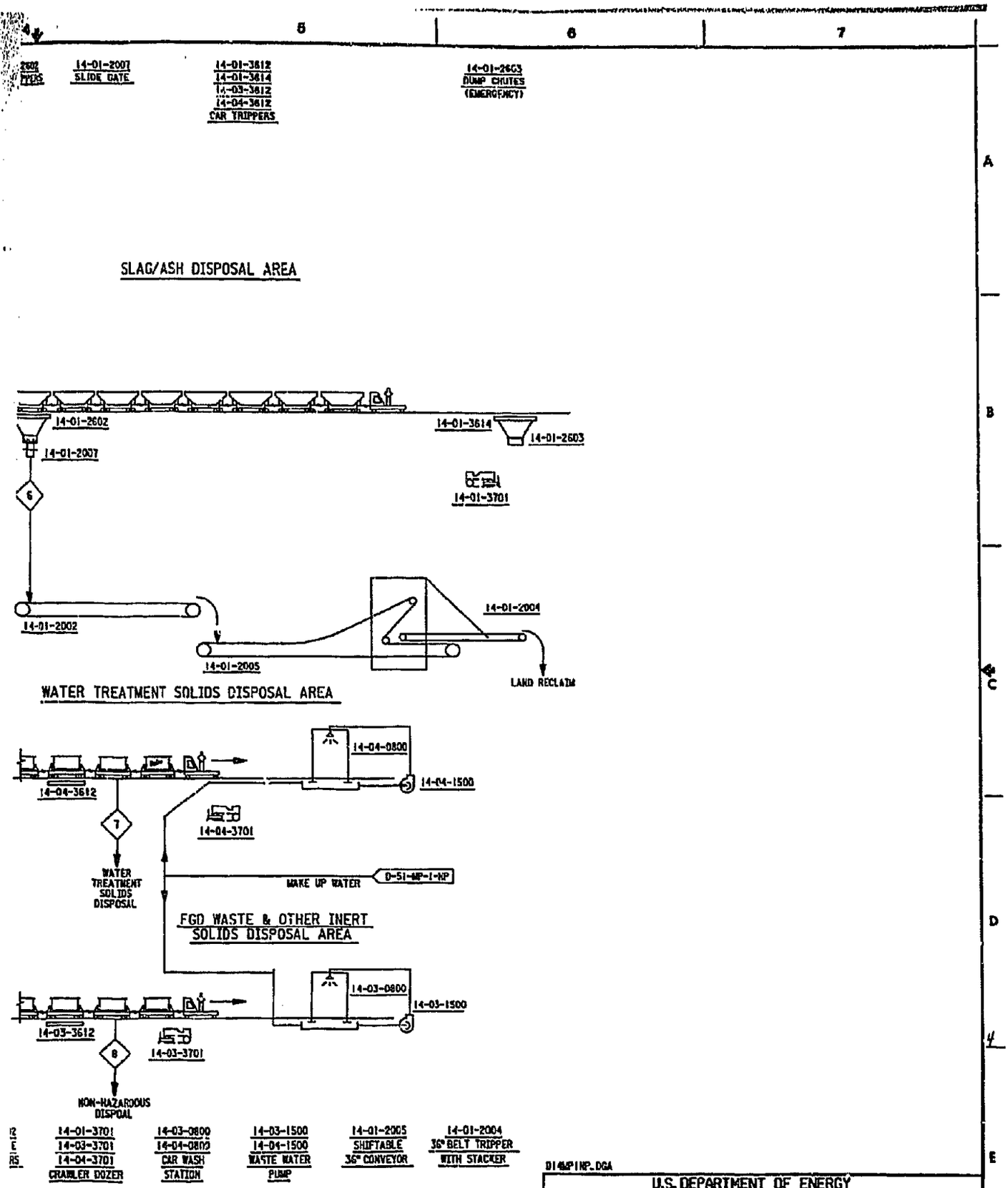
REFERENCES	
D-52-MP-6 NP	
D-21-MP-1 NP	
D-51-MP-1 NP	
D-52-MP-9 NP	
D-53-CE-3 NP	
DRAWING NO.	DESCRIPTION

REFERENCES	
D-53-MP-6 NP	
D-27-MP-2 NP	
DRAWING NO.	DESCRIPTION

REVISIONS								
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	

REVISIONS								
C	6/3/02							FOR
B	5/24/02		RS	OMA	SHR			FOR
A	4/22/02		RS	OMA	SHR			FOR
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		

This document and the design it covers are the property of ... They are neither loaned and on the borrowers' express agreement just only will not be reproduced, copied, loaned, exhibited, nor used except in the limited way and private use permitted by any written consent given by the lender to the borrower.



D14MP1NP.DGA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

	DRAWN	WFV	
FOR DESIGN REPORT	CHECKED	RS	4/21/82
FOR CLIENT APPROVAL	APVD SECT MGR	OMA	4/21/82
FOR CLIENT 50% REVIEW	APVD PROJ MGR	SHR	4/21/82
DESCRIPTION	APVD CLIENT		

RMP

THE RALPH M. PARSONS COMPANY

PASADENA, CALIFORNIA

TITLE: PROCESS FLOW & CONTROL DIAGRAM
COAL AREA - UNIT 14
SOLID WASTE DISPOSAL SYSTEMS

SCALE: NONE | ACCOUNT NUMBER: 2000 | DATE: 6182

DOCUMENT NUMBER: D-14-MP-1 NP

REVISION: C

FLOW IDENTIFICATION	1 GAS. PROCESS WATER TREATMENT	2 FROM BELT PRESS	3 FROM PUG MILL	4 FROM BOTTOM BOILER ASH	5 FROM GASIFICATION UNIT
MATERIAL	WATER TREATMENT SOLIDS	INERT SOLIDS	STABLIZED F.O.D. SLUDGE	BOILER BOTTOM ASH	GASIFIER SLAG
SIZE (1) (INCHES) (MESH)	(±100)	(±100)	(±10)	(-1")	(-1")
MOISTURE % (MAX.)	45%	60%	15%	20%	20%
TEMPERATURE °F	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT
BULK DENSITY (LBS. FT.3)	80	60	120.8	84.7	84.7
EQUIP. OPERATING RATE STPH (LBS/HR)	30	10	60	3	300
EQUIP. DESIGN RATE NOM. STPH (LBS/HR)	37	12	75	4	375
EQUIP. DESIGN FACTOR*	1.25	1.25	1.25	1.25	1.25
TOTAL QUANTITY (NOC) TPD	380	231	972	52	5,315

REFERENCES

DRAWING NO.	DESCRIPTION
D-14-MP-1	

REFERENCES

DRAWING NO.	DESCRIPTION

REVISIONS

NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS

NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	
E	3/19/81		RS		SHR		REISSU
D	7/9/80		RS	DMA	SHA		REISSU
C	8/11/80		RS	DMA			FOR C
B	6/3/80		RS		SHR		FOR C
A	5/14/80			DMA	SHR		FOR C

CHD-DE-23 (12/79)

NOTES:

1. PARTICULATE SIZES ARE APPROXIMATE. THE SOLID MATERIAL HANDLER WILL BE IN THE SHAPE OF CAKE BOUND BY THE PRESENCE OF MOISTURE.

5	6	7	8	9
RON ICATION IT	GAS. SLAG & BOILER ASH	WATER TREATMENT SLUDGE	F.G.D. SLUDGE & INERT SOLIDS	EVAPORATOR SOLIDS
IFIER LAG	GAS. SLAG & BOTTOM ASH	WATER TREATMENT SLUDGE	F.G.D. SLUDGE & INERT SOLIDS	WATER TREATMENT SOLIDS
(-1")	(-1")	(±100)	(±10)	(±100)
20%	20%	45%	25%	40%
AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT
84.7	84.7	80	100	80
300	400	300	300	25
375	500	375	375	30
1.25	1.25	1.25	1.25	1.25
5,319	5,367	632	1,203	252

D14MP2NP.DGA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: MATERIAL BALANCE SOLID WASTE COLLECTION & DISPOSAL SYSTEM UNIT 14

SCALE: NONE | PROJECT NUMBER: 2000 | DOC NUMBER: 6182 | REVISION: E

DOCUMENT NUMBER: D-14-MP-2 NP

DESCRIPTION	DATE		
REVISED FOR DESIGN REPORT			
REISSUED FOR CLIENT APPROVAL			
FOR DESIGN REPORT			
FOR CLIENT APPROVAL			
FOR CLIENT SOX REVIEW			

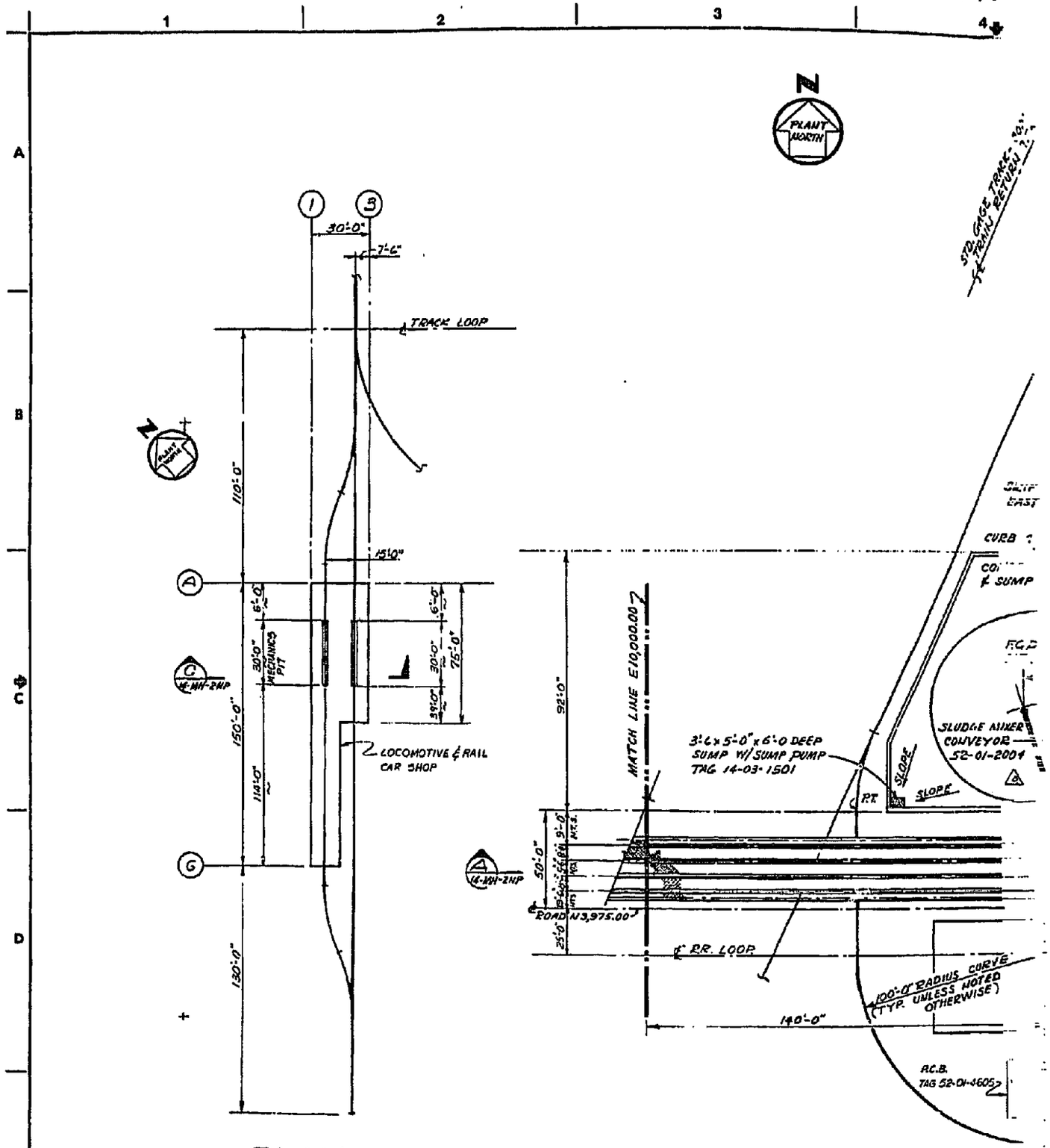
DATE / DRAWN / CHECKED / APVD SUCV MR / APVD PROJ MGR / APVD CLIENT

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

F. Plot Plan/General Arrangement Drawings

Plot Plan/General Arrangement Drawings for Solid Waste Collection and Disposal Unit 14 are as follows:

Drawing No.	Title
D-14-MH-1NP	General Arrangement - Slag and Ash Collection and Disposal - Unit 14 Loadout Area - Plan
D-14-MH-2NP	General Arrangement - Slag and Ash Collection and Disposal - Unit 14 Loadout Area - Elevation
D-14-MH-3NP	General Arrangement - Slag and Ash Collection and Disposal - Unit 14 Slag and Ash Disposal - Plans and Sections



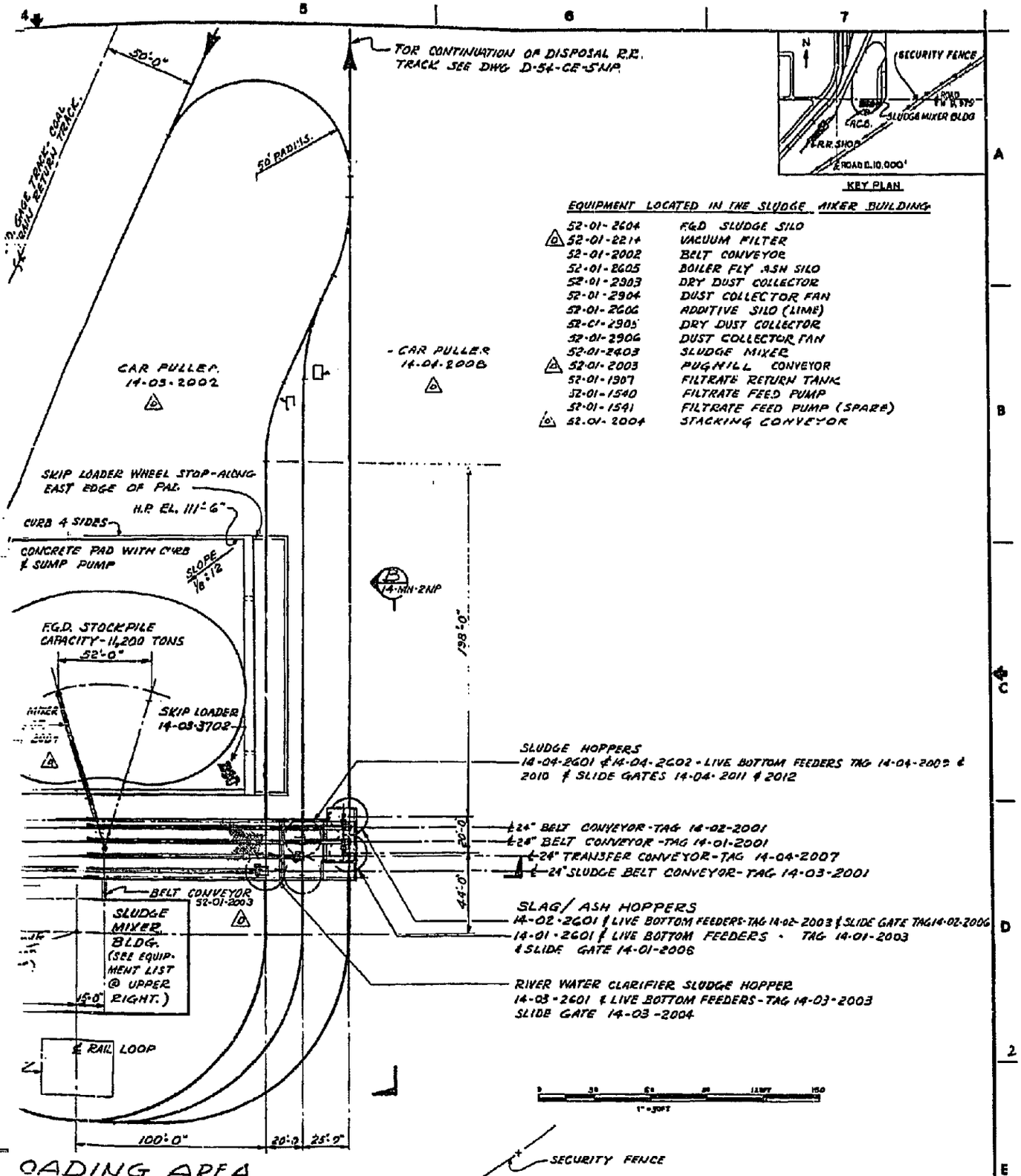
REFERENCES		
R-01-PD-3HP	PLOT PLAN	
D-14-MH-2HP	SLAG/SLUDGE DISPOSAL-FLOW	
D-21-MH-1HP	GRASHARC AREA PLAN	
DRAWING NO.	DESCRIPTION	

REFERENCES		
DRAWING NO.	DESCRIPTION	

REVISIONS							
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS									
E	1/17/73	R.S.	F.G.				101	REVISE
D	6/6/72	R.S.	F.G.					REVISE
C	5/24/72	W.W.	F.G.				1705	ISSUE
B	5/7/72	W.W.	F.G.					ISSUE
A	4/14/72	W.W.						CLIENT
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		

1 2 3 4



EQUIPMENT LOCATED IN THE SLUDGE MIXER BUILDING

52-01-2604	F.G.D. SLUDGE SILO
△ 52-01-2214	VACUUM FILTER
52-01-2002	BELT CONVEYOR
52-01-2605	BOILER FLY ASH SILO
52-01-2903	DRY DUST COLLECTOR
52-01-2904	DUST COLLECTOR FAN
52-01-2606	ADDITIVE SILO (LIME)
52-01-2905	DRY DUST COLLECTOR
52-01-2906	DUST COLLECTOR FAN
52-01-2403	SLUDGE MIXER
△ 52-01-2003	PUGMILL CONVEYOR
52-01-1907	FILTRATE RETURN TANK
52-01-1540	FILTRATE FEED PUMP
52-01-1541	FILTRATE FEED PUMP (SPARE)
△ 52-01-2004	STACKING CONVEYOR

LOADING AREA
SLUDGE & F.G.D.

ISSUED FOR DESIGN REPORT		
ISSUED FOR DESIGN REPORT		
ISSUED FOR CLIENT APPROVAL		
30% REVIEW		
DESCRIPTION		

△ FOR

DRAWN		4-16-82
CHECKED		4-16-82
APVD SECT HD		4-16-82
APVD PROJ MGR		4-21-82
APVD CLIENT		

RMP
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

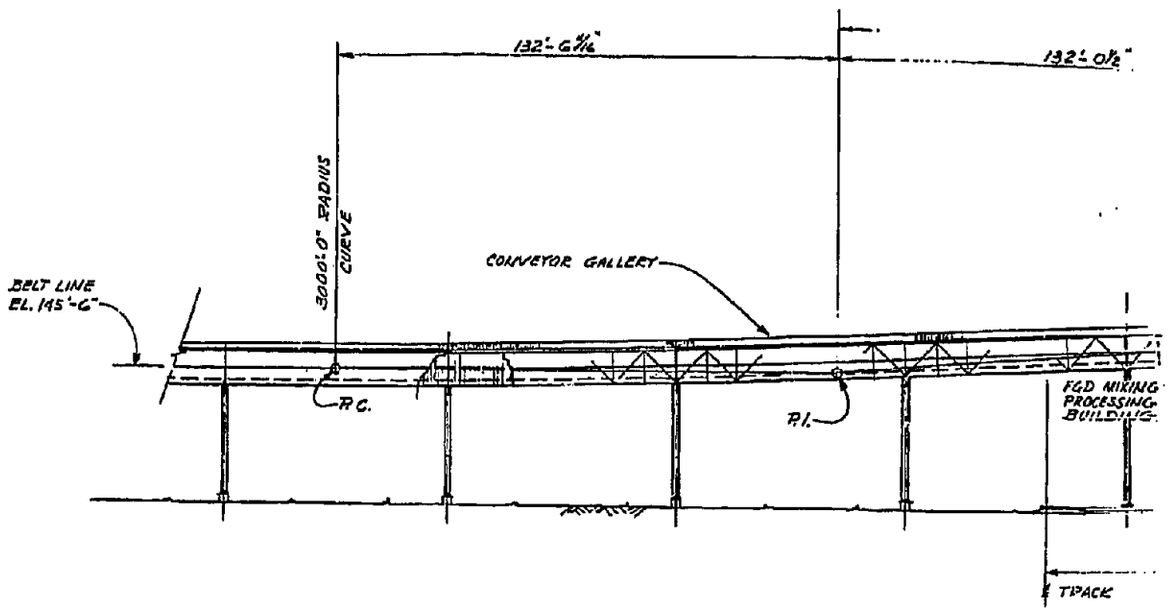
50,000 B.P.D.

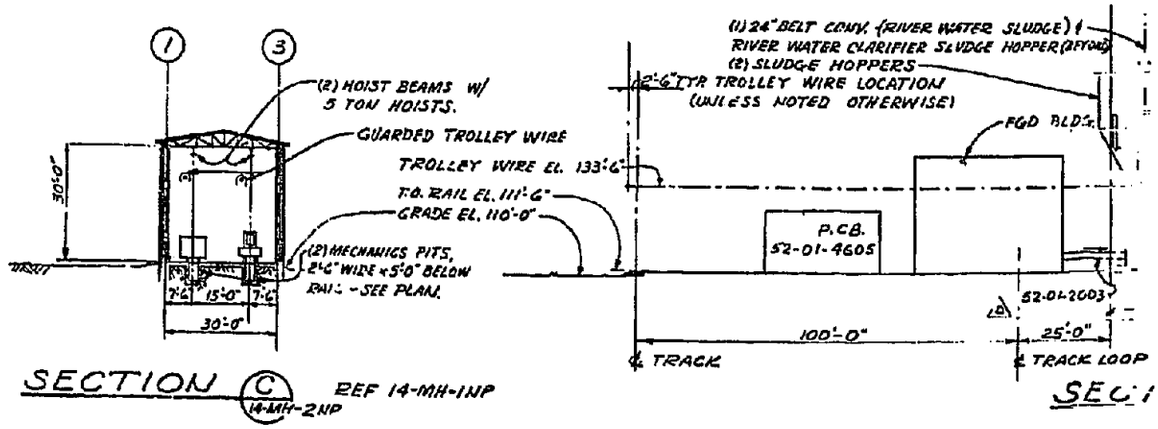
COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: GENERAL ARRANGEMENT SLAG/ASH COLLECTION & DISPOSAL LOAD OUT AREA — UNIT 14 PLAN

SCALE: 1" = 30'-0" | ACCOUNT NUMBER: 2000 | DRAWING NUMBER: 6182 | REVISION: E

DOCUMENT NUMBER: D-14-MH-1 NP





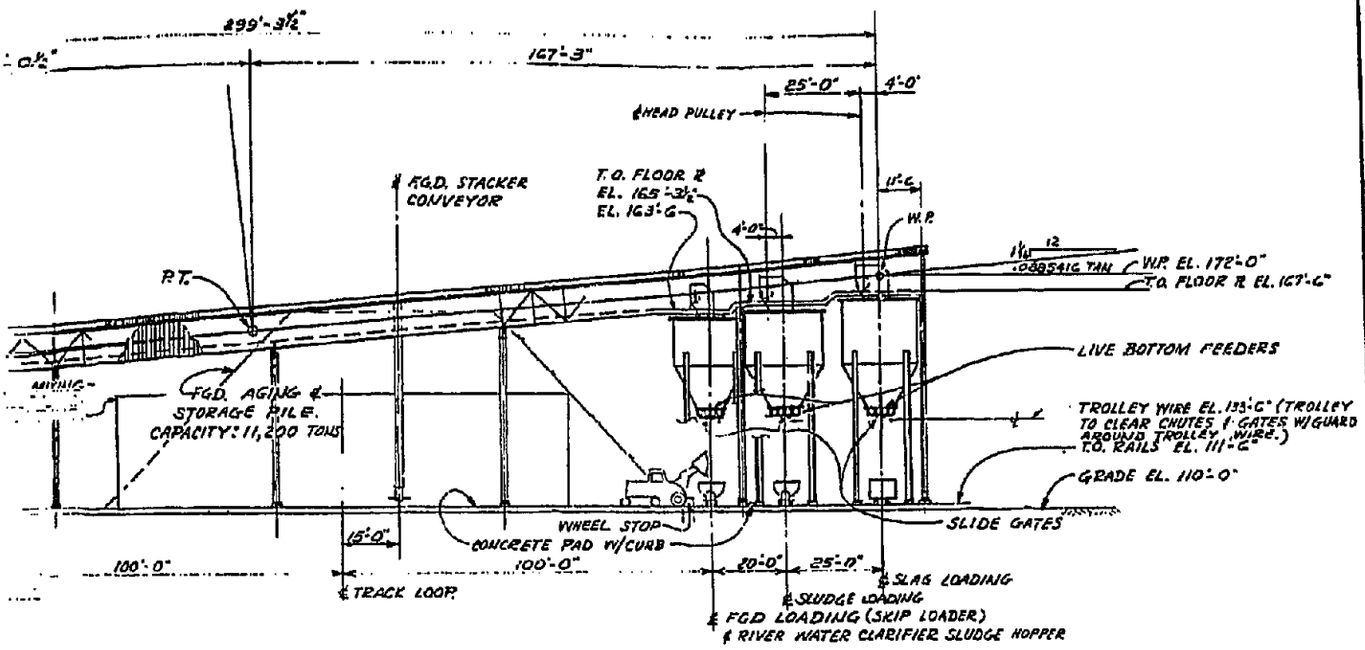
REFERENCES	
R-01-PD-3NP	PLOT PLAN
D-14-MH-1NP	SLAG/ASH DISPOSAL PLAN
D-21-MH-1NP	GASIFIER AREA PL. & EL.
DRAWING NO.	DESCRIPTION

REFERENCES	
DRAWING NO.	DESCRIPTION

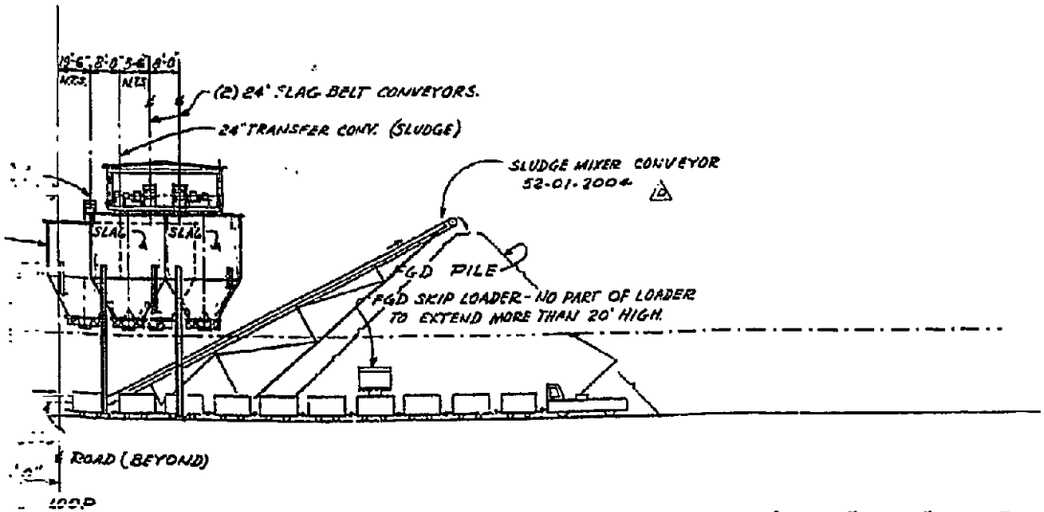
REVISIONS							
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

REVISIONS								
E	6/4/81	R.S.	FG					
D	5/8/81	RS	FG					
C	5/14/81	WW	FG					
B	5/3/81	WW	FG					
A	1/12/81	WJ						
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		

DWG-02-23 (12/78)



SECTION (A) REF 14-MH-1NP
(14-MH-2NP)



SECTION (B) REF. 14-MH-1NP
(14-MH-2NP)

1" = 20FT

1	ISSUED FOR DESIGN REPORT	DRAWN	4-5-82
2	RE-ISSUED FOR DESIGN REPORT	CHECKED FG	4-16-82
3	ISSUED FOR DESIGN REPORT	APVD SECT HD	4-16-82
4	ISSUED FOR CLIENT APPROVAL	APVD PROJ MGR	4-21-82
5	CLIENT 50% Review	APVD CLIENT	
	DESCRIPTION		

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

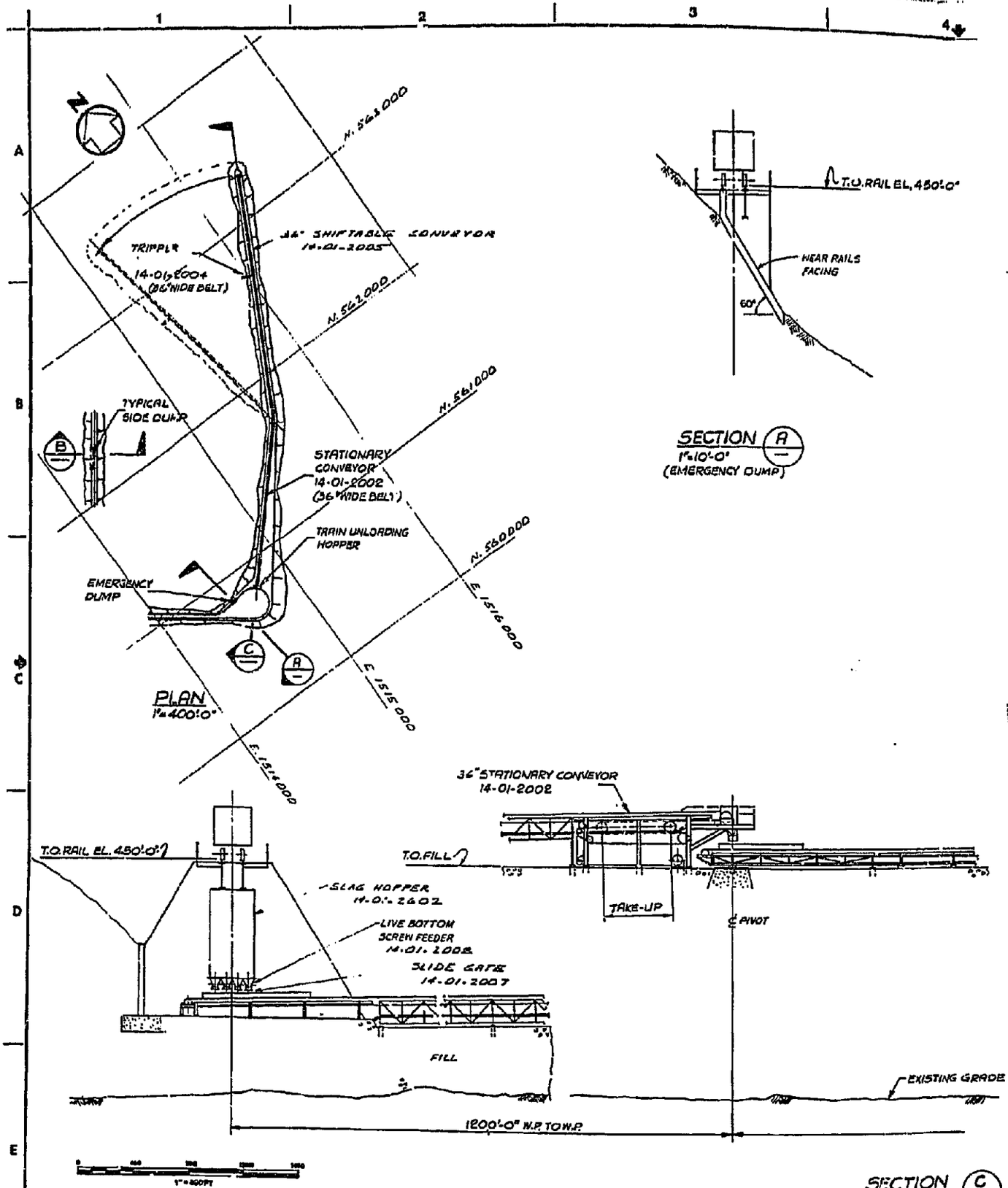
50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: GENERAL ARRANGEMENT SLAG/ASH COLLECTION & DISPOSAL LOAD OUT AREA — UNIT 14 ELEVATION

SCALE: 1" = 20'-0" | DOCUMENT NUMBER: 2000 | JOB NUMBER: 6182 | REVISION: E

DOCUMENT NUMBER: D-14-MH-2NP



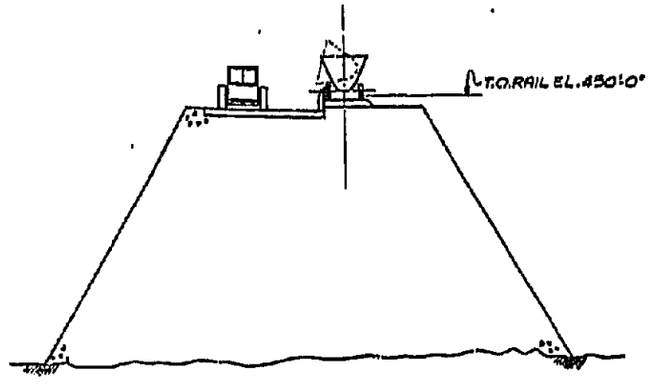
REFERENCES		
D-14-CE-2NP	INITIAL CONSTR. 50KBPD	
D-14-CE-3NP	FINAL COND. 50KBPD	
D-14-YA-1NP	PROCESS FLOW DIAGR.	
DRAWING NO.	DESCRIPTION	

REFERENCES	
DRAWING NO.	DESCRIPTION

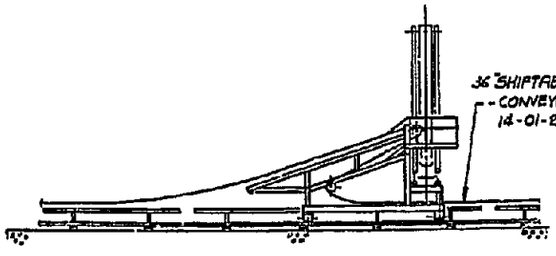
REVISIONS							
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION

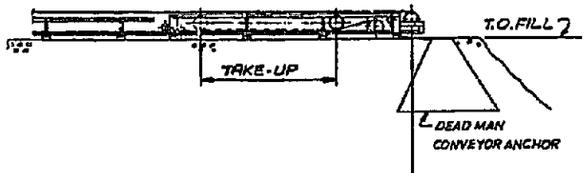
REVISIONS								
C	5-27-82	L.K.	R.S.					
B	5-4-82	L.K.	R.S.					
A	5-7-82	L.B.K.						
NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		

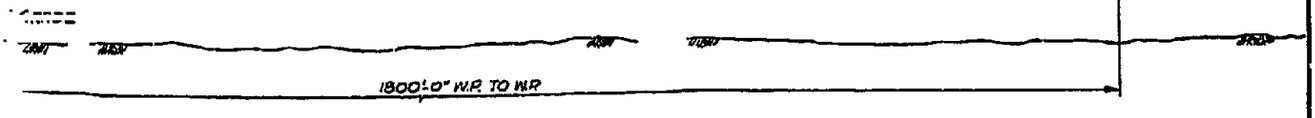
ENG-GE-23 (12/78)



SECTION B
1" = 10'-0"
(TYP. SIDE DUMP)







1" = 10FT

FOR DESIGN REPORT		
FOR CLIENT APPROVAL		
FOR CLIENT 50% REVIEW		
DESCRIPTION		

DRAWN	LBK	5-7-82
CHECKED	OMA	5-7-82
APVD SECT HD		5-7-82
APVD PROJ MGR		5-7-82
APVD CLIENT		

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: GENERAL ARRANGEMENT
SLAG & ASH COLLECTION & DISPOSAL - UNIT 14
SLAG & ASH DISPOSAL
PLANS & SECTIONS

SCALE: AS NOTED | ACCOUNT NUMBER: 6182 | JOB NUMBER: 2000

DOCUMENT NUMBER: D-14-MH-3NP

REVISION: C

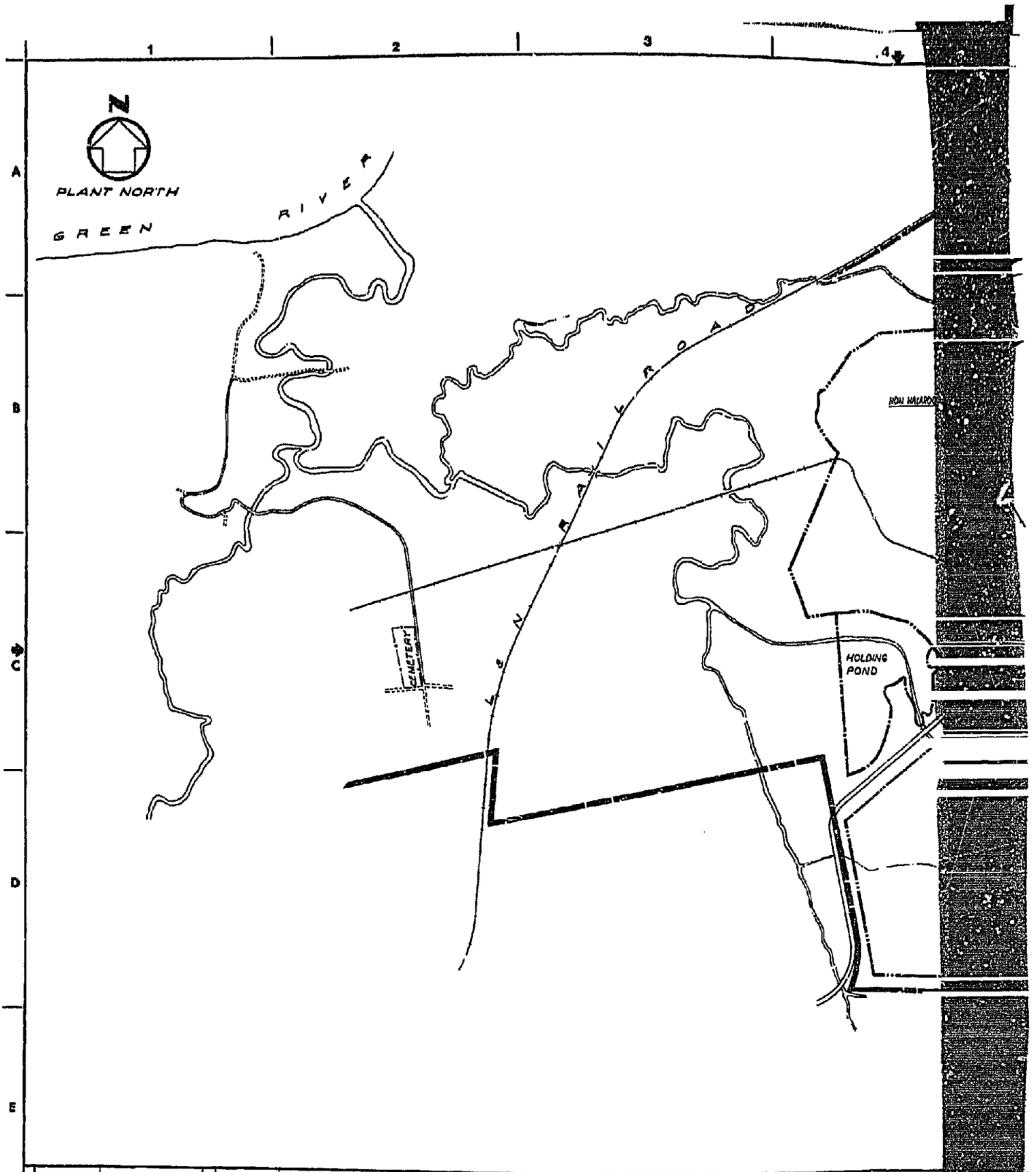
G. Single-Line Diagrams

See Volume II, 1.2.1(G) for Solid Waste Collection and Disposal Unit 14 Single-Line Diagrams.

H. Civil Engineering Drawings

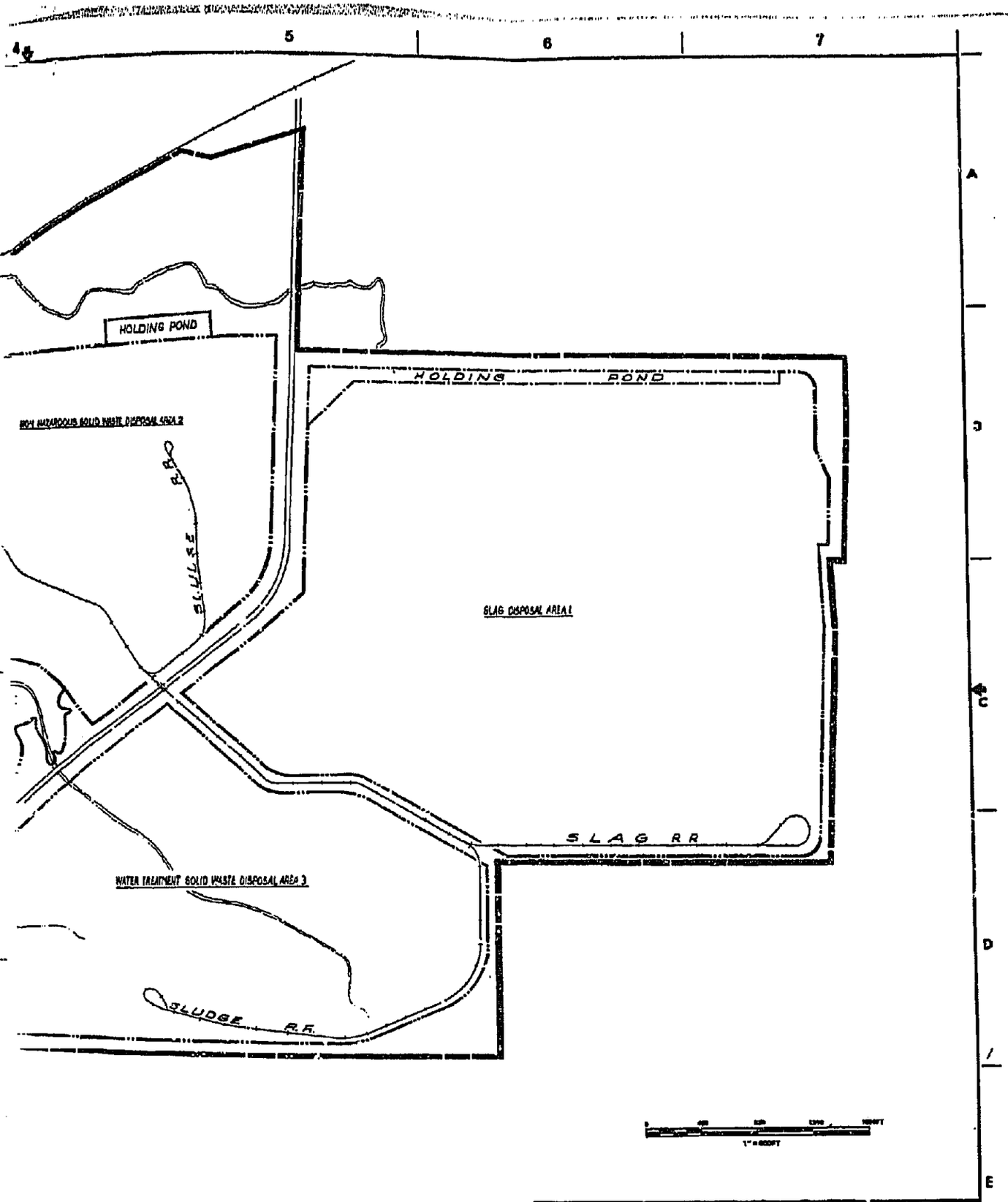
Civil Engineering Drawings for Solid Waste Collection and Disposal Unit 14 are as follows:

Drawing No.	Title
D-01-CE-1NP	Solid Waste Disposal Area - Plot Plan
D-14-CE-1NP	Railroad Profiles
D-14-CE-2NP	Slag Disposal Area - Initial Construction
D-14-CE-3NP	Slag Disposal Area - Final Construction
D-14-CE-4NP	Slag Railroad and Waste Disposal Area - Sections and Details



REFERENCES		REFERENCES		REVISIONS								REVISIONS								
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		
												C	6-20-82	TK						UNLESS NO.
												B	5-5-82	TK						FOR CLIENT
												A	2-26-82	PC						CLIENT

ENG-GE-23 (12/79)



U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

60,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: SOLID WASTE DISPOSAL AREA

SCALE: 1" = 400'

ACCOUNT NUMBER: 4800

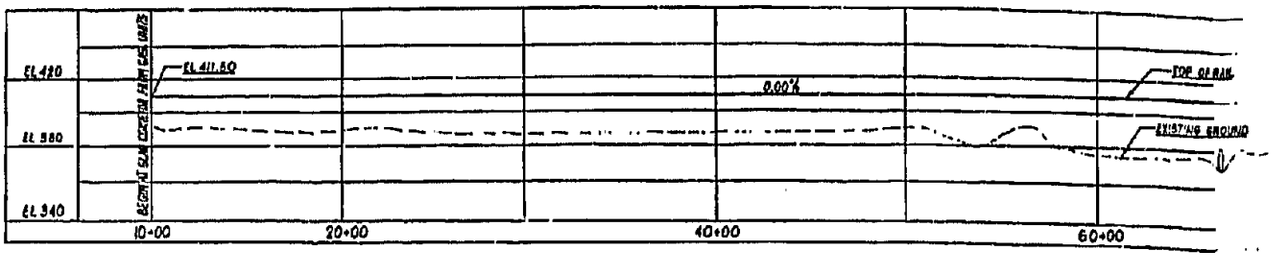
JOB NUMBER: 6182

DOCUMENT NUMBER: D-01-CE-INP

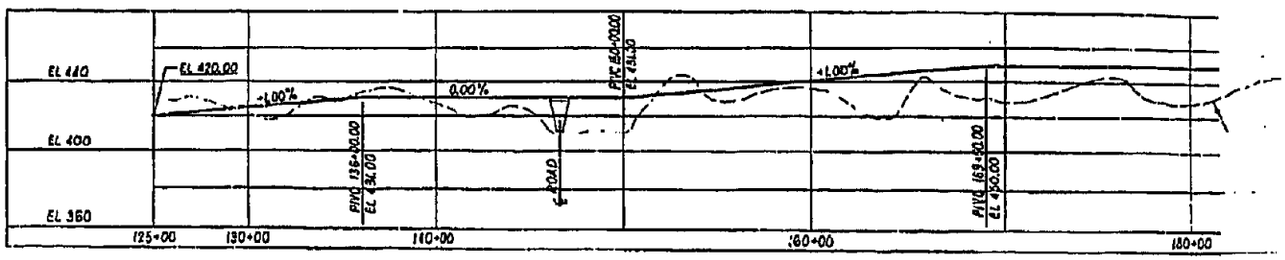
REVISIONS: 0

DESCRIPTION			
	DRAWN	PAC	5-18-82
	CHECKED		5-5-82
FOR CLIENT APPROVAL	APVD SECT HD		5-5-82
CLIENT 50% REVIEW	APVD PROJ MGR		5-18-82
	APVD CLIENT		

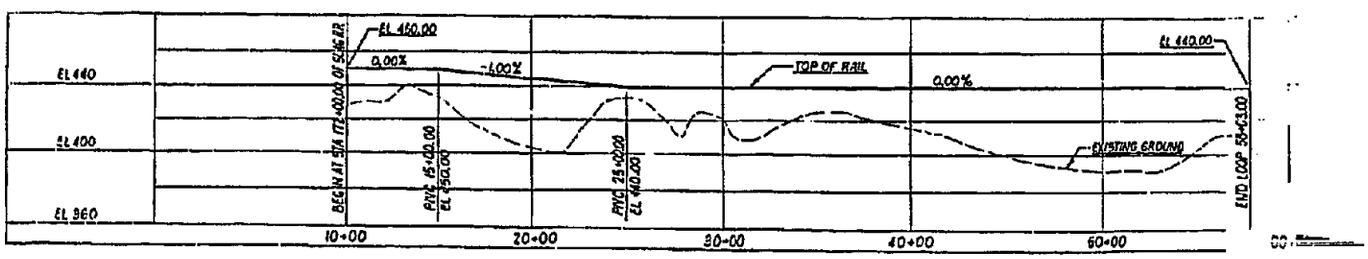
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA



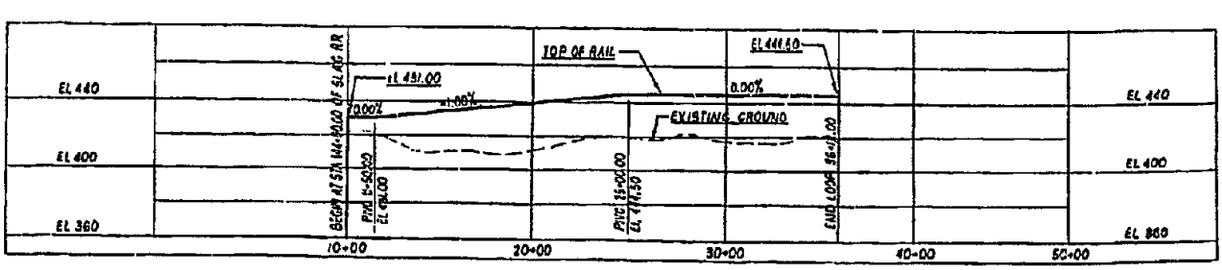
℄ SLAG DISPOSAL RAIL
HORZ 1" = 400'
VERT 1" = 40'



℄ SLAG DISPOSAL RAIL
HORZ: 1" = 400'
VERT: 1" = 40'



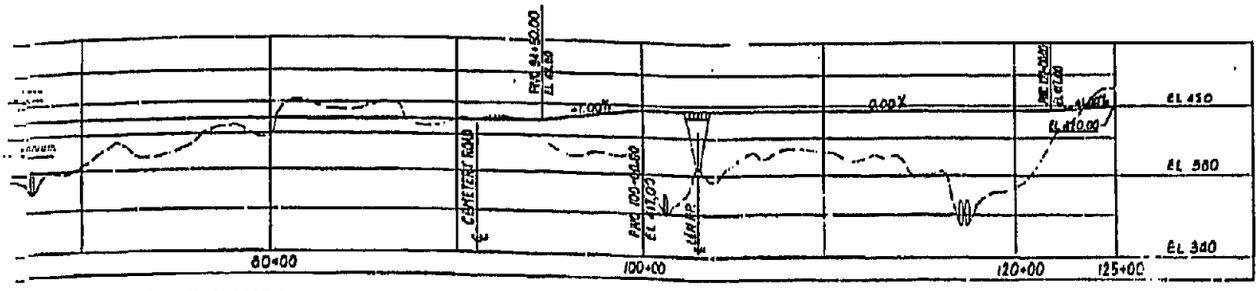
℄ WATER TREATMENT SLUDGE RAILROAD PROFILE AREA 3
HORZ: 1" = 400'
VERT: 1" = 40'



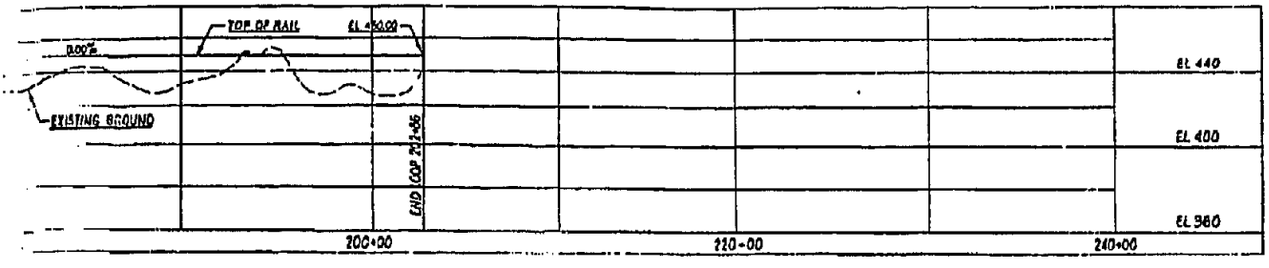
℄ NON-HAZARDOUS SLUDGE RAILROAD PROFILE AREA 2
HORZ: 1" = 400'
VERT: 1" = 40'

REFERENCES		REFERENCES		REVISIONS								REVISIONS							
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	
												C	5-20-93	TMK					CLIENT
												B	5-6-92	TMK					CLIENT
												A	4-2-92	TMK					

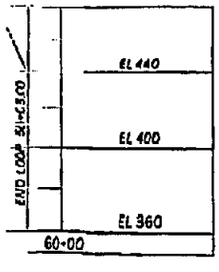
ENG-GE-23 (12/79)



RAILROAD PROFILE AREA I



RAILROAD PROFILE AREA I



NOTES:

1. FOR PLANS SEE DWG NO D-14-CE-2 NP

U.S. DEPARTMENT OF ENERGY

BASKETT — W.R. GRACE & CO. — KENTUCKY

50,000 B.P.D.

COAL - TO - METHANOL - TO - GASOLINE PLANT

TITLE: RAILROAD PROFILES

SCALE: AS SHOWN | ACCOUNT NUMBER: 4800 | JOB NUMBER: 6182

DOCUMENT NUMBER: D-14-CE-1 NP

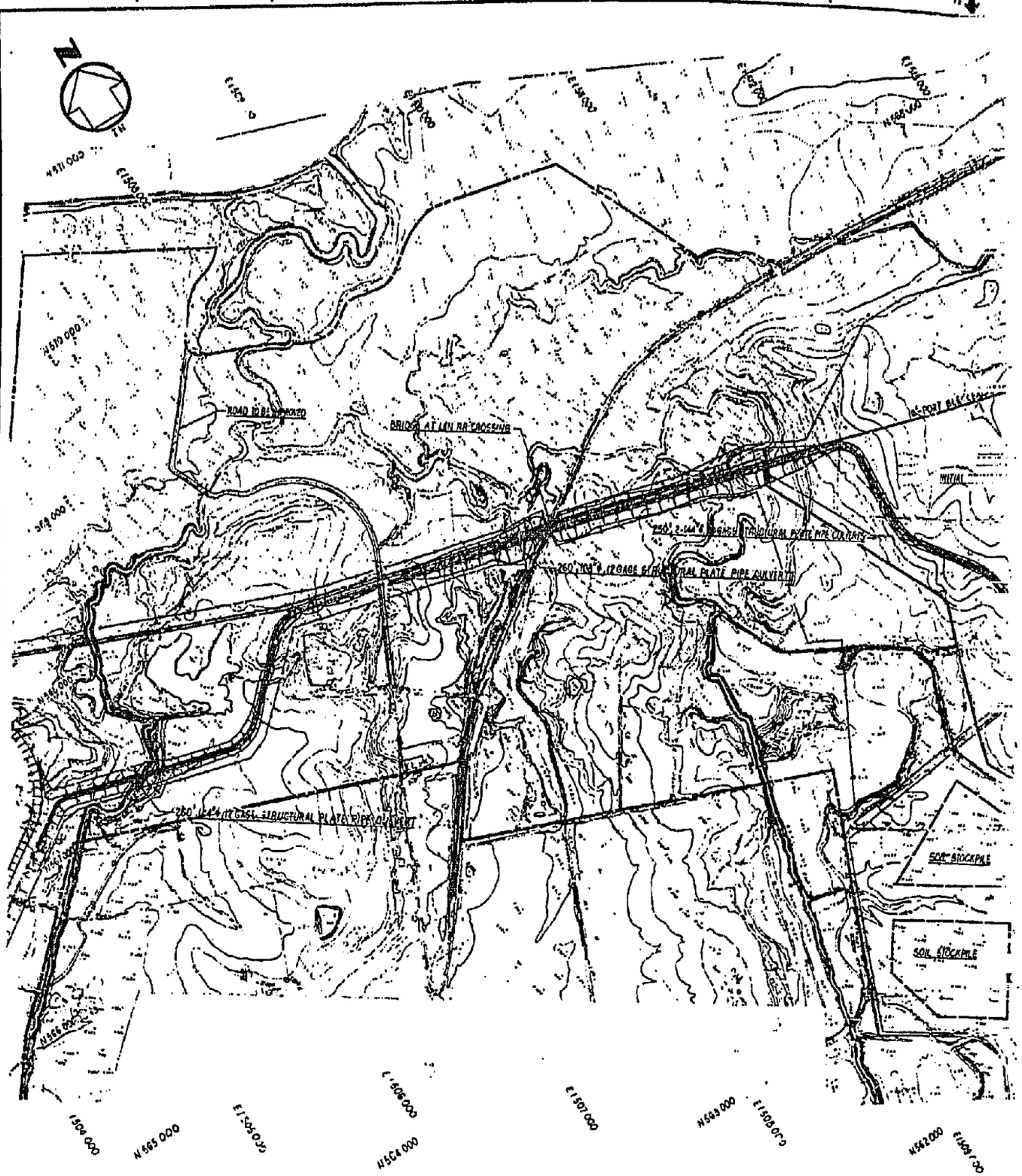
REVISION: C

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

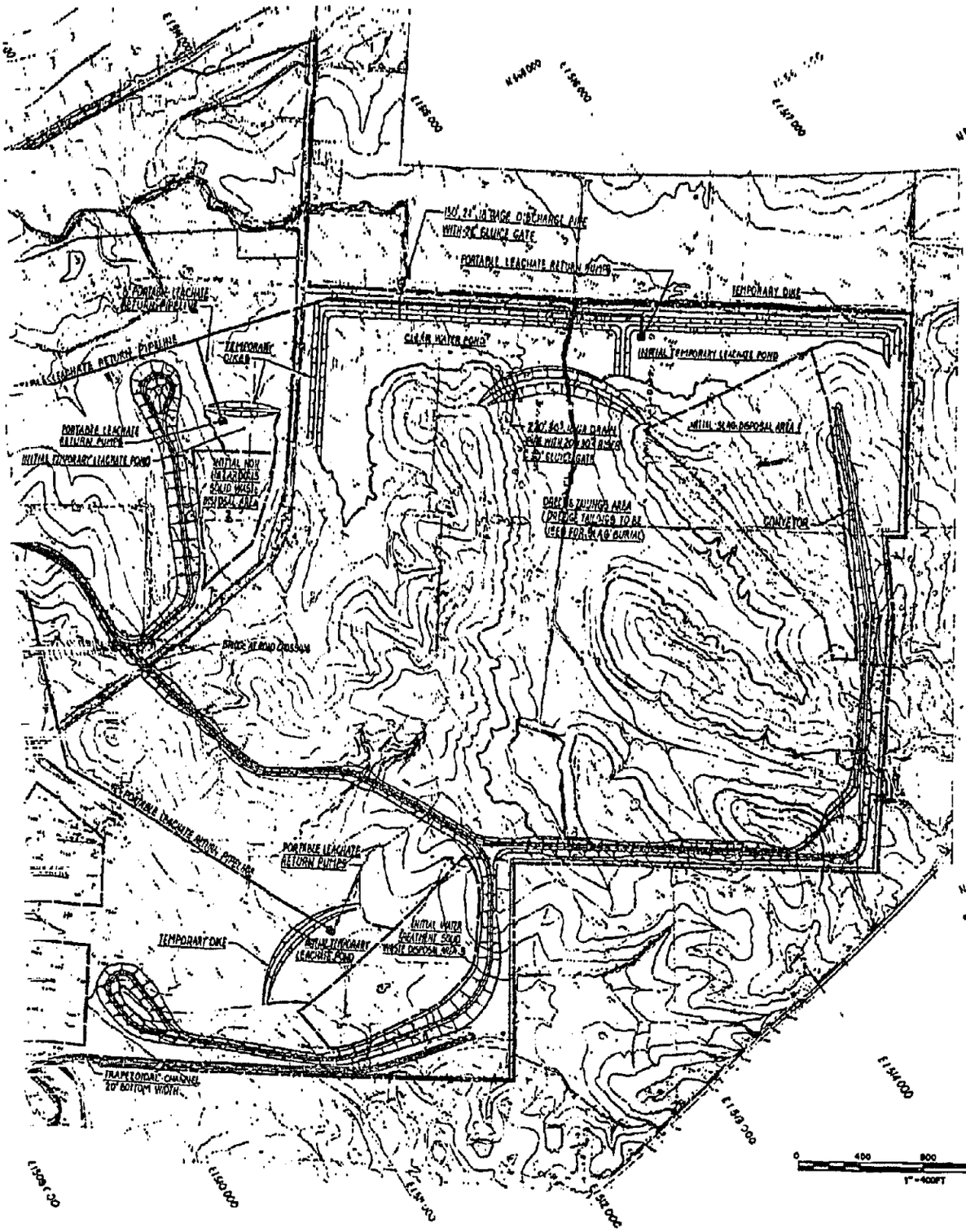
DRAWN	T. KELLY	
CHECKED		4-2-82
APVD SECT HD		4-2-82
APVD PROJ MGR		4-2-82
APVD CLIENT		

CLIENT APPROVAL

DESCRIPTION



REFERENCES		REFERENCES		REVISIONS								REVISIONS							
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	
												C	5-24-82	TMK					
												B	5-5-82	TMK					
												A	4-2-82	TMK					

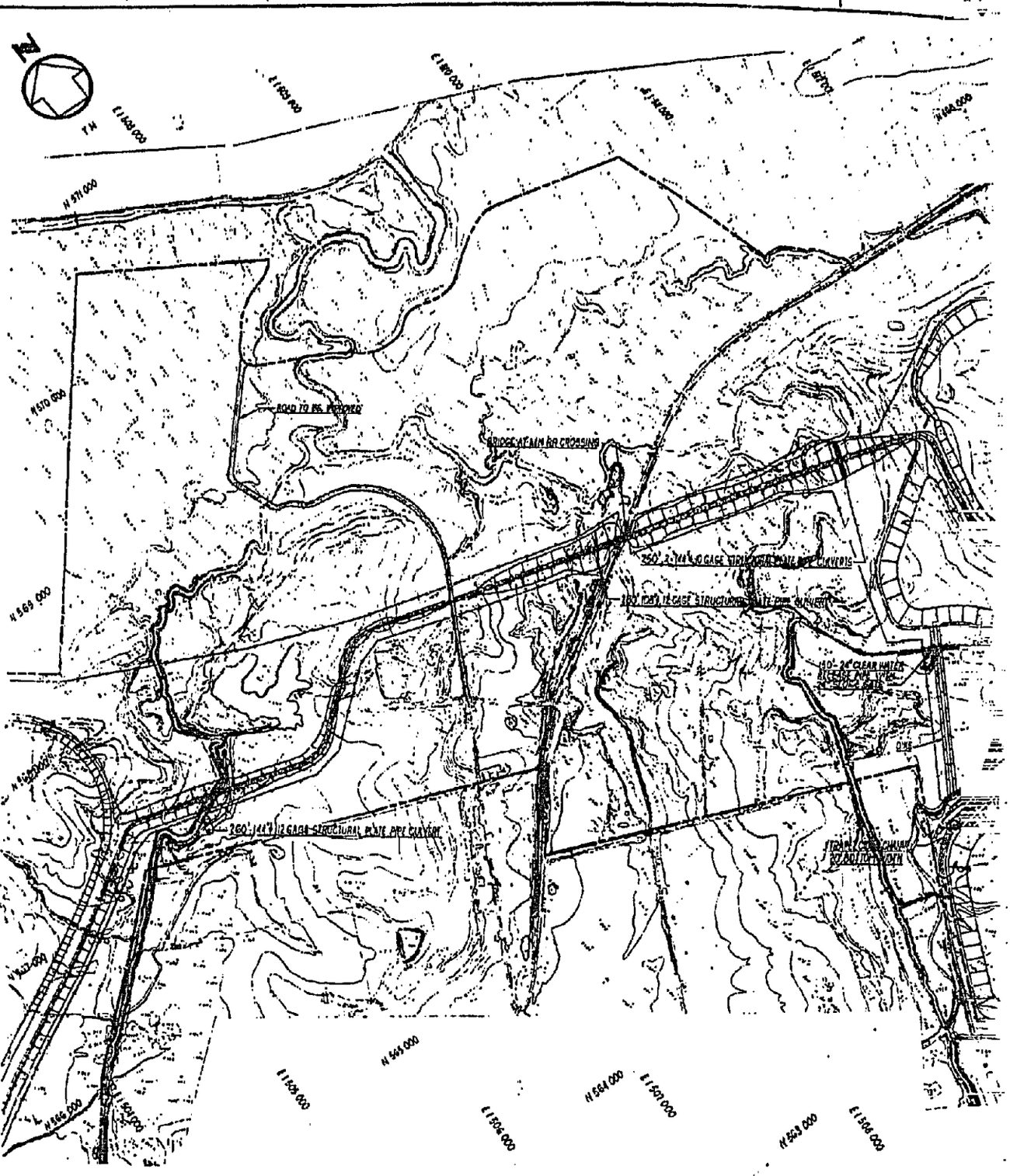


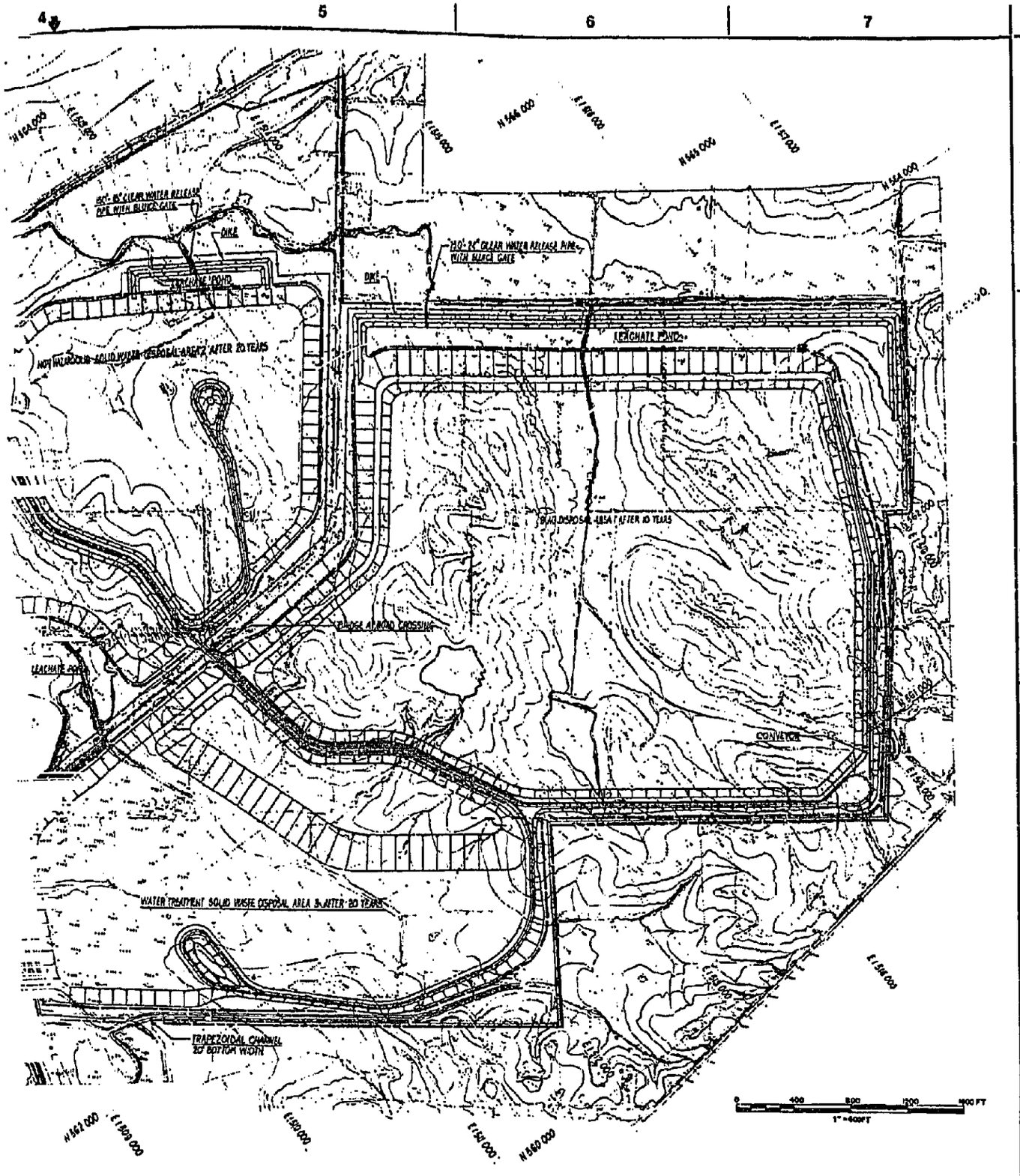
U.S. DEPARTMENT OF ENERGY		
BASKETT	W.R. GRACE & CO. 50,000 B.P.D. COAL - TO - METHANOL - TO - GASOLINE PLANT	KENTUCKY
TITLE: SLAG DISPOSAL AREA INITIAL CONSTR 50K BPD	SCALE 1" = 400' / ACCOUNT NUMBER 4800 / JOB NUMBER 6182	REVISION C
	DOCUMENT NUMBER D-14-CE-2 NP	

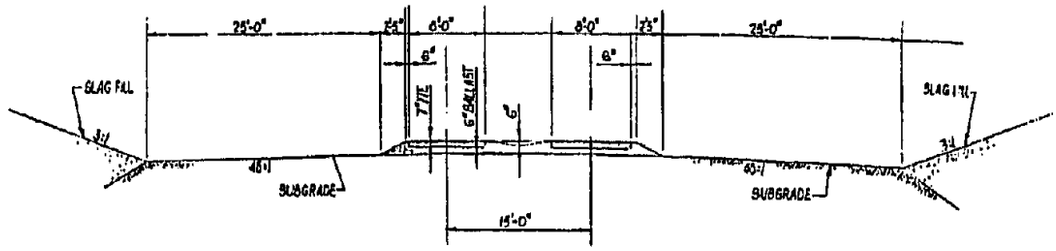
DESCRIPTION			
ISSUED FOR DESIGN REPORT	DRAWN	KELLY	
CLIENT APPROVAL	CHECKED		
CLIENT 60% REVIEW	APVD DSGN MGR		
	APVD PROJ MGR		
	APVD CLIENT		

AMP

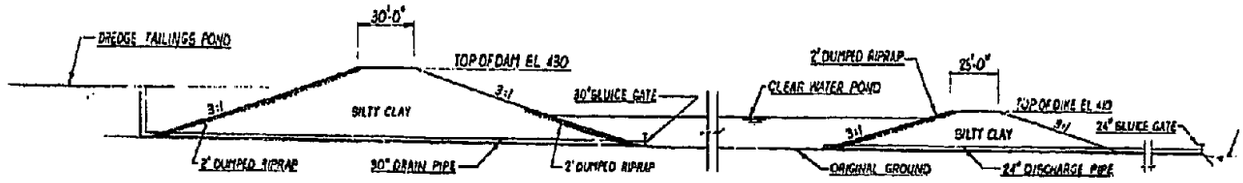
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA


ROAD TO BE REMOVED
BRIDGE AT MIN RR CROSSING
350' 2.144" 10 GAGE STRUCTURAL PLATE PIPE CULVERTS
180' (144") 12 GAGE STRUCTURAL PLATE PIPE CULVERT
40' 24" CLEAR WATER RELEASE PIPE TYPE SPILLWAY
260' (144") 12 GAGE STRUCTURAL PLATE PIPE CULVERT
TRANSMISSION RELOCATION
N 571 000
N 570 000
N 569 000
N 568 000
N 567 000
N 566 000
N 565 000
N 564 000
N 563 000
E 1 503 000
E 1 504 000
E 1 505 000
E 1 506 000
E 1 507 000
E 1 508 000
E 1 509 000
E 1 510 000
E 1 511 000
E 1 512 000
E 1 513 000
E 1 514 000
E 1 515 000
E 1 516 000
E 1 517 000
E 1 518 000
E 1 519 000
E 1 520 000
E 1 521 000
E 1 522 000
E 1 523 000
E 1 524 000
E 1 525 000
E 1 526 000
E 1 527 000
E 1 528 000
E 1 529 000
E 1 530 000
E 1 531 000
E 1 532 000
E 1 533 000
E 1 534 000
E 1 535 000
E 1 536 000
E 1 537 000
E 1 538 000
E 1 539 000
E 1 540 000
E 1 541 000
E 1 542 000
E 1 543 000
E 1 544 000
E 1 545 000
E 1 546 000
E 1 547 000
E 1 548 000
E 1 549 000
E 1 550 000
E 1 551 000
E 1 552 000
E 1 553 000
E 1 554 000
E 1 555 000
E 1 556 000
E 1 557 000
E 1 558 000
E 1 559 000
E 1 560 000
E 1 561 000
E 1 562 000
E 1 563 000
E 1 564 000
E 1 565 000
E 1 566 000
E 1 567 000
E 1 568 000
E 1 569 000
E 1 570 000
E 1 571 000
E 1 572 000
E 1 573 000
E 1 574 000
E 1 575 000
E 1 576 000
E 1 577 000
E 1 578 000
E 1 579 000
E 1 580 000
E 1 581 000
E 1 582 000
E 1 583 000
E 1 584 000
E 1 585 000
E 1 586 000
E 1 587 000
E 1 588 000
E 1 589 000
E 1 590 000
E 1 591 000
E 1 592 000
E 1 593 000
E 1 594 000
E 1 595 000
E 1 596 000
E 1 597 000
E 1 598 000
E 1 599 000
E 1 600 000
E 1 601 000
E 1 602 000
E 1 603 000
E 1 604 000
E 1 605 000
E 1 606 000
E 1 607 000
E 1 608 000
E 1 609 000
E 1 610 000
E 1 611 000
E 1 612 000
E 1 613 000
E 1 614 000
E 1 615 000
E 1 616 000
E 1 617 000
E 1 618 000
E 1 619 000
E 1 620 000
E 1 621 000
E 1 622 000
E 1 623 000
E 1 624 000
E 1 625 000
E 1 626 000
E 1 627 000
E 1 628 000
E 1 629 000
E 1 630 000
E 1 631 000
E 1 632 000
E 1 633 000
E 1 634 000
E 1 635 000
E 1 636 000
E 1 637 000
E 1 638 000
E 1 639 000
E 1 640 000
E 1 641 000
E 1 642 000
E 1 643 000
E 1 644 000
E 1 645 000
E 1 646 000
E 1 647 000
E 1 648 000
E 1 649 000
E 1 650 000
E 1 651 000
E 1 652 000
E 1 653 000
E 1 654 000
E 1 655 000
E 1 656 000
E 1 657 000
E 1 658 000
E 1 659 000
E 1 660 000
E 1 661 000
E 1 662 000
E 1 663 000
E 1 664 000
E 1 665 000
E 1 666 000
E 1 667 000
E 1 668 000
E 1 669 000
E 1 670 000
E 1 671 000
E 1 672 000
E 1 673 000
E 1 674 000
E 1 675 000
E 1 676 000
E 1 677 000
E 1 678 000
E 1 679 000
E 1 680 000
E 1 681 000
E 1 682 000
E 1 683 000
E 1 684 000
E 1 685 000
E 1 686 000
E 1 687 000
E 1 688 000
E 1 689 000
E 1 690 000
E 1 691 000
E 1 692 000
E 1 693 000
E 1 694 000
E 1 695 000
E 1 696 000
E 1 697 000
E 1 698 000
E 1 699 000
E 1 700 000
E 1 701 000
E 1 702 000
E 1 703 000
E 1 704 000
E 1 705 000
E 1 706 000
E 1 707 000
E 1 708 000
E 1 709 000
E 1 710 000
E 1 711 000
E 1 712 000
E 1 713 000
E 1 714 000
E 1 715 000
E 1 716 000
E 1 717 000
E 1 718 000
E 1 719 000
E 1 720 000
E 1 721 000
E 1 722 000
E 1 723 000
E 1 724 000
E 1 725 000
E 1 726 000
E 1 727 000
E 1 728 000
E 1 729 000
E 1 730 000
E 1 731 000
E 1 732 000
E 1 733 000
E 1 734 000
E 1 735 000
E 1 736 000
E 1 737 000
E 1 738 000
E 1 739 000
E 1 740 000
E 1 741 000
E 1 742 000
E 1 743 000
E 1 744 000
E 1 745 000
E 1 746 000
E 1 747 000
E 1 748 000
E 1 749 000
E 1 750 000
E 1 751 000
E 1 752 000
E 1 753 000
E 1 754 000
E 1 755 000
E 1 756 000
E 1 757 000
E 1 758 000
E 1 759 000
E 1 760 000
E 1 761 000
E 1 762 000
E 1 763 000
E 1 764 000
E 1 765 000
E 1 766 000
E 1 767 000
E 1 768 000
E 1 769 000
E 1 770 000
E 1 771 000
E 1 772 000
E 1 773 000
E 1 774 000
E 1 775 000
E 1 776 000
E 1 777 000
E 1 778 000
E 1 779 000
E 1 780 000
E 1 781 000
E 1 782 000
E 1 783 000
E 1 784 000
E 1 785 000
E 1 786 000
E 1 787 000
E 1 788 000
E 1 789 000
E 1 790 000
E 1 791 000
E 1 792 000
E 1 793 000
E 1 794 000
E 1 795 000
E 1 796 000
E 1 797 000
E 1 798 000
E 1 799 000
E 1 800 000
E 1 801 000
E 1 802 000
E 1 803 000
E 1 804 000
E 1 805 000
E 1 806 000
E 1 807 000
E 1 808 000
E 1 809 000
E 1 810 000
E 1 811 000
E 1 812 000
E 1 813 000
E 1 814 000
E 1 815 000
E 1 816 000
E 1 817 000
E 1 818 000
E 1 819 000
E 1 820 000
E 1 821 000
E 1 822 000
E 1 823 000
E 1 824 000
E 1 825 000
E 1 826 000
E 1 827 000
E 1 828 000
E 1 829 000
E 1 830 000
E 1 831 000
E 1 832 000
E 1 833 000
E 1 834 000
E 1 835 000
E 1 836 000
E 1 837 000
E 1 838 000
E 1 839 000
E 1 840 000
E 1 841 000
E 1 842 000
E 1 843 000
E 1 844 000
E 1 845 000
E 1 846 000
E 1 847 000
E 1 848 000
E 1 849 000
E 1 850 000
E 1 851 000
E 1 852 000
E 1 853 000
E 1 854 000
E 1 855 000
E 1 856 000
E 1 857 000
E 1 858 000
E 1 859 000
E 1 860 000
E 1 861 000
E 1 862 000
E 1 863 000
E 1 864 000
E 1 865 000
E 1 866 000
E 1 867 000
E 1 868 000
E 1 869 000
E 1 870 000
E 1 871 000
E 1 872 000
E 1 873 000
E 1 874 000
E 1 875 000
E 1 876 000
E 1 877 000
E 1 878 000
E 1 879 000
E 1 880 000
E 1 881 000
E 1 882 000
E 1 883 000
E 1 884 000
E 1 885 000
E 1 886 000
E 1 887 000
E 1 888 000
E 1 889 000
E 1 890 000
E 1 891 000
E 1 892 000
E 1 893 000
E 1 894 000
E 1 895 000
E 1 896 000
E 1 897 000
E 1 898 000
E 1 899 000
E 1 900 000
E 1 901 000
E 1 902 000
E 1 903 000
E 1 904 000
E 1 905 000
E 1 906 000
E 1 907 000
E 1 908 000
E 1 909 000
E 1 910 000
E 1 911 000
E 1 912 000
E 1 913 000
E 1 914 000
E 1 915 000
E 1 916 000
E 1 917 000
E 1 918 000
E 1 919 000
E 1 920 000
E 1 921 000
E 1 922 000
E 1 923 000
E 1 924 000
E 1 925 000
E 1 926 000
E 1 927 000
E 1 928 000
E 1 929 000
E 1 930 000
E 1 931 000
E 1 932 000
E 1 933 000
E 1 934 000
E 1 935 000
E 1 936 000
E 1 937 000
E 1 938 000
E 1 939 000
E 1 940 000
E 1 941 000
E 1 942 000
E 1 943 000
E 1 944 000
E 1 945 000
E 1 946 000
E 1 947 000
E 1 948 000
E 1 949 000
E 1 950 000
E 1 951 000
E 1 952 000
E 1 953 000
E 1 954 000
E 1 955 000
E 1 956 000
E 1 957 000
E 1 958 000
E 1 959 000
E 1 960 000
E 1 961 000
E 1 962 000
E 1 963 000
E 1 964 000
E 1 965 000
E 1 966 000
E 1 967 000
E 1 968 000
E 1 969 000
E 1 970 000
E 1 971 000
E 1 972 000
E 1 973 000
E 1 974 000
E 1 975 000
E 1 976 000
E 1 977 000
E 1 978 000
E 1 979 000
E 1 980 000
E 1 981 000
E 1 982 000
E 1 983 000
E 1 984 000
E 1 985 000
E 1 986 000
E 1 987 000
E 1 988 000
E 1 989 000
E 1 990 000
E 1 991 000
E 1 992 000
E 1 993 000
E 1 994 000
E 1 995 000
E 1 996 000
E 1 997 000
E 1 998 000
E 1 999 000
E 1 1 000 000
E 1 1 001 000
E 1 1 002 000
E 1 1 003 000
E 1 1 004 000
E 1 1 005 000
E 1 1 006 000
E 1 1 007 000
E 1 1

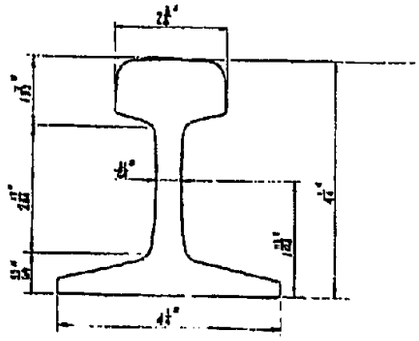

4
5
6
7
A
B
C
D
E
N 564 000
N 563 000
N 562 000
N 561 000
N 560 000
E 1 000 000
E 1 050 000
E 1 100 000
E 1 150 000
E 1 200 000
E 1 250 000
E 1 300 000
E 1 350 000
E 1 400 000
E 1 450 000
E 1 500 000
E 1 550 000
E 1 600 000
E 1 650 000
E 1 700 000
E 1 750 000
E 1 800 000
E 1 850 000
E 1 900 000
E 1 950 000
E 2 000 000
E 2 050 000
E 2 100 000
E 2 150 000
E 2 200 000
E 2 250 000
E 2 300 000
E 2 350 000
E 2 400 000
E 2 450 000
E 2 500 000
E 2 550 000
E 2 600 000
E 2 650 000
E 2 700 000
E 2 750 000
E 2 800 000
E 2 850 000
E 2 900 000
E 2 950 000
E 3 000 000
E 3 050 000
E 3 100 000
E 3 150 000
E 3 200 000
E 3 250 000
E 3 300 000
E 3 350 000
E 3 400 000
E 3 450 000
E 3 500 000
E 3 550 000
E 3 600 000
E 3 650 000
E 3 700 000
E 3 750 000
E 3 800 000
E 3 850 000
E 3 900 000
E 3 950 000
E 4 000 000
E 4 050 000
E 4 100 000
E 4 150 000
E 4 200 000
E 4 250 000
E 4 300 000
E 4 350 000
E 4 400 000
E 4 450 000
E 4 500 000
E 4 550 000
E 4 600 000
E 4 650 000
E 4 700 000
E 4 750 000
E 4 800 000
E 4 850 000
E 4 900 000
E 4 950 000
E 5 000 000
E 5 050 000
E 5 100 000
E 5 150 000
E 5 200 000
E 5 250 000
E 5 300 000
E 5 350 000
E 5 400 000
E 5 450 000
E 5 500 000
E 5 550 000
E 5 600 000
E 5 650 000
E 5 700 000
E 5 750 000
E 5 800 000
E 5 850 000
E 5 900 000
E 5 950 000
E 6 000 000
E 6 050 000
E 6 100 000
E 6 150 000
E 6 200 000
E 6 250 000
E 6 300 000
E 6 350 000
E 6 400 000
E 6 450 000
E 6 500 000
E 6 550 000
E 6 600 000
E 6 650 000
E 6 700 000
E 6 750 000
E 6 800 000
E 6 850 000
E 6 900 000
E 6 950 000
E 7 000 000
E 7 050 000
E 7 100 000
E 7 150 000
E 7 200 000
E 7 250 000
E 7 300 000
E 7 350 000
E 7 400 000
E 7 450 000
E 7 500 000
E 7 550 000
E 7 600 000
E 7 650 000
E 7 700 000
E 7 750 000
E 7 800 000
E 7 850 000
E 7 900 000
E 7 950 000
E 8 000 000
E 8 050 000
E 8 100 000
E 8 150 000
E 8 200 000
E 8 250 000
E 8 300 000
E 8 350 000
E 8 400 000
E 8 450 000
E 8 500 000
E 8 550 000
E 8 600 000
E 8 650 000
E 8 700 000
E 8 750 000
E 8 800 000
E 8 850 000
E 8 900 000
E 8 950 000
E 9 000 000
E 9 050 000
E 9 100 000
E 9 150 000
E 9 200 000
E 9 250 000
E 9 300 000
E 9 350 000
E 9 400 000
E 9 450 000
E 9 500 000
E 9 550 000
E 9 600 000
E 9 650 000
E 9 700 000
E 9 750 000
E 9 800 000
E 9 850 000
E 9 900 000
E 9 950 000
E 10 000 000
E 10 050 000
E 10 100 000
E 10 150 000
E 10 200 000
E 10 250 000
E 10 300 000
E 10 350 000
E 10 400 000
E 10 450 000
E 10 500 000
E 10 550 000
E 10 600 000
E 10 650 000
E 10 700 000
E 10 750 000
E 10 800 000
E 10 850 000
E 10 900 000
E 10 950 000
E 11 000 000
E 11 050 000
E 11 100 000
E 11 150 000
E 11 200 000
E 11 250 000
E 11 300 000
E 11 350 000
E 11 400 000
E 11 450 000
E 11 500 000
E 11 550 000
E 11 600 000
E 11 650 000
E 11 700 000
E 11 750 000
E 11 800 000
E 11 850 000
E 11 900 000
E 11 950 000
E 12 000 000
E 12 050 000
E 12 100 000
E 12 150 000
E 12 200 000
E 12 250 000
E 12 300 000
E 12 350 000
E 12 400 000
E 12 450 000
E 12 500 000
E 12 550 000
E 12 600 000
E 12 650 000
E 12 700 000
E 12 750 000
E 12 800 000
E 12 850 000
E 12 900 000
E 12 950 000
E 13 000 000
E 13 050 000
E 13 100 000
E 13 150 000
E 13 200 000
E 13 250 000
E 13 300 000
E 13 350 000
E 13 400 000
E 13 450 000
E 13 500 000
E 13 550 000
E 13 600 000
E 13 650 000
E 13 700 000
E 13 750 000
E 13 800 000
E 13 850 000
E 13 900 000
E 13 950 000
E 14 000 000
E 14 050 000
E 14 100 000
E 14 150 000
E 14 200 000
E 14 250 000
E 14 300 000
E 14 350 000
E 14 400 000
E 14 450 000
E 14 500 000
E 14 550 000
E 14 600 000
E 14 650 000
E 14 700 000
E 14 750 000
E 14 800 000
E 14 850 000
E 14 900 000
E 14 950 000
E 15 000 000
E 15 050 000
E 15 100 000
E 15 150 000
E 15 200 000
E 15 250 000
E 15 300 000
E 15 350 000
E 15 400 000
E 15 450 000
E 15 500 000
E 15 550 000
E 15 600 000
E 15 650 000
E 15 700 000
E 15 750 000
E 15 800 000
E 15 850 000
E 15 900 000
E 15 950 000
E 16 000 000
E 16 050 000
E 16 100 000
E 16 150 000
E 16 200 000
E 16 250 000
E 16 300 000
E 16 350 000
E 16 400 000
E 16 450 000
E 16 500 000
E 16 550 000
E 16 600 000
E 16 650 000
E 16 700 000
E 16 750 000
E 16 800 000
E 16 850 000
E 16 900 000
E 16 950 000
E 17 000 000
E 17 050 000
E 17 100 000
E 17 150 000
E 17 200 000
E 17 250 000
E 17 300 000
E 17 350 000
E 17 400 000
E 17 450 000
E 17 500 000
E 17 550 000
E 17 600 000
E 17 650 000
E 17 700 000
E 17 750 000
E 17 800 000
E 17 850 000
E 17 900 000
E 17 950 000
E 18 000 000
E 18 050 000
E 18 100 000
E 18 150 000
E 18 200 000
E 18 250 000
E 18 300 000
E 18 350 000
E 18 400 000
E 18 450 000
E 18 500 000
E 18 550 000
E 18 600 000
E 18 650 000
E 18 700 000
E 18 750 000
E 18 800 000
E 18 850 000
E 18 900 000
E 18 950 000
E 19 000 000
E 19 050 000
E 19 100 000
E 19 150 000
E 19 200 000
E 19 250 000
E 19 300 000
E 19 350 000
E 19 400 000
E 19 450 000
E 19 500 000
E 19 550 000
E 19 600 000
E 19 650 000
E 19 700 000
E 19 750 000
E 19 800 000
E 19 850 000
E 19 900 000
E 19 950 000
E 20 000 000
E 20 050 000
E 20 100 000
E 20 150 000
E 20 200 000
E 20 250 000
E 20 300 000
E 20 350 000
E 20 400 000
E 20 450 000
E 20 500 000
E 20 550 000
E 20 600 000
E 20 650 000
E 20 700 000
E 20 750 000
E 20 800 000
E 20 850 000
E 20 900 000
E 20 950 000
E 21 000 000
E 21 050 000
E 21 100 000
E 21 150 000
E 21 200 000
E 21 250 000
E 21 300 000
E 21 350 000
E 21 400 000
E 21 450 000
E 21 500 000
E 21 550 000
E 21 600 000
E 21 650 000
E 21 700 000
E 21 750 000
E 21 800 000
E 21 850 000
E 21 900 000
E 21 950 000
E 22 000 000
E 22 050 000
E 22 100 000
E 22 150 000
E 22 200 000
E 22 250 000
E 22 300 000
E 22 350 000
E 22 400 000
E 22 450 000
E 22 500 000
E 22 550 000
E 22 600 000
E 22 650 000
E 22 700 000
E 22 750 000
E 22 800 000
E 22 850 000
E 22 900 000
E 22 950 000
E 23 000 000
E 23 050 000
E 23 100 000
E 23 150 000
E 23 200 000
E 23 250 000
E 23 300 000
E 23 350 000
E 23 400 000
E 23 450 000
E 23 500 000
E 23 550 000
E 23 600 000
E 23 650 000
E 23 700 000
E 23 750 000
E 23 800 000
E 23 850 000
E 23 900 000
E 23 950 000
E 24 000 000
E 24 050 000
E 24 100 000
E 24 150 000
E 24 200 000
E 24 250 000
E 24 300 000
E 24 350 000
E 24 400 000
E 24 450 000
E 24 500 000
E 24 550 000
E 24 600 000
E 24 650 000
E 24 700 000
E 24 750 000
E 24 800 000
E 24 850 000
E 24 900 000
E 24 950 000
E 25 000 000
E 25 050 000
E 25 100 000
E 25 150 000
E 25 200 000
E 25 250 000
E 25 300 000
E 25 350 000
E 25 400 000
E 25 450 000
E 25 500 000
E 25 550 000
E 25 600 000
E 25 650 000
E 25 700 000
E 25 750 000
E 25 800 000
E 25 850 000
E 25 900 000
E 25 950 000
E 26 000 000
E 26 050 000
E 26 100 000
E 26 150 000
E 26 200 000
E 26 250 000
E 26 300 000
E 26 350 000
E 26 400 000
E 26 450 000
E 26 500 000
E 26 550 000
E 26 600 000
E 26 650 000
E 26 700 000
E 26 750 000
E 26 800 000
E 26 850 000
E 26 900 000
E 26 950 000
E 27 000 000
E 27 050 000
E 27 100 000
E 27 150 000
E 27 200 000
E 27 250 000
E 27 300 000
E 27 350 000
E 27 400 000
E 27 450 000
E 27 500 000
E 27 550 000
E 27 600 000
E 27 650 000
E 27 700 000
E 27 750 000
E 27 800 000
E 27 850 000
E 27 900 000
E 27 950 000
E 28 000 000
E 28 050 000
E 28 100 000
E 28 150 000
E 28 200 000
E 28 250 000
E 28 300 000
E 28 350 000
E 28 400 000
E 28 450 000
E 28 500 000
E 28 550 000
E 28 600 000
E 28 650 000
E 28 700 000
E 28 750 000
E 28 800 000
E 28 850 000
E 28 900 000
E 28 950 000
E 29 000 000
E 29 050 000
E 29 100 000
E 29 150 000
E 29 200 000
E 29 250 000
E 29 300 000
E 29 350 000
E 29 400 000
E 29 450 000
E 29 500 000
E 29 550 000
E 29 600 000
E 29 650 000
E 29 700 000
E 29 750 000
E 29 800 000
E 29 850 000
E 29 900 000
E 29 950 000
E 30 000 000
E 30 050 000
E 30 100 000
E 30 150 000
E 30 200 000
E 30 250 000
E 30 300 000
E 30 350 000
E 30 400 000
E 30 450 000
E 30 500 000
E 30 550 000
E 30 600 000
E 30 650 000
E 30 700 000
E 30 750 000
E 30 800 000
E 30 850 000
E 30 900 000
E 30 950 000
E 31 000 000
E 31 050 000
E 31 100 000
E 31 150 000
E 31 200 000
E 31 250 000
E 31 300 000
E 31 350 000
E 31 400 000
E 31 450 000
E 31 500 000
E 31 550 000
E 31 600 000
E 31 650 000
E 31 700 000
E 31 750 000
E 31 800 000
E 31 850 000
E 31 900 000
E 31 950 000
E 32 000 000
E 32 050 000
E 32 100 000
E 32 150 000
E 32 200 000
E 32 250 000
E 32 300 000
E 32 350 000
E 32 400 000
E 32 450 000
E 32 500 000
E 32 550 000
E 32 600 000
E 32 650 000
E 32 700 000
E 32 750 000
E 32 800 000
E 32 850 000
E 32 900 000
E 32 950 000
E 33 000 000
E 33 050 000
E 33 100 000
E 33 150 000
E 33 200 000
E 33 250 000
E 33 300 000
E 33 350 000
E 33 400 000
E 33 450 000
E 33 500 000
E 33 550 000
E 33 600 000
E 33 650 000
E 33 700 000
E 33 750 000
E 33 800 000
E 33 850 000
E 33 900 000
E 33 950 000
E 34 000 000
E 34 050 000
E 34 100 000
E 34 150 000
E 34 200 000
E 34 250 000
E 34 300 000
E 34 350 000
E 34 400 000
E 34 450 000
E 34 500 000
E 34 550 000
E 34 600 000
E 34 650 000
E 34 700 000
E 34 750 000
E 34 800 000
E 34 850 000
E 34 900 000
E 34 950 000
E 35 000 000
E 35 050 000
E 35 100 000
E 35 150 000
E 35 200 000
E 35 250 000
E 35 300 000
E 35 350 000
E 35 400 000
E 35 450 000
E 35 500 000
E 35 550 000
E 35 600 000
E 35 650 000
E 35 700 000
E 35 750 000
E 35 800 000
E 35 850 000
E 35 900 000
E 35 950 000
E 36 000 000
E 36 050 000
E 36 100 000
E 36 150 000
E 36 200 000
E 36 250 000
E 36 300 000
E 36 350 000
E 36 400 000
E 36 450 000
E 36 500 000
E 36 550 000
E 36 600 000
E 36 650 000
E 36 700 000
E 36 750 000
E 36 800 000
E 36 850 000
E 36 900 000
E 36 950 000
E 37 000 000
E 37 050 000
E 37 100 000
E 37 150 000
E 37 200 000
E 37 250 000
E 37 300 000
E 37 350 000
E 37 400 000
E 37 450 000
E 37 500 000
E 37 550 000
E 37 600 000
E 37 650 000
E 37 700 000
E 37 750 000
E 37 800 000
E 37 850 000
E 37 900 000
E 37 950 000
E 38 000 000
E 38 050 000
E 38 100 000
E 38 150 000
E 38 200 000
E 38 250 000
E 38 300 000
E 38 350 000
E 38 400 000
E 38 450 000
E 38 500 000
E 38 550 000
E 38 600 000
E 38 650 000
E 38 700 000
E 38 750 000
E 38 800 000
E 38 850 000
E 38 900 000
E 38 950 000
E 39 000 000
E 39 050 000
E 39 100 000
E 39 150 000
E 39 200 000
E 39 250 000
E 39 300 000
E 39 350 000
E 39 400 000
E 39 450 000
E 39 500 000
E 39 550 000
E 39 600 000
E 39 650 000
E 39 700 000
E 39 750 000
E 39 800 000
E 39 850 000
E 39 900 000
E 39 950 000
E 40 000 000
E 40 050 000
E 40 100 000
E 40 150 000
E 40 200 000
E 40 250 000
E 40 300 000
E 40 350 000
E 40 400 000
E 40 450 000
E 40 500 000
E 40 550 000
E 40 600 000
E 40 650 000
E 40 700 000
E 40 750 000
E 40 800 000
E 40 850 000
E 40 900 000
E 40 950 000
E 41 000 000
E 41 050 000
E 41 100 000
E 41 150 000
E 41 200 000
E 41 250 000
E 41 300 000
E 41 350 000
E 41 400 000
E 41 450 000
E 41 500 000
E 41 550 000
E 41 600 000
E 41 650 000
E 41 700 000
E 41 750 000
E 41 800 000
E 41 850 000
E 41 900 000
E 41 950 000
E 42 000 000
E 42 050 000
E 42 100 000
E 42 150 000
E 42 200 000
E 42 250 000
E 42 300 000
E 42 350 000
E 42 400 000
E 42 450 000
E 42 500 000
E 42 550 000
E 42 600 000
E 42 650 000
E 42 700 000
E 42 750 000
E 42 800 000
E 42 850 000
E 42 900 000
E 42 950 000
E 43 000 000
E 43 050 000
E 43 100 000
E 43 150 000
E 43 200 000
E 43 250 000
E 43 300 000
E 43 350 000
E 43 400 000
E 43 450 000
E 43 500 000
E 43 550 000
E 43 600 000
E 43 650 000
E 43 700 000
E 43 750 000
E 43 800 000
E 43 850 000
E 43 900 000
E 43 950 000
E 44 000 000
E 44 050 000
E 44 100 000
E 44 150 000
E 44 200 000
E 44 250 000
E 44 300 000
E 44 350 000
E 44 400 000
E 44 450 000
E 44 500 000
E 44 550 000
E 44 600 000
E 44 650 000
E 44 700 000
E 44 750 000
E 44 800 000
E 44 850 000
E 44 900 000
E 44 950 000
E 45 000 000
E 45 050 000
E 45 100 000
E 45 150 000
E 45 200 000
E 45 250 000
E 45 300 000
E 45 350 000
E 45 400 000
E 45 450 000
E 45 500 000
E 45 550 000
E 45 600 000
E 45 650 000
E 45 700 000
E 45 750 000
E 45 800 000
E 45 850 000
E 45 900 000
E 45 950 000
E 46 000 000
E 46 050 000
E 46 100 000
E 46 150 000
E 46 200 000
E 46 250 000
E 46 300 000
E 46 350 000
E 46 400 000
E 46 450 000
E 46 500 000
E 46 550 000
E 46 600 000
E 46 650 000
E 46 700 000
E 46 750 000
E 46 800 000
E 46 850 000
E 46 900 000
E 46 950 000
E 47 000 000
E 47 050 000
E 47 100 000
E 47 150 000
E 47 200 000
E 47 250 000
E 47 300 000
E 47 350 000
E 47 400 000
E 47 450 000
E 47 500 000
E 47 550 000
E 47 600 000
E 47 650 000
E 47 700 000
E 47 750 000
E 47 800 000
E 47 850 000
E 47 900 000
E 47 950 000
E 48 000 000
E 48 050 000
E 48 100 000
E 48 150 000
E 48 200 000
E 48 250 000
E 48 300 000
E 48 350 000
E 48 400 000
E 48 450 000
E 48 500 000
E 48 550 000
E 48 600 000
E 48 650 000
E 48 700 000
E 48 750 000
E 48 800 000
E 48 850 000
E 48 900 000
E 48 950 000
E 49 000 000
E 49 050 000
E 49 100 000
E 49 150 000
E 49 200 000
E 49 250 000
E 49 300 000
E 49 350 000
E 49 400 000
E 49 450 000
E 49 500 000
E 49 550 000
E 49 600 000
E 49 650 000
E 49 700 000
E 49 750 000
E 49 800 000
E 49 850 000
E 49 900 000
E 49 950 000
E 50 000 000
E 50 050 000
E 50 100 000
E 50 150 000
E 50 200 000
E 50 250 000
E 50 300 000
E 50 350 000
E 50 400 000
E 50 450 000
E 50 500 000
E 50 550 000
E 50 600 000
E 50 650 000
E 50 700 000
E 50 750 000
E 50 800 000
E 50 850 000
E 50 900 000
E 50 950 000
E 51 000 000
E 51 050 000
E 51 100 000
E 51 150 000
E 51 200 000
E 51 250 000
E 51 300 000
E 51 350 000
E 51 400 000
E 51 450 000
E 51 500 000
E 51 550 000
E 51 600 000
E 51 650 000
E 51 700 000
E 51 750 000
E 51 800 000
E 51 850 000
E 51 900 000
E 51 950 000
E 52 000 000
E 52 050 000
E 52 100 000
E 52 150 000
E 52 200 000
E 52 250 000
E 52 300 000
E 52 350 000
E 52 400 000
E 52 450 000
E 52 500 000
E 52 550 000
E 52 600 000
E 52 650 000
E 52 700 000
E 52 750 000
E 52 800 000
E 52 850 000
E 52 900 000
E 52 950 000
E 53 000 000
E 53 050 000
E 53 100 000
E 53 150 000
E 53 200 000
E 53 250 000
E 53 300 000
E 53 350 000
E 53 400 000
E 53 450 000
E 53 500 000
E 53 550 000
E 53 600 000
E 53 650 000
E 53 700 000
E 53 750 000
E 53 800 000
E 53 850 000
E 53 900 000
E 53 950 000
E 54 000 000
E 54 050 000
E 54 100 000
E 54 150 000
E 54 200 000
E 54 250 000
E 54 300 000
E 54 350 000
E 54 400 000
E 54 450 000
E 54 500 000
E 54 550 000
E 54 600 000
E 54 650 000
E 54 700 000
E 54 750 000
E 54 800 000
E 54 850 000
E 54 900 000
E 54 950 000
E 55 000 000
E 55 050 000
E 55 100 000
E 55 150 000
E 55 200 000
E 55 250 000
E 55 300 000
E 55 350 000
E 55 400 000
E 55 450 000
E 55 500 000
E 55 550 000
E 55 600 000
E 55 650 000
E 55 700 000
E 55 750 000
E 55 800 000
E 55 850 000
E 55 900 000
E 55 950 000
E 56 000 000
E 56 050 000
E 56 100 000
E 56 150 000
E 56 200 000
E 56 250 000
E 56 300 000
E 56 350 000
E 56 400 000
E 56 450 000
E 56 500 000
E 56 550 000
E 56 600 000
E 56 650 000
E 56 700 000
E 56 750 000
E 56 800 000
E 56 850 000
E 56 900 000
E 56 950 000
E 57 000 000
E 57 050 000
E 57 100 000
E 57 150 000
E 57 200 000
E 57 250 000
E 57 300 000
E 57 350 000
E 57 400 000
E 57 450 000
E 57 500 000
E 57 550 000
E 57 600 000
E 57 650 000
E 57 700 000
E 57 750 000
E 57 800 000
E 57 850 000
E 57 900 000
E 57 950 000
E 58 000 000
E 58 050 000
E 58 100 000
E 58 150 000
E 58 200 000
E 58 250 000
E 58 300 000
E 58 350 000
E 58 400 000
E 58 450 000
E 58 500 000
E 58 550 000
E 58 600 000
E 58 650 000
E 58 700 000
E 58 750 000
E 58 800 000
E 58 850 000
E 58 900 000
E 58 950 000
E 59 000 000
E 59 050 000
E 59 100 000
E 59 150 000
E 59 200 000
E 59 250 000
E 59 300 000
E 59 350 000
E 59 400 000
E 59 450 000
E 59 500 000
E 59 550 000
E 59 600 000
E 59 650 000
E 59 700 000
E 59 750 000
E 59 800 000
E 59 850 000
E 59 900 000
E 59 950 000
E 60 000 000
E 60 050 000
E 60 100 000
E 60 150 000
E 60 200 000
E 60 250 000
E 60 300 000
E 60 350 000
E 60 400 000
E 60 450 000
E 60 500 000
E 60 550 000
E 60 600 000
E 60 650 000
E 60 700 000
E 60 750 000
E 60 800 000
E 60 850 000
E 60 900 000
E 60 950 000
E 61 000 000
E 61 050 000
E 61 100 000
E 61 150 000
E 61 200 000
E 61 250 000
E 61 300 000
E 61 350 000
E 61 400 000
E 61 450 000
E 61 500 000
E 61 550 000
E 61 600 000
E 61 650 000
E 61 700 000
E 61 750 000
E 61 800 000
E 61 850 000
E 61 900 000
E 61 950 000
E 62 000 000
E 62 050 000
E 62 100 000
E 62 150 000
E 62 200 000
E 62 250 000
E 62 300 000
E 62 350 000
E 62 400 000
E 62 450 000
E 62 500 000
E 62 550 000
E 62 600 000
E 62 650 000
E 62 700 000
E 62 750 000
E 62 800 000
E 62 850 000
E 62 900 000
E 62 950 000
E 63 000 000
E 63 050 000
E 63 100 000
E 63 150 000
E 63 200 000
E 63 250 000
E 63 300 000
E 63 350 000
E 63 400 000
E 63 450 000
E 63 500 000
E 63 550 000
E 63 600 000
E 63 650 000
E 63 700 000
E 63 750 000
E 63 800 000
E 63 850 000
E 63 900 000
E 63 950 000
E 64 000 000
E 64 050 000
E 64 100 000
E 64 150 000
E 64 200 000
E 64 250 000
E 64 300 000
E 64 350 000
E 64 400 000
E 64 450 000
E 64 500 000
E 64 550 000
E 64 600 000
E 64 650 000
E 64 700 000
E 64 750 000
E 64 800 000
E 64 850 000
E 64 900 000
E 64 950 000
E 65 000 000
E 65 050 000
E 65 100 000
E 65 150 000
E 65 200 000
E 65 250 000
E 65 300 000
E 65 350 000
E 65 400 000
E 65 450 000
E 65 500 000
E 65 550 000
E 65 600 000
E 65 650 000
E 65 700 000
E 65 750 000
E 65 800 000
E 65 850 000
E 65 900 000
E 65 950 000
E 66 000 000
E 66 050 000
E 66 100 000
E 66 150 000
E 66 200 000
E 66 250 000
E 66 300 000
E 66 350 000
E 66 400 000
E 66 450 000
E 66 500 000
E 66 550 000
E 66 600 000
E 66 650 000
E 66 700 000
E 66 750 000
E 66 800 000
E 66 850 000
E 66 900 000
E 66 950 000
E 67 000 000
E 67 050 000
E 67 100 000
E 67 150 000
E 67 200 000
E 67 250 000
E 67 300 000
E 67 350 000
E 67 400 000
E 67 450 000
E 67 500 000
E 67 550 000
E 67 600 000
E 67 650 000
E 67 700 000
E 67 750 000
E 67 800 000
E 67 850 000
E 67 900 000
E 67 950 000
E 68 000 000
E 68 050 000
E 68 100 000
E 68 150 000
E 68 200 000
E 68 250 000
E 68 300 000
E 68 350 000
E 68 400 000
E 68 450 000
E 68 500 000
E 68 550 000
E 68 600 000
E 68 650 000
E 68 700 000
E 68 750 000
E 68 800 000
E 68 850 000
E 68 900 000
E 68 950 000
E 69 000 000
E 69 050 000
E 69 100 000
E 69 150 000
E 69 200 000
E 69 250 000
E 69 300 000
E 69 350 000
E 69 400 000
E 69 450 000
E 69 500 000
E 69 550 000
E 69 600 000
E 69 650 000
E 69 700 000
E 69 750 000
E 69 800 000
E 69 850 000
E 69 900 000
E 69 950 000
E 70 000 000
E 70 050 000
E 70 100 000
E 70 150 000
E 70 200 000
E 70 250 000
E 70 300 000
E 70 350 000
E 70 400 000
E 70 450 000
E 70 500 000
E 70 550 000
E 70 600 000
E 70 650 000
E 70 700 000
E 70 750 000
E 70 800 000
E 70 850 000
E 70 900 000
E 70 950 000
E 71 000 000
E 71 050 000
E 71 100 000
E 71 150 000
E 71 200 000
E 71 250 000
E 71 300 000
E 71 350 000
E 71 400 000
E 71 450 000
E 71 500 000
E 71 550 000
E 71 600 000
E 71 650 000
E 71 700 000
E 71 750 000
E 71 800 000
E 71 850 000
E 71 900 000
E 71 950 000
E 72 000 000
E 72 050 000
E 72 100 000
E 72 150 000
E 72 200 000
E 72 250 000
E 72 300 000
E 72 350 000
E 72 400 000
E 72 450 000
E 72 500 000
E 72 550 000
E 72 600 000
E 72 650 000
E 72 700 000
E 72 750 000
E 72 800 000
E 72 850 000
E 72 900 000
E 72 950 000
E 73 000 000
E 73 050 000
E 73 100 000
E 73 150 000
E 73 200 000
E 73 250 000
E 73 300 000
E 73 350 000
E 73 400 000
E 73 450 000
E 73 500 000
E 73 550 000
E 73 600 000
E 73 650 000
E 73 700 000
E 73 750 000
E 73 800 000
E 73 850 000
E 73 900 000
E 73 950 000
E 74 000 000
E 74 050 000
E 74 100 000
E 74 150 000
E 74 200 000
E 74 250 000
E 74 300 000
E 74 350 000
E 74 400 000
E 74 450 000
E 74 500 000
E 74 550 000
E 74 600 000
E 74 650 000
E 74 700 000
E 74 750 000
E 74 800 000
E 74 850 000
E 74 900 000
E 74 950 000
E 75 000 000
E 75 050 000
E 75 100 000
E 75 150 000
E 75 200 000
E 75 250 000
E 75 300 000
E 75 350 000
E 75 400 000
E 75 450 000
E 75 500 000
E 75 550 000
E 75 600 000
E 75 650 000
E 75 700 000
E 75 750 000
E 75 800 000
E 75 850 000
E 75 900 000
E 75 950 000
E 76 000 000
E 76 050 000
E 76 100 000
E 76 150 000
E 76 200 000
E 76 250 000
E 76 300 000
E 76 350 000
E 76 400 000
E 76 450 000
E 76 500 000
E 76 550 000
E 76 600 000
E 76 650 000
E 76 700 000
E 76 750 000
E 76 800 000
E 76 850 000
E 76 900 000
E 76 950 000
E 77 000 000
E 77 050 000
E 77 100 000
E 77 150 000
E 77 200 000
E 77 250 000
E 77 300 000
E 77 350 000
E 77 400 000
E 77 450 000
E 77 500 000
E 77 550 000
E 77 600 000
E 77 650 000
E 77 700 000
E 77 750 000
E 77 800 000
E 77 850 000
E 77 900 000
E 77 950 000
E 78 000 000
E 78 050 000
E 78 100 000
E 78 150 000
E 78 200 000
E 78 250 000
E 78 300 000
E 78 350 000
E 78 400 000
E 78 450 000
E 78 500 000
E 78 550 000
E 78 600 000
E 78 650 000
E 78 700 000
E 78 750 000
E 78 800 000
E 78 850 000
E 78 900 000
E 78 950 000
E 79 000 000
E 79 050 000
E 79 100 000
E 79 150 000
E 79 200 000
E 79 250 000
E 79 300 000
E 79 350 000
E 79 400 000
E 79 450 000
E 79 500 000
E 79 550 000
E 79 600 000
E 79 650 000
E 79 700 000
E 79 750 000
E 79 800 000
E 79 850 000
E 79 900 000
E 79 950 000
E 80 000 000
E 80 050 000
E 80 100 000
E 80 150 000
E 80 200 000
E 80 250 000
E 80 300 000
E 80 350 000
E 80 400 000
E 80 450 000
E 80 500 000
E 80 550 000
E 80 600 000
E 80 650 000
E 80 700 000
E 80 750 000
E 80 800 000
E 80 850 000
E 80 900 000
E 80 950 000
E 81 000 000
E 81 050 000
E 81 100 000
E 81 150 000
E 81 200 000
E 81 250 000
E 81 300 000
E 81 350 000
E 81 400 000
E 81 450 000
E 81 500 000
E 81 550 000
E 81 600 000
E 81 650 000
E 81 700 000
E 81 750 000
E 81 800 000
E 81 850 000
E 81 900 000
E 81 950 000
E 82 000 000
E 82 050 000
E 82 100 000
E 82 150 000
E 82 200 000
E 82 250 000
E 82 300 000
E 82 350 000
E 82 400 000
E 82 450 000
E 82 500 000
E 82 550 000
E 82 600 000
E 82 650 000
E 82 700 000
E 82 750 000
E 82 800 000
E 82 850 000
E 82 900 000
E 82 950 000
E 83 000 000
E 83 050 000
E 83 100 000
E 83 150 000
E 83 200 000
E 83 250 000
E 83 300 000
E 83 350 000
E 83 400 000
E 83 450 000
E 83 500 000
E 83 550 000
E 83 600 000
E 83 650 000
E 83 700 000
E 83 750 000
E 83 800 000
E 83 850 000
E 83 900 000
E 83 950 000
E 84 000 000
E 84 050 000
E 84 100 000
E 84 150 000
E 84 200 000
E 84 250 000
E 84 300 000
E 84 350 000
E 84 400 000
E 84 450 000
E 84 500 000
E 84 550 000
E 84 600 000
E 84 650 000
E 84 700 000
E 84 750 000
E 84 800 000
E 84 850 000
E 84 900 000
E 84 950 000
E 85 000 000
E 85 050 000
E 85 100 000
E 85 150 000
E 85 200 000
E 85 250 000
E 85 300 000
E 85 350 000
E 85 400 000
E 85 450 000
E 85 500 000
E 85 550 000
E 85 600 000
E 85 650 000
E 85 700 000
E 85 750 000
E 85 800 000
E 85 850 000
E 85 900 000
E 85 950 000
E 86 000 000
E 86 050 000
E 86 100 000
E 86 150 000
E 86 200 000
E 86 250 000
E 86 300 000
E 86 350 000
E 86 400 000
E 86 450 000
E 86 500 000
E 86 550 000
E 86 600 000
E 86 650 000
E 86 700 000
E 86 750 000
E 86 800 000
E 86 850 000
E 86 900 000
E 86 950 000
E 87 000 000
E 87 050 000
E 87 100 000
E 87 150 000
E 87 200 000
E 87 250 000
E 87 300 000
E 87 350 000
E 87 400 000
E 87 450 000
E 87 500 000
E 87 550 000
E 87 600 000
E 87 650 000
E 87 700 000
E 87 750 000
E 87 800 000
E 87 850 000
E 87 900 000
E 87 950 000
E 88 000 000
E 88 050 000
E 88 100 000
E 88 150 000
E 88 200 000
E 88 250 000
E 88 300 000
E 88 350 000
E 88 400 000
E 88 450 000
E 88 500 000
E 88 550 000
E 88 600 000
E 88 650 000
E 88 700 000
E 88 750 000
E 88 800 000
E 88 850 000
E 88 900 000
E 88 950 000
E 89 000 000
E 89 050 000
E 89 100 000
E 89 150 000
E 89 200 000
E 89 250 000
E 89 300 000
E 89 350 000
E 89 400 000
E 89 450 000
E 89 500 000
E 89 550 000
E 89 600 000
E 89 650 000
E 89 700 000
E 89 750 000
E 89 800 000
E 89 850 000
E 89 900 000
E 89 950 000
E 90 000 000
E 90 050 000
E 90 100 000
E 90 150 000
E 90 200 000
E 90 250 000
E 90 300 000
E 90 350 000
E 90 400 000
E 90 450 000
E 90 500 000
E 90 550 000
E 90 600 000
E 90 650 000
E 90 700 000
E 90 750 000
E 90 800 000
E 90 850 000
E 90 900 000
E 90 950 000
E 91 000 000
E 91 050 000
E 91 100 000
E 91 150 000
E 91 200 000
E 91 250 000
E 91 300 000
E 91 350 000
E 91 400 000
E 91 450 000
E 91 500 000
E 91 550 000
E 91 600 000
E 91 650 000
E 91 700 000
E 91 750 000
E 91 800 000
E 91 850 000
E 91 900 000
E 91 950 000
E 92 000 000
E 92 050 000
E 92 100 000
E 92 150 000
E 92 200 000
E 92 250 000
E 92 300 000
E 92 350 000
E 92 400 000
E 92 450 000
E 92 500 000
E 92 550 000
E 92 600 000
E 92 650 000
E 92 700 000
E 92 750 000
E 92 800 000
E 92 850 000
E 92 900 000
E 92 950 000
E 93 000 000
E 93 050 000
E 93 100 000
E 93 150 000
E 93 200 000
E 93 250 000
E 93 300 000
E 93 350 000
E 93 400 000
E 93 450 000
E 93 500 000
E 93 550 000
E 93 600 000
E 93 650 000
E 93 700 000
E 93 750 000
E 93 800 000
E 93 850 000
E 93 900 000
E 93 950 000
E 94 000 000
E 94 050 000
E 94 100 000
E 94 150 000
E 94 200 000
E 94 250 000
E 94 300 000
E 94 350 000
E 94 400 000
E 94 450 000
E 94 500 000
E 94 550 000
E 94 600 000
E 94 650 000
E 94 700 000
E 94 750 000
E 94 800 000
E 94 850 000
E 94 900 000
E 94 950 000
E 95 000 000
E 95 050 000
E 95 100 000
E 95 150 000
E 95 200 000
E 95 250 000
E 95 300 000
E 95 350 000
E 95 400 000
E 95 450 000
E 95 500 000
E 95 550 000
E 95 600 000
E 95 650 000
E 95 700 000
E 95 750 000
E 95 800 000
E 95 850 000
E 95 900 000
E 95 950 000
E 96 000 000
E 96 050 000
E 96 100 000
E 96 150 000
E 96 200 000
E 96 250 000
E 96 300 000
E 96 350 000
E 96 400 000
E 96 450 000
E 96 500 000
E 96 550 000
E 96 600 000
E 96 650 000
E 96 700 000
E 96 750 000
E 96 800 000
E 96 850 000
E 96 900 000
E 96 950 000
E 97 000 000
E 97 050 000
E 97 100 000
E 97 150 000
E 97 200 000
E 97 250 000
E 97 300 000
E 97 350 000
E 97 400 000
E 97 450 000
E 97 500 000
E 97 550 000
E 97 600 000
E 97 650 000
E 97 700 000
E 97 750 000
E 97 800 000
E 97 850 000
E 97 900 000
E 97 950 000
E 98 000 000
E 98 050 000
E 98 100 000
E 98 150 000
E 98 200 000
E 98 250 000
E 98 300 000
E 98 350 000
E 98 400 000
E 98 450 000
E 98 500 000
E 98 550 000
E 98 600 000
E 98 650 000
E 98 700 000
E 98 750 000
E 98 800 000
E 98 850 000
E 98 900 000
E 98 950 000
E 99 000 000
E 99 050 000
E 99 100 000
E 99 150 000
E 99 200 000
E 99 250 000
E 99 300 000
E 99 350 000
E 99 400 000
E 99 450 000
E 99 500 000
E 99 550 000
E 99 600 000
E 99 650 000
E 99 700 000
E 99 750 000
E 99 800 000
E 99 850 000
E 99 900 000
E 99 950 000
E 100 000 000
E 100 050 000
E 100 100 000
E 100 150 000
E 100 200 000
E 100 250



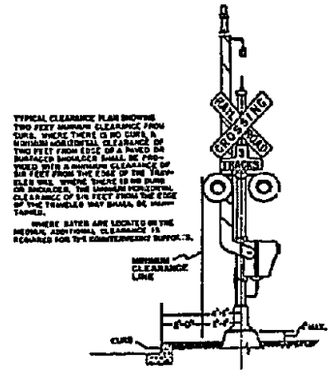
SLAG RAILROAD BALLAST SECTION AT SLAG FILL AREA
1/8"=1'-0"



DREDGE TAILINGS DAM & CLEAR WATER POND DIKE SECTIONS
1"=40'-0"



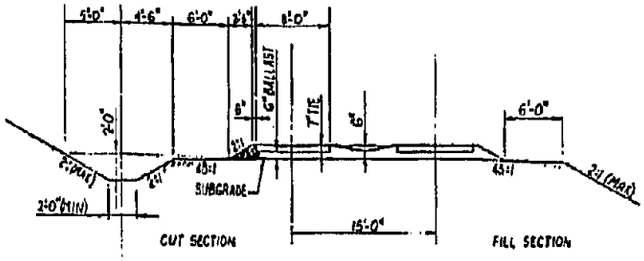
60 A.S.C.E. RAIL SECTION
NTS



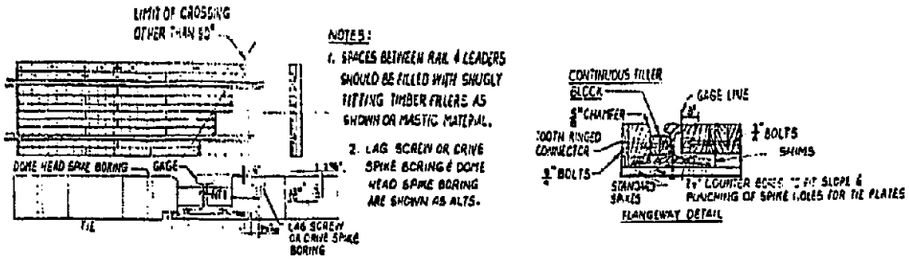
RAILROAD CROSSING SIGNAL
NTS

REFERENCES		REFERENCES		REVISIONS								REVISIONS								
DRAWING NO.	DESCRIPTION	DRAWING NO.	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT	DESCRIPTION	NO.	DATE	BY	CHKD	SEC	PROJ	CLIENT		
												C	5-20-82	TK						
												B	5-5-82	TK						
												A	4-11-82	TK						

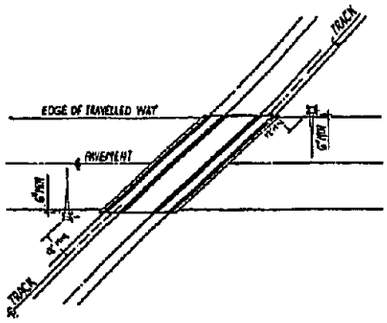
CHO-DE-13 (12/79)



SLAG RAILROAD BALLAST SECTION
1/8" = 1'-0"



WOOD PLANK ROAD CROSSING
NTS



CROSSING SIGNAL LOCATION PLAN
NTS