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CHARACTERIZATION & SUPPLY OF COAL BASED FUELS

Quarterly Report for the Period
August 1, 1987 to October 31, 1987

Energy International, Inc.
135 William Pitt Way
Pittsburgh, PA 15238

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Pittsburgh Energy Technology Center

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1.0 INTRODUCTION & BACKGROUND

Under the Department of Energy's Advanced Combustor Technology Program, approximately 11 combustor contractors (under 13 contracts) are developing combustion systems (during 1987-1989) for use in residential, commercial, light industrial and industrial retrofit markets. Sufficient quantities of well-characterized, coal-based fuels possessing specific, appropriate specifications are required by the contractors for their developmental test programs. Fuels may be dry pulverized coal or coal liquid fuels. In support of these equipment development efforts, the team of Energy International and Dravo Engineers is providing such fuels (under DOE Contract DE-AC22-86PC90258 within the PETC Alternate Energy Program).

Nearly a third of the total energy use in the U.S. is in the residential, commercial, and light industrial sectors. Of this, about half of the energy is supplied by the direct consumption (not including electricity) of conventional oil and gas resources. Thus, there is a significant energy use component for which coal is not currently a viable user option.

For coal to significantly penetrate this important market sector, it must be demonstrated that:

- o Premium coal-based fuels can be made, combusted, and used in low maintenance, automatic use systems to which such users are accustomed, i.e., by a direct replacement for conventional fuels and require only simple installation changes.
- o Advanced coal fuel combustion systems can effectively combust coal based fuels while meeting economic, environmental, and performance standards.
- o Coal fuels, combustion systems and service support are well matched, reliable, cost effective, and are anticipated to be available over the projected lifetime of the installations.

The key to the development of fuel and combustor technologies for future application to the use of premium coal-based fuels in these market sectors is to make representative coal fuels available for developmental testing. Current coal cleaning and processing technologies in early development stages offer the promise to meet the market, the performance and the environmental acceptability that are expected to be required. They are not economically competitive now and production facilities are presently limited to experimental and pilot-scale operations which do not offer the economy of scale to reduce costs to the minimum. This is not likely to change with the current plentiful supplies of relatively low cost fuels.

The developmental testing of advanced combustion equipment systems requires fuels for testing; test experience and performance measures are needed to identify cost competitiveness in the market and specific market niches for early commercialization; and, commercial market opportunities are needed to justify and specify the development and installation of advanced fuels facilities for supplying the developmental testing needs.

The capability to produce significant quantities of coal based fuels cannot be supported in the current economic and energy use situation. Once these pieces of experience and information begin to fall into place, the market driven needs will more clearly identify the suite of coals that will satisfy the markets and the performance requirements (i.e., cost, maintenance, energy efficiency, environmental). For now, it is important to provide sufficient quantities of surrogate fuels to enable development testing to proceed. To serve as surrogate fuels, the fuels should have chemical and physical characteristics (ash, sulfur, volatiles, fusion temperature, heat content, particle size distribution, slurry formulation, etc.) that are consistent with projected performance and environmental standards. In addition, these surrogates are to be produced using readily available conventional types of cleaning and processing so as to not promote a particular fuel technology or create a reliability on an uncertain fuel technology.

While the definitions of market and performance are not finalized nor quantitatively fixed and the eventual, economically acceptable fuel processes are not yet determined, it is possible to make use of current understanding of coal resources, markets, combustor and environmental requirements and specific available coal properties and characteristics to make reasonable selections of coals for fuels representative of future advanced fuels. With selected coals, conventional beneficiation methods can be used to prepare current versions of advanced premium coal-based fuels. The associated excessive grinding, special processing, low energy recoveries, and process economics are not expected to be acceptable for eventual commercial operations. However, these current advanced premium fuels can meet the needs of developmental testing with acceptable costs at this time.

The analysis of fuel needs, the selection of candidate coals, the characterization and supply in this contract are to be accomplished with the above in mind. The best choices of those available have been made based upon the available information, coal and processes. This will at least provide the developmental test fuels that will enable the DOE-PETC advanced combustion and fuels program to move forward. Following the fuels and combustor development activities that this supply contract will support, it is expected that additional optional candidate coals will become evident based on the new experience. In the meantime, these coal fuels will enable the program to proceed.

During the fourth quarter of this contract (August 1 through October 31, 1987) the primary activities were involved with:

- o The completion of the laboratory washability studies of the first five coals selected in Task 1 and the preparation of preliminary washability data results.
- o Upgrading and improvement of the pilot wash circuit to improve both the product quality and yield.
- o Continuation of the survey of the data base to select appropriate coals for use by Vortec, Avco and the University of Tennessee Space Institute contracts.
- o Continuation of the coal procurement, cleaning, fuel preparation and delivery activities.
- o Initiation of contacts with companies and/or other laboratories with coal cleaning facilities to determine if it would be possible to lower the coal cleaning costs by reason of increased capacity compared to the current coal cleaning facilities.

The progress on the above activities is reported in the following sections of this report.

2.0 OBJECTIVES AND SCOPE OF WORK

2.1 Contract Objectives

Contract objectives are as follows:

- o Develop fuel specifications to serve combustor requirements.
- o Select coals having appropriate compositional and quality characteristics as well as an economically attractive reserve base.
- o Provide quality assurance for both the parent coals and the fuel forms.
- o Deliver premium coal-based fuels to combustor developers as needed for their contract work.

2.1 Contract Scope of Work

Energy International/Dravo will perform the following:

- o From information obtained both from the combustor PRDA and from the combustor contractors, develop fuel specifications and schedule.
- o Using published reports and databases, perform a market assessment and a resource assessment in order to identify acceptable coals within reasonable proximity to markets. In other words, determine the availability and applicability of a wide range of coals in order to produce premium coal-based fuels for specific markets.
- o From all coal ranks and all domestic resources select coals which satisfy the requirements of combustion systems being developed.
- o Procure premium coals having the ability to be processed to contain <0.8 lb ash per million Btu and <0.5 lbs sulfur per million Btu.
- o Procure coals and produce coal liquid mixtures or dry pulverized coal and deliver these premium fuels to combustor contractors.

2.3 Task 1 Objectives

The objectives of Task 1, "Analysis of Fuels Needs", are as follows:

- o To provide analyses, information and evaluation of coal resources, coal properties, and market opportunities to support the selection of coals for characterization, processing and supply.

- o To assure that coals used in developmental testing are representative of future potential coal used in those applications and are:
 - o Available as U.S. domestic resource in sufficient quantity
 - o Geographically proximate to the regional markets
 - o Capable of being processed into premium coal-based fuels that have the properties to satisfy the combustor needs and market constraints (such as environmental)
- o To evaluate, interpret and assess the available information on coal reserves, market opportunities, performance requirements, environmental acceptability, coal properties and specific characteristics to provide guidance in the selection of candidate coals for characterization and supply for developmental testing of advanced combustors for residential, commercial and light industrial applications.
- o To collect, review and evaluate information about specific, currently available coals that can be procured from existing mining operations to provide contracted quantities of development test fuels that satisfy the reserves, market, geographic, property, performance and environmental criteria.
- o To recommend candidate coals and then select specific coals to be purchased, processed into coal-based premium fuels, and supplied to DOE users.
- o To coordinate the performance requirements of combustor developers under DOE-PETC contract and in-house efforts with the selection and supply of coals.

2.4 Task 2 Objectives

The objectives of Task 2, "Characterization of Coal Based Fuels", are as follows:

- o To procure representative samples of the coals selected in Task 1 and prepare them for characterization studies.
- o To obtain baseline analytical data for each of the parent coals.
- o To carry out bench-scale froth flotation cleaning test on each of the candidate coals to determine the yield of specification coal attainable from each.

- o To carry out detailed washability studies for each coal to determine the effect of particle size reduction on mineral matter liberation as well as the coal yield as a function of the specific gravity of the separation.
- o Using the available results of the characterization studies, to select a coal or suite of coals suitable for the preparation of the fuels to meet the specifications of the combustor contractors.

2.5 Task 3 Objectives

The objectives of Task 3, "Fuel Supply", are as follows:

- o To arrange for the capability, availability, and operation of suitable deep-cleaning coal wash circuit, coal/water slurry preparation plant, and micronizing/grinding facilities.
- o To purchase and arrange for the delivery of the appropriate coals for fuel preparation.
- o To clean the coals to meet the specifications necessary for the specific fuel needs, i.e., quality categories, such as slagging, non-slagging, industrial retrofit, residential/commercial.
- o To prepare the coal based fuels according to the specifications of the PRDA and as modified or requested by the combustor contractors.
- o To deliver the fuel to the combustor contractor on schedule.
- o To characterize each fuel prior to shipment to assure that the specifications are being met.

3.0 EXECUTIVE SUMMARY

Under the Department of Energy's Combustor Technology Program, approximately 11 combustor contractors (under 13 contracts) are developing combustor systems (during 1987-1989) for use in residential, commercial, light industrial and industrial retrofit markets. Sufficient quantities of well-characterized, coal-based fuels processing specific, appropriate specifications are required by the contractors for their developmental test programs. Fuels may be dry pulverized coal or coal-water fuels. In support of these equipment development efforts, the team of Energy International and Dravo Engineering Companies is providing such fuels under DOE Contract No. DE-AC22-86PC90258.

During the fourth quarter of this contract (August 1, 1987 through October 31, 1987) the primary activities were involved with:

- o The completion of the laboratory washability studies of the first five coals selected in Task 1 and the preparation of preliminary washability results.
- o Upgrading and improvement of the pilot wash circuit to improve both the product quality and yield.
- o Continuation of the survey of the data base to select appropriate coals for use by Vortec, Avco and the University of Tennessee Space Institute (UTSI) contracts.
- o Continuation of the coal procurement, cleaning, fuel preparation and delivery activities.
- o Initiation of contacts with companies and/or other laboratories with coal cleaning facilities to determine if it would be possible to lower the coal cleaning costs by reason of increased capacity, compared to the current coal cleaning facilities.

A brief summary of these activities is as follows.

Under the Task 1 coal selection activity, efforts were made to select coals for specific and unique requirements for several of the combustor contractors. In particular, Vortec, which specified a lower than average iron content, UTSI which required a cleaner, i.e., lower ash coal, than specified by most of the other contractors and Avco which requested a subbituminous and lignite coal both micronized and in coal-water slurries.

In further discussions with Vortec they indicated that they would probably be relaxing their specifications to the point that an Northern Appalachian coal could probably be found to fill their requirements. To obtain the ultra clean coal requested by UTSI samples would probably have to be chemically cleaned by processes such as that developed by Amax Coal Company. Finally, it was determined that the University of North Dakota Energy & Mineral Research Center could select and prepare the lignite and subbituminous fuels needed by Avco.

The Task 2 washability studies were completed and all the sample analyses were obtained on the first five coals selected in Task 1. The data are now being reviewed and the necessary calculations begun to prepare the washability curves. This activity should be completed in December. This should conclude Task 2 activities unless additional coal seams are selected for the combustion program and additional characterization is needed.

The major improvements to the Dravo cleaning circuits accomplished during the performance of Task 3 activities included increasing the feed capacity from 450 to 600 lb/hour without product degradation, and the inclusion of an auxiliary set of scavenger flotation cells for reprocessing the flotation tailings which may increase the yield of clean coal by as much as 25%.

Preliminary contacts were made with Iowa State University, Ames, Iowa; Amax R&D Center, Golden, Colorado; and the Electric Power Research Institute (EPRI) coal cleaning test facilities at Homer City, PA to explore their capabilities for preparing the deep cleaned coal needed for the combustor program. All indicated that they would be able to accomplish the task but would like to receive a sample of the coal that we wished to have cleaned in order to evaluate their methods. After evaluation they would be able to give us a cost figure. Arrangements are being made to ship them samples of the Upper Elkhorn #3 coal from the Westmoreland Coal Company's Wentz cleaning plant.

4.0 TASK 1 - ANALYSIS OF FUEL NEEDS

4.1 Subtask 1.1 - Project Management

The changes in the requirements for quantities and specifications of the coal-fuels to be processed and delivered by Energy International to PETC's combustor development contractors has precipitated a need to review and reassess the plans and costs for coal processing to make the micronized powder and slurry fuels.

A key concern centers around the processing capabilities and costs of the deep cleaning circuit needed to provide the very low ash requirements for the residential, commercial, and light industrial (RCLI) fuels. The original supply contract plan was premised on expected deliveries of very large quantities of a limited set of common fuel specifications. The very stringent RCLI requirements were anticipated to press the conventional physical deep cleaning capabilities in order to meet the specifications.

The small cleaning circuit (normally 300 lb/hr of coal feed processed) at Dravo has ably satisfied the initially intended need to supply early delivery of small quantities of the RCLI fuel. The small circuit has consistently met the established low ash specifications of either the RCLI or industrial retrofit standards, but at low product recovery rates. This processing has proved to be more costly than planned, in part because of the low recovery and the engineering supervision needed to maintain the desired quality. Further reductions in ash content are not anticipated in the current process configuration and control. Building a large scale (5 ton/hr) froth flotation circuit at Dravo is not justified, since the originally anticipated large quantity requirements for coal deliveries are not currently scheduled. The costs of continual processing with the current capability may not be justified either.

At PETC's suggestion, Energy International conducted discussions with alternative sources of deep cleaning services in order to assess the potential for identifying alternative means of supplying deep cleaned coal of RCLI quality at more reasonable costs. At the same time, a review of the combustor coal test needs and coal selection criteria were begun to evaluate the possibility of relaxed or altered fuel requirements. (See the discussion of Subtask 1.2.) After contacting a number of institutions with deep cleaning capabilities, the EPRI coal cleaning test facility (CCTF) at Homer City, PA; the Ames Laboratory at Iowa State University; and Amax R&D Center at Golden, CO were iden-

tified as potential alternatives. They each reviewed the coal analyses and preliminary washability data supplied by Energy International and expressed an expectation of meeting the requirements. At the close of the quarter, both were preparing tests to determine the ability to process to meet specifications and they were planning to provide cost proposals if it becomes appropriate. This assessment was intended only to determine the feasibility and existence of lower cost deep cleaning options. Specific plans and process selection will follow in conjunction with PETC review if determined to be appropriate.

4.2 Subtask 1.2 - Coal Selection

Prior to this quarter, the initial recommendation of coal candidates and selections of a primary coal source for coal fuel supply requirements had been accomplished. All of the combustor developers had been contacted, and they had responded with quantities and specifications for their fuel requirements. Initial shipments of fuel, both dry micronized and coal-water slurry, had been provided to a number of contractors. A summary of those needs and shipments was provided in the previous quarterly.

During this quarter, major activities in this subtask, reassessment and planning of the coal selection requirements, was conducted to support specific supply decisions and to refocus the planning bases for fiscal year 1988 plans for supplies, processing and deliveries under this contract. Several of the contractors requested specifications that made it necessary to expand the search and recommendation of candidate coals for the supply program. In particular, the fuel specifications requested by Vortec, TRW, The University of Tennessee Space Institute (UTSI), Avco, and SAIC have required the addressing of additional coal candidates and the reiteration of discussions on the revision of the specifications for the coals. Some of the particulars follow. Additional supporting information on the quantification of reserves of the coal candidates was also provided in response to DOE request.

The development of detailed project plans and the projection of costs of fuel supply led to on-going reviews of both the coal selections and the deep cleaning and micronizing requirements. The consideration of options in the area of required specifications, process capabilities and costs resulted in the review and revision of the project plans. Particulars on these issues also follow.

A listing of the candidate coals and the corresponding estimates of reserves of those coals was provided in both the Topical Report and the First Quarterly Technical Progress Report. In response to questions raised by DOE to clarify the sources and assumptions and to develop those resources, the available information on reserve quantities was further reviewed. The estimates originally reported were based upon available resources information by seam from a combination of reserve database, Keystone Coal Industry Manual (1986) and Keystone data on coal production by seam. Those estimates included:

- o Original tonnage in minable seams
- o Revision of minability criteria to include thinner seams
- o Recent increases in reserve quantity estimates
- o Coal in correlated beds

In addition to explaining the information sources and basis for the estimates, estimates of coal resources were prepared on several different bases for comparison purposes, with each case imposing added restrictions on the estimate. In any of the cases, the total available coal resources that are minable from all of the candidate coals is more than sufficient to meet the defined market need. The revised Table 6.1 is shown here as Table 6.1A in Appendix 8.1. A table showing the several levels of coal resource estimates based on the different assumptions is presented here as Table 6.1B in Appendix 8.1. The letter report entitled "Candidate Coal Resource Estimates" that was sent to DOE on August 25, 1987 is included in this Quarterly Report as Appendix 8.1.

The coal fuel needs of Vortec pose a special set of requirements for recommending a candidate. The Vortec combustor is being developed for use in glass-making operations and a low level of iron content is required to avoid contamination problems in the glass. Further, their request included low ash fusion temperature and high heating value. The specifications in the Vortec initial request are shown in Table 4.2.1. They later relaxed the specifications, as also shown in Table 4.2.1 which follows. In August, Energy International prepared two tables of information regarding potential coal candidates for Vortec and forwarded that information to Vortec (see Tables 4.2.2 and 4.2.3 in this section). Furthermore, PETC's direction to Energy International was to select coal candidates in this program that are representative of ample and available reserves of the coal that would be suitable for the market needs for future commercialization.

Table 4.2.2 provides sample analyses information for six candidates suggested to Vortec in August. Table 4.2.3 summarizes the advantages and disadvantages for the different candidate categories. Significant programmatic implications related to these candidates are noted below.

1. The Colorado Coal Basin D and deep cleaned Upper Elkhorn Southern Appalachian coals are currently in stock and well characterized by Energy International as a part of the on-going coal supply project for PETC. The use of very low ash content and/or western coals may not be appropriate for Vortec commercial development interests, but these coals would be convenient to supply and they meet the technical criteria requested.

2. The Oklahoma and Montana coals are representative of a number of samples for which analysis conforms well to a consistent pattern. These should be good slagging candidates, but western coals may not be of market interest. Special procurement and analysis would be required.

3. The West Virginia coals would likely be of greatest programmatic interest for development of a slagging combustor. The Pittsburgh seam sample meets the criteria well as a raw coal, and the Lower Kittanning clean coal 1.60 float fraction also meets the criteria. However, both of these samples are singular analyses in the extensive PETC database and are non-representative of broadly available and typical coal analysis patterns. Other samples taken from the same seam, same county, and in some cases the same mine, are significantly different, particularly with regard to critical parameters such as ash fusion temperature and iron content. These reported samples were collected and analyzed many years ago and are not necessarily representative of current production. A decision to select one of these West Virginia coal candidates will likely require Energy International to conduct: (1) contacting of coal suppliers, (b) review of current analyses, and (c) sampling and characterization analyses of coals until a specific coal is located.

Energy International was able to identify with relative ease a large number of Interior and Western coals, both bituminous and subbituminous that will meet most of the selection criteria, sometimes being very low in iron content and usually low in heat value. There are plentiful coal supplies in Southern Appalachia for which the candidate is representative. While analyses of deeply cleaned coals of this category are not readily available (other than those we are currently using in our program), Energy International expects the results to be representative.

The Northern Appalachian coals (for example, the noted West Virginia samples) are the real enigma. They would be the most desirable candidates for slagging combustors for industrial use. However, extensive review of the available database has firmed up only these limited candidates (one raw, one cleaned), and they are expected to be non-representative. The Vortec list of coals included potential candidates in the Pittsburgh and Sewell seams, but were contradicted by other samples in the same table. In addition, that data source was some thirty years old and thus not current.

Table 4.2.1

Vortec Requested Coal Specifications

	<u>Initial Request</u>	<u>Relaxed Specifications</u>
Ash, %	6 to 10	<10
Iron, %	<10	<10
Sulfur, %	<1.5	<3
Heating Value, Btu/lb	>13,000	>12,500
Ash Fusion Temperature (°F) Fluid	<2,450	<2,600

Table 4.2.2

COAL SELECTION CANDIDATES FOR VORTEC CRITERIA

<u>Sample No.</u>	CBD-093-WRM-D	W-00920	UE3-113-PCO-C	W-00971	W-00546	—
<u>State</u> <u>County</u>	Colorado	West Virginia Marion Co.	Virginia Wise Co.	West Virginia Upshur Co.	Oklahoma Wagoner Co.	Montana Rosebud Co.
<u>Seam</u>	<u>Coal Basin D</u>	<u>Pittsburgh</u>	<u>Taggart</u>	<u>Lower Kittanning</u>	<u>Croweburg</u>	<u>Rosebud</u>
<u>Preparation</u>	Washed Run-of-Mine	Raw	Deep Cleaned	Clean (F 1.60)	Raw	Drying Processed
<u>ANALYSIS</u>						
<u>Proximate</u>						
Volatile Matter	39.60	36.2	35.98	29.0	35.8	38.6
Fixed Carbon	53.80	56.7	62.68	62.2	58.2	52.8
Ash	6.60	7.2	1.34	8.8	6.0	7.0
Sulfur	0.53	0.7	0.61	0.71	0.53	0.39
Btu/lb	12945	13980	15031	13147	14142	12175
<u>Ultimate</u>						
Carbon	72.80	78.00	84.35	75.1	78.8	70.07
Hydrogen	4.78	5.00	5.14	4.7	2.60	4.92
Nitrogen	1.68	1.40	1.54	1.5	2.00	0.90
<u>Ash Chemistry</u>						
SiO ₂	61.95	50.09	50.27	42.28	45.17	38.17
Al ₂ O ₃	21.21	25.02	29.57	32.16	18.90	19.70
TiO ₂	0.82	1.17	1.69	2.03	0.90	0.89
Fe ₂ O ₃	5.47	6.32	8.02	3.43	6.15	1.85
CaO	2.39	8.72	2.75	8.72	19.88	16.98
MgO	1.06	1.19	0.68	1.51	1.41	4.75
K ₂ O	1.34	1.43	1.44	1.61	0.94	0.80
Na ₂ O	3.12	--	2.70	--	--	--
SO ₃	1.29	3.86	1.35	4.12	2.21	--
P ₂ O ₅	0.69	--	0.20	--	--	--
SrO	0.22	--	0.58	--	--	--
BaO	0.29	--	0.43	--	--	--
Mn ₃ O ₄	0.00	--	0.06	--	--	--
Base Acid Ratio	0.16	--	0.19	--	--	--
T 250 Temperature	2900	--	2720	--	--	--
<u>Ash Fusion Temperature</u> (Reducing)						
Initial	2200	2300	2200	2300	--	2245
Softening	2310	2350	2330	2390	2140	2260
Fluid	2440	2400	2440	2490	--	2360
Hardgrove	51	55	--	55	--	--
FSI	5.0	7.5	8.5	1.5	5.0	--

Note: All analysis data are on a dry basis.

Table 4.2.3

SUMMARY OF COAL CANDIDATES
FOR VORTEC COMBUSTOR

<u>Category</u>	<u>Candidate Location and Seam</u>	<u>Advantages</u>	<u>Disadvantages</u>
Western Bituminous	Colorado Coal Basin D	<ul style="list-style-type: none"> • EI has in stock and characterized • Representative of numerous samples 	<ul style="list-style-type: none"> • Heating value is low in desired range • Western source is far from markets
Northern Appalachian Bituminous	West Virginia Pittsburgh	<ul style="list-style-type: none"> • Close match with criteria • Proximity to markets • Political value 	<ul style="list-style-type: none"> • Non-representative • Acquisition and characterization
Southern Appalachian Bituminous - Deep Cleaned	Virginia Taggart (Upper Elkhorn #3)	<ul style="list-style-type: none"> • EI has in stock and characterized • Representative of numerous samples 	<ul style="list-style-type: none"> • Requires expensive deep cleaning process • Low ash for slagging
Northern Appalachian Bituminous - Cleaned	West Virginia Lower Kittanning	<ul style="list-style-type: none"> • Lower iron oxide • Proximity to markets • Political value 	<ul style="list-style-type: none"> • Non-representative • Acquisition and characterization • Controlled cleaning required
Interior Province Bituminous	Oklahoma Croweburg	<ul style="list-style-type: none"> • Good criteria match • Representative of several samples • Advantageous use of "unknown" coal 	<ul style="list-style-type: none"> • Transportation to dominant markets not convenient
Processed Western Subbituminous	Montana Rosebud -WECO	<ul style="list-style-type: none"> • Advantageous use of plentiful and inexpensive coal • Very low iron oxide • Representative of large number of coals 	<ul style="list-style-type: none"> • Low heating value • Far from markets

After review of the information on candidate coals as provided by Energy International and following discussions with PETC project management, Energy International was informed by PETC and Vortec that the planning and coal specifications for the Vortec test program will be revised. It is likely that a typical Pennsylvania slagging coal will be selected and that the special processing or other deep cleaning will be required. Energy International is awaiting specific selection criteria and direction.

The University of Tennessee Space Institute (UTSI) had requested a very low ash, low sulfur coal with relatively high ash fusion temperature and high volatiles. In September, Energy International sent analysis information for the Upper Elkhorn #3 baseline coal to UTSI with the recognition that this option most closely matched the UTSI request among available options. A shipment of that coal was sent to UTSI for shakedown testing and evaluation. UTSI expressed concern that the ash fusion temperature was not high enough and that issue is of critical concern in their design configuration. All indications are that a high heat value bituminous coal that is deeply cleaned to very low ash levels does not retain the ash chemistry needed to keep the ash fusion temperature as high as required. In discussion with Amax, it was suggested that mild acid leaching can possibly leave an ash content that is both low in amount and high enough in fusion temperature. Energy international will consider that option if it becomes necessary, but is not yet prepared to recommend it.

The coal fuel needs for the Avco project were based upon the use of low rank, high volatile fuels. Both lignite and sub-bituminous coals were requested. The preparation of high quality low rank fuels (both powder and slurry forms) posed some special issues to supply the needs. Discussions were held with the University of North Dakota Energy and Minerals Research Center (UNDEMRC), as they have the experience and processing expertise with low rank fuels. Normally, low rank coals, particularly lignite, are very high in moisture content, correspondingly low in heating value, and very difficult to make quality slurries. UNDEMRC has developed processing technology to counteract these problems and to avert the spontaneous combustion normally expected of dried lignite. By hot-water-drying (the hydrothermal treatment process), UNDEMRC proposed to provide the coal fuels needed by Avco. A proposal was solicited from UNDEMRC and was under consideration at the close of the quarter. The high processing cost was of major concern.

During this quarter, it became evident that the different coal fuel specification requests of the various combustor developers was changing the nature of the coal selection and coal fuel supply efforts of this contract. These factors have become increasingly important to the effective planning and scheduling of coal processing support used to meet fuel delivery needs. As discussed in the section on project management, Energy International began a review of coal fuel process capabilities, costs and schedule needs at the request of PETC management. As discussed in that section, Energy International has contacted a number of potential suppliers of coal processing services in order to assess the cost and feasibility of meeting the changing needs (quantities, specifications, delivery schedules) of their program and the interaction with coal selections.

5.0 TASK 2 - CHARACTERIZATION OF COAL BASED FUELS

The washability studies of the first five candidate coals selected in Task 1 are almost complete. The coals selected for evaluation were (1) Upper Elkhorn #1 (Alma seam), (2) Upper Elkhorn #2 (Lower Cedar Grove seam), (3) Upper Elkhorn #3 (Taggart seam), (4) Lower Elkhorn (Pond Creek Seam), and (5) Colorado Coal Basin D from Colorado. Note that the locally known seam names are given in parentheses. A preliminary summary of the washabilities of all five coals at the 1/8" x 0 size are given in Appendix 8.2, Washability Data. Data work-up of the other sizes, i.e., 28 x 0, 100 x 0, and 200 x 0 mesh, are continuing and should be completed in December.

6.0 TASK 3 - FUEL SUPPLY

6.1 Production Facilities

The matrix of fuel requirements as shown in Table 6.1 has set into motion several contract facilities to supply the desired fuel forms. No single organization has yet been found, nor is expected, to provide deep cleaning capabilities, dry pulverizing, dry micronizing and coal slurring technology unless a new plant is constructed with a primary goal of supplying fuel for this contract. Specific selections of contractors used to date and facilities are described below.

TABLE 6.1

BITUMINOUS FUEL FORMS REQUIRED FOR THIS PROJECT

	<u>Dry Coal Fuels</u>		<u>Dry Water Fuels</u>	
	<u>Pulverized</u>	<u>Micronized</u>	<u>Pulverized</u>	<u>Micronized</u>
Deep Cleaned	X	X	X	X
Standard	X	X	X	X

6.1.1 Deep Cleaned Coal

Following DOE approval of February 6, 1987, Dravo initiated the design, modification and operation of their pilot facilities for the production of deep cleaned coal meeting the low ash and sulfur requirements of between 0.8 and 1.0 lbs ash per million btu's and 0.5 and 0.8 lbs sulfur per million btu's. The basic circuit consists of a four-phase operation including grinding, classification, beneficiation, and drying.

The major process improvements in deep cleaning which were performed on the Dravo pilot circuitry since July 1987 included the provision for increasing the circuit feed capacity from 450 to 600 lbs per hour and the inclusion of an auxiliary set of scavenger flotation cells for reprocessing the primary flotation tailings. Both changes were instituted during the latter third of the quarter reporting period and therefore comparative results to the previous production runs are only preliminary. In fact, final engineering and circuit modifications for the inclusion of the auxiliary unit were not completed until October 29. Further details of these process changes are presented in sections 6.1.1.2 and 6.1.1.3, respectively.

The Dravo circuitry has undergone several mechanical changes for both improvements of process efficiency and product consistency while maintenance repair involving several of the major unit operations including the ball mill, classifying cyclone feed system and thermal disc processor were required.

In order to accommodate the constantly changing and increasingly demanding production schedule, the Dravo facility was operated as a two-shift operation one week after start-up and continued throughout the summer. Even with this demanding production mode, equipment failures were uncommon, except for line plugging and leaks. In fact, the main downtime contributor for the first six months of continued operation was primarily due to process changes for improved performance, including the installation of the refuse drum filter, thermal disc processor and clarified process water system. During the month of August, no major modifications were made to the Dravo pilot deep cleaning circuit. All unit operations performed satisfactorily with only minor repair work required.

Even with a stringent maintenance program, on September 8 the ball mill drive mechanism failed which resulted in two weeks of unscheduled downtime. The worm and matching drive tooth gear were completely worn and required immediate replacement. Because their single shaft reducer was integrally connected to these components and an availability problem associated with replacement parts, mandated that the entire reducer assembly be rebuilt (by an outside contractor).

Prior to the drive failure, it was anticipated that after meeting the first fiscal year's production requirement on schedule, a period of scheduled downtime would be set aside for general maintenance and repairs. Therefore, in the interim, it was decided that worn alignment bearings on several of the thermal disc processor shafts be replaced. (These were plaguing the Bethlehem dryer unit since it's June arrival at Dravo.) Due to the arrangement of components on the thermal dryer unit (i.e., limited accessibility) only six of the ten bearings were actually replaced. The remaining four bearings were in operable condition.

After the drive mechanism was rebuilt and reinstalled, the Dravo pilot circuit operated for only three additional shifts before determining that the mechanical seals on the dryer oil recirculating pump was also failing. Communication with the pump vendor established that a delivery schedule of a new seal would involve a delay of several days to a week; therefore, a temporary oil level control system was set up to repump the oil leakages to the expansion reservoir. With less than a full shift of operation on the aggravated seal, the condition worsened, resulting in severe leakage at the seal which ultimately required unit shutdown. Bethlehem personnel strongly recommended that, because of both the capital expense and close tolerances associated with the mechanical seals, the pump be rebuilt. This resulted in a third week of unscheduled downtime for the month of September.

Table 6.2

Comparative Microtrac Analysis of Coal Cleaned
@ 450 and 600 lbs/hour

<u>Thruput Rate (lbs/hour)</u>	450	600
<u>Drum Number</u>	8-31-7	10-16-2
<u>Micron size</u>	<u>Cum % passing</u>	<u>Cum % passing</u>
176	100.0	100.0
125	100.0	96.1
88	95.5	88.8
62	83.5	73.2
44	68.8	52.6
31	54.2	39.1
22	41.0	31.1
16	30.1	22.1
11	22.6	13.6
7.8	13.9	9.2
5.5	7.3	7.7
3.9	3.2	3.6
2.8	1.3	1.6
Mean	35.0	46.9
50 Percentile	27.7	41.0

Table 6.3
Daily Run Averages

RUN DATE	RUN AVG. SLURRY RATE (LBS/MIN))	RUN AVG. SOLIDS RATE (LBS/MIN)	RUN AVG. MOISTURE CONTENT (WT %)	RUN AVG. ASH CONTENT (WT %)
8-04-87	15.37	3.93	26.79	1.24
8-06-87	14.06	3.36	18.33	1.18
8-07-87	16.95	4.20	23.14	1.25
8-10-87	27.54	4.54	32.78	1.64
8-11-87	14.23	3.41	19.31	1.31
8-12-87	14.83	3.33	25.12	1.32
8-13-87	13.98	3.46	34.01	1.23
8-18-87	13.12	3.35	23.01	1.30
8-19-87	12.92	3.21	28.89	1.15
8-20-87	13.10	3.37	25.23	1.29
8-24-87	12.29	3.08	23.30	1.32
8-25-87	12.54	3.12	26.82	1.26
8-26-87	13.33	3.38	25.69	1.32
8-27-87	14.33	3.95	26.98	1.35
8-28-87	12.64	3.22	24.87	1.36
8-31-87	11.99	3.10	26.72	1.30
9-01-87	11.03	2.60	24.54	1.40
9-02-87	9.61	2.47	25.97	1.44
9-03-87	8.58	2.07	28.46	1.28
9-04-87	10.78	2.79	27.29	1.35
9-08-87	9.38	2.20	23.72	1.30
9-16-87	10.98	2.85	22.83	1.37
9-17-87	8.93	2.22	23.92	1.27
9-21-87	5.62	1.28	34.64	1.60
9-22-87	10.75	2.64	27.97	1.25
9-23-87	11.78	2.95	29.44	1.39
9-24-87	8.55	2.04	27.95	1.32
10-2-87	9.87	2.23	22.67	1.52
10-7-87	11.22	2.75	20.89	1.44
10-8-87	16.42	4.25	19.23	1.24
10-9-87	15.01	4.00	19.56	1.28
10-12-87	15.39	4.12	24.43	1.31
10-13-87	18.90	5.09	26.19	1.36
10-14-87	15.47	3.74	26.73	1.31
10-15-87	12.79	3.70	24.74	1.22
10-16-87	11.98	3.22	25.20	1.21
10-19-87	10.66	2.90	24.99	1.30
10-20-87	9.92	2.63	24.17	1.22
10-21-87	8.21	2.55	22.95	1.19
10-22-87	10.11	2.83	21.27	1.22
10-23-87	9.62	2.67	19.86	1.30
10-26-87	11.74	2.85	21.77	1.19
10-27-87	12.43	3.41	19.20	1.22
10-28-87	11.73	3.20	20.20	1.27
10-29-87	13.87	3.96	18.61	1.22
10-30-87	12.25	3.20	20.55	1.11

Table 6.4
Ash Balance Determinations

Date	Feed Ash	Primary		Secondary		System Recovery
		Product	Tails	Product	Tails	
8-04-87	2.52	2.07	11.69	1.61	3.59	73.18
8-06-87	2.85	1.57	5.70	1.25	3.19	57.62
8-07-87	3.15	1.71	7.91	1.47	3.03	64.96
8-11-87	3.01	1.64	4.70	1.36	3.28	47.17
8-12-87	3.07	1.72	6.35	1.53	2.93	61.23
8-19-87	2.97	1.64	4.69	1.26	2.65	40.98
8-25-87	3.01	1.73	5.11	1.47	3.37	53.63
8-26-87	2.95	1.73	5.21	1.40	3.34	53.90
8-28-87	2.86	1.76	5.03	1.37	2.95	49.98
9-01-87	2.74	1.66	4.44	1.31	2.97	48.26
9-03-87	2.84	1.66	3.94	1.33	3.03	38.88
9-04-87	2.65	1.67	3.99	1.31	2.68	42.58
9-16-87	2.80	1.68	4.64	1.25	3.16	48.17
9-17-87	3.00	1.80	5.35	1.53	3.27	55.93
9-22-87	2.73	1.64	4.23	1.38	3.85	51.82
10-01-87	2.94	1.63	4.28	1.45	8.42	49.26
10-07-87	2.68	1.56	3.97	1.43	3.93	50.74
10-08-87	2.56	1.62	4.00	1.33	3.28	51.51
10-12-87	2.51	1.62	4.02	1.30	2.75	49.03
10-15-87	2.31	1.48	4.05	1.12	2.20	45.14
10-16-87	2.51	1.51	3.73	1.15	2.09	33.91
10-21-87	2.61	1.56	3.28	1.34	3.23	34.42
10-26-87	2.37	1.56	3.49	1.20	2.09	34.56
10-27-87	2.43	1.48	3.48	1.26	2.12	39.07
10-28-87	2.62	1.45	4.14	1.29	2.59	49.55
10-29-87	2.44	1.46	3.26	1.24	2.46	37.34
Averages	2.74	1.64	4.80	1.34	3.17	48.57
@ 450	2.88	1.71	5.53	1.39	3.15	52.55
@ 600	2.54	1.54	3.79	1.28	3.20	43.14

The rebuilt pump was delivered and reinstalled by October 7. During the period the drive and pump were being rebuilt, changes were also made to improve the quality and yield of clean coal. First, the air operated lightning mixer was removed from the reagent conditioning tank and replaced with a variable speed electric mixer. Because of line air pressure fluctuations, changes in impeller speed were noted. With the overflow design of the conditioning tank, during periods of higher line pressure, larger quantities of flotation feed would be fed to the flotation cells, thus generating pulses in feed rate and; consequently, minor fluctuations in reagent dosage. Because of the ash yield curve relationships, small changes in reagent dosage were critical to the circuitry.

The second item, a trommel screen, was installed at the ball mill discharge. This unit, which was field designed, fabricated and installed, was attached directly onto the ball mill and is used to screen out oversize particles feeding into the classifying cyclone assembly, which could plug the cyclone. Prior to the installation, only a pump protection screen was used. It rapidly became overloaded and would require manual discharging which resulted in discarding of both oversize and nearsize particles to refuse. Currently, the rotating trummel screen minimizes oversize discard and virtually eliminated cyclone plugging.

During October, Dravo received a complaint from the selected dry micronizer subcontractor, Schutz-O'Neill Company, regarding formed moisture condensate inside the plastic liners of the drums containing thermally dried deep cleaned coal. This moisture level was apparently coating the drum liners, and consequently, wetting the coal surfaces near the outer edges thus causing inconsistent levels of grinding. Apparently, the moisture was due to the temperature differential between the heated coal and drum.

During in-house discussions, a method utilizing a conventional screw conveyor was devised to pre-cool the coal surfaces before entering the drum. A screw conveyor unit was ordered and received by late October for testing. Final installation and unit performance verification tests are expected to be completed after the first week in November.

6.1.1.1 Increased Circuit Capacity

Because of mechanical sparking related to worn bearings on the classifying cyclone feed pump, and after dismantling revealed excessive unrepairable misalignment problems, a higher volumetric capacity high solids loading pump was purchased and installed during the ball mill drive mechanism rebuild. This new pump afforded the opportunity, after manipulating cyclone configuration and circuit solids and liquid rebalancing, to further increase the pilot circuit's thruput by 33% or from 450 to 600 pounds per hour feed capacity.

By increasing the volumetric thruput of the classifying cyclone feed system from 19.5 to 30 gpm, including a 5:1 recycle ratio, at the higher thruput, and by enlarging the vortex finder, it was possible to maintain the original 7-10 psi pressure drop. Normally, increasing the vortex finder results in a coarser cut-point, however, when using the Derrick screen closed loop circuit, the 100 mesh topsize was maintained.

Since product grind is dependent upon both topsize and mean grain size, comparative microtrac analysis of products were evaluated to determine significant differences at the finer sizes. Table 6.2 represents typical distribution patterns at 450 and 600 pounds per hour. As shown, the topsize as expected is basically the same for both cases and the mean grain size is coarser (35.0 vs 46.9 microns) at the higher feed rate. Also, the percent solids of the cyclone underflow approaches 40% at the higher thruput, which is more typical to a conventional coal preparation plant application and reflects a more uniform cut-point and performance efficiency. Because of the significant change in grind level, further improvements in thruput are not recommended unless refuse scalping prior to the mill would be attempted.

The second concern associated with increasing the feed rate is the effect it would have on product quality, i.e., ash content. The level of ash rejection which can be achieved with the Upper Elkhorn feedstock, as shown by the results of the liberation tests in Task 2.0 FUEL CHARACTERIZATION, is significantly dependent upon the degree of grind. After installation of the new classifying cyclone feed pump was completed on September 25, several test runs were performed and evaluated to determine changes in achieved quality level. Table 6.4 shows run analysis at similar desired ash levels, several days before and after the modifications for increased thruput. Aside from the differences in yield (solids rate), no specific changes in product ash could be detected. For these reasons, the production thruput was maintained at the 600 lb per hour level throughout October. The flowsheets on Figures 6.1 and 6.2 show the results of the modified thruput. Yield quantities shown on the flowsheets are from the ash balance calculations exhibited on Table 6.4.

6.1.1.2 Auxiliary Flotation Set-up

The ongoing investigation for maximizing yield and thruput continued. Samples collected from primary and secondary flotation tailings were used to monitor the flotation circuit. Evaluating these samples with timed sequence flotation studies afforded a realistic determination of potential increased yield at the specification ash levels. This analysis when compared to the actual production values provided Dravo with an indication of efficiencies for the froth flotation circuit. These bench-scale studies became more critical as the relationship between retention time and circuit capacity decreased. When adjusting the circuit feed rate from 300 to 600 pounds per hour without changing the percent solids of the flotation cell feed, the retention time of

DRAVO RESEARCH CENTER SMALL PILOT PLANT

FIGURE 6.1

DRAVO RESEARCH CENTER SMALL PILOT PLANT

FIGURE 6.2

particles in the flotation cells decreased from 7.1 to 3.5 minutes. This lower value, even though only 50% of the original, is not considered a short retention time and should not create concern. Most conventional plants are designed for a similar factor, and even bench studies commonly use three minutes as a standard for both scavenger and conventional tests.

The values shown on Table 6.5 for May are representative of the tests taken from May through September 1987. The remainder of the values shown on Table 6.5 were taken after increasing the production thruput to 600 lbs per hour.

Table 6.5

BENCH SCALE FLOTATION STUDIES USING
PRIMARY FLOTATION TAILING AS FEED

Date	Sample	Wt %	Ash %	Cum. Wt %	Cum. Ash %	Reagent Dosage Lb/Ton
5/28/87	Product	53.25	1.62	53.25	1.62	0.09
	Cleaner Tails	20.42	3.45	73.67	2.13	
	Rougher Tails	26.33	11.63	100.00	4.63	
10/9/87	Product	8.71	1.04	8.71	1.04	0.05
	Cleaner Tails	33.16	1.92	41.87	1.73	
	Rougher Tails	58.13	5.50	100.00	3.92	
10/12/87	Product	29.19	1.33	29.19	1.33	0.08
	Cleaner Tails	41.67	2.37	70.86	1.94	
	Rougher Tails	29.14	8.05	100.00	3.72	
10/9/87	Product	21.77	1.91	21.77	1.91	0.21
	Cleaner Tails	67.62	2.96	89.39	2.70	
	Rougher Tails	10.61	16.83	100.00	4.20	

Table 6.5 exhibits the results for reprocessing primary tails only because primary circuit recoveries are typically less than 60 percent and secondary recoveries range from 70-90 percent. This accounts for the most significant yield potential, and with values exceeding 90 percent from the secondary units, indicates that sufficient particle retention is available in the secondary units.

As shown, with the increase in feed tonnage after May 18, to 450 lbs per hour, no significant yield losses were detected; however, the samples taken after September 30 begin to show potential system losses. These bench studies indicated a optimum reagent dosage of 0.1 #/ton.

To reduce the potential losses Dravo began installing a second (stand-by) pilot scale froth flotation unit to reprocess primary tailings. This unit operation was installed

with a separate reagent feed and conditioning system and, therefore, became a second independent variable for clean coal recovery and quality assays. With careful reagent monitoring on October 29 and 30, preliminary results indicate that the potential 25 percent yield improvement at specification quality was realized. The modified flowsheet and preliminary results are exhibited on Figure 6.3.

6.1.1.3 Future Plans - Dravo Deep Cleaning

At the onset of the Fuel Supply Program, it was necessary to immediately supply several combustor contractors with significant quantities of deep cleaned fuel. In order to satisfy these requests, Dravo ran preliminary bench-scale froth flotation tests using only one known pyritic sulfur selective reagent. This reagent was initially selected on the basis of historical scavenger flotation data and proved effective. A range of reagent dosages were tested at several grain sizes. The results of these tests not only indicated a specific dosage which produced a clean coal product at specification quality, but also provided a yield vs ash vs reagent dosage curve which could satisfy the immediate requests of all the combustor contractors at that time. To insure meeting the scheduled production quantities, Dravo ran start-up tests which confirmed the bench-scale results, and continued processing in that production mode attempting to improve system performance and thruput. Dravo has exhibited significant improvements with both of these operating parameters.

However, since mid-October's recent scheduling changes, which are anticipated to defer several of the larger clean coal shipments until the latter part of the 1988 fiscal year, Dravo is proposing to utilize some of the available time for bench-scale investigation of several known non-pyritic sulfur selective froth flotation reagents. Bench-scale testing using the new suite of reagents is expected to show greater yield potentials without affecting product quality. Developments in this area could significantly reduce the raw coal tonnage requirements and thereby further improve system performance. Recent review of the Task 2.0 liberation tests show this may be possible.

With the current circuit equipment flexibility, especially with regard to the ancillary flotation tests, no additional circuit modifications are expected.

6.1.2 Coal Water Fuels

As defined in the previous quarterly report (May-July, 1987) OXCE Fuel Company was selected as the primary supplier of coal-water fuel for the combustor contractors. Thus far they have been able to meet the required production and delivery schedule at the same time producing specification product.

6.1.3 Dry Ground Coal

With the selection of Schutz-O'Neill Company of Roseville, Minnesota as the dry micronizer subcontractor, a ten

ton shipment was delivered to Schutz by August 5, for preliminary micronizing tests. In-house investigations at Schutz were performed with a Coulter Counter to determine achieved levels of grind, with final verification of size to be established by Dravo using a Microtrac analyzer.

Several drums of shipment UE3-142-DCC-D were used by Schutz-O'Neill to optimize their grinding circuit for production of specification quality dry micronized fuel. Triplicate determinations with a microtrac confirmed that the desired particle size (90% minus 20 microns) could be obtained, however, only with a recirculating load of feed rates as high as 450 lbs per hour. No additional problems were noted after processing an additional 15 tons of deep cleaned coal until the condensate situation, detailed in section 6.1.1, evolved. Until final resolution by Dravo, Schutz has decided to compensate for the caking material by further increasing the recycle loading.

6.2 Production

6.2.1 Deep Cleaned Coal

During this quarter the following shipments of the Upper Elkhorn #3 coal from Westmoreland Coal Company's Wentz Plant were received by Dravo for use in the preparation of deep-cleaned coal.

UE3-149-WRM-A - 23 tons <3.5% ash

UE3-156-WRM-A - 24 tons <3.5% ash

UE3-161-WRM-A - 24 tons <3.5% ash

UE3-164-WRM-A - 24 tons <3.5% ash

Prior to August, 36.3 tons of deep-cleaned coal were produced at the Dravo Research Center from the Upper Elkhorn #3 baseline coal. Of that total production, 90.4 percent had been utilized in the Fuel Supply Program and formulated into either dry micronized coal or coal water fuels. The Dravo pilot facility had operated a total of 49 days and produced a deep-cleaned coal exhibiting an average dry ash content of 1.33 percent. Plant operations during that period were comprised of 18 single shift and 31 double shift days. Assuming a plant availability (based on cooldown time for the thermal disc dryer) of 78.25 hours per operating shift, calculates to 124 lbs of deep-cleaned coal produced per operating hour.

Since August, an additional 38.3 tons of deep-cleaned coal were produced, also exclusively from the Upper Elkhorn #3 baseline feedstock, with 94.9 percent meeting the quality criteria established for residential, commercial and light industrial markets (i.e., 0.8 - 1.0 lbs per million btu's). With the pilot facility operating approximately 72 shifts, and using the same availability criteria, calculates to 146 lbs produced per operat-

ing hour or nearly 18 percent improvement over the first three month production period. These calculations reflect an average feed rate of 450 lbs per hour plus the increased thruput during several weeks during October. Evaluating the end result of October's improvements only show the production rate increasing to 156 lbs per hour, and when incorporating the changes reflected by the inclusion of the auxiliary flotation cells, the calculated production value is expected to exceed 195 lbs per hour.

It is to be noted that these production values are only estimates based on full shift operations, including unscheduled downtime and therefore cannot be associated with yield or recovery values. Furthermore, since the average product ash changed from 1.33 to 1.35 to 1.36 for the three periods discussed, yield calculations cannot be equivalently compared even on the basis of equivalent feed stocks.

The following three graphs, Figures 6.4, 6.5, and 6.6 are an attempt to illustrate the performance efficiency of the Dravo pilot circuit and exhibit the resultant changes and improvements which have occurred since April, 1987. The input data for all three graphs was taken from the daily run averages of the hourly quality control samples, including quality assays and actual dry lbs per minute produced, over the 99 processing days starting April 21, 1987.

The first graph, Figure 6.4, exhibits the observed relationship between product yield and quality. The wide scatter of data points (i.e., a yield variance of over 45% at 1.27% dry ash) indicates that additional factors are somehow affecting the yields as measured. The graph also shows that of the 99 data points, only four do not satisfy the RCLI quality specification. Since these data points actually represent average daily production, therefore 96% of the total production was within specification, and that over 50% of the production met the residential specification of less than 0.8 lbs per million btu's (i.e., less than 1.25% dry ash).

The second graph, Figure 6.5, addresses the observed variances and comparative yields by factoring the effect of varying feedstocks and accounting for the quality of product produced. For the total production period of 94 days beginning April 21, the graph shows a calculated yield factor on daily basis. This production factor was derived from the following formula:

$$\frac{\% \text{ raw ash} * \% \text{ clean coal yield}}{\% \text{ clean coal ash}}$$

The input data for the calculation was taken from the daily run averages and the percent raw coal ashes were determined from ash balance testing, from several samples collected during the processing of each raw coal shipment. This graph also includes the range of processing days associated with each raw coal shipment.

FIGURE 6.4
YIELD VS QUALITY

FIGURE 6.5
Processing Efficiency

NOTE : RAW COAL SHIPMENT NUMBERS ARE SHOWN ON BOTTOM OF GRAPH

According to the equation, a value of 1.0 could be defined by 100 percent yield with equivalent raw coal and clean coal ash contents or say with a 50 percent reduction in the ratio of raw coal to clean coal with a corresponding 50 percent clean coal yield. This scenario is also closely related to the UE3 raw to clean coal ratio (i. e. 2.50/1.25 and 3.00/1.50) and therefore serves as a guideline for process efficiency.

Two specific areas are shown on the graph which significantly drop below the guideline, namely the processing days 20-42 and from 72 through 99. Since the pilot circuit was upgraded to 450 lbs. per hour at 19 days and to 600 lbs. at 81 days, definite learning curves can be observed up to several days after the upgrade. However, more importantly, the reduced production areas shown also correspond to changes in raw coal shipments, and therefore indicate that specific characteristics of certain raw coal shipments may be affecting surface chemistry with a resultant fluctuation in the production rate factor.

The graph also indicates that after 90 days Dravo attempted to improve performance even at the higher feed rate. Unfortunately, the resultant from the addition of the secondary rougher cells (auxiliary flotation cells) is not included in the time frame.

The third and final graph, Figure 6.6, shows a direct relationship between actual dry lbs. of deep clean coal produced per minute and the corresponding ash content. This graph also confirms the varying differences between shipments and production efficiency, and tends to explain the peaks and valleys on both Figures 6.5 and 6.6, being increases or decreases in product ash with a corresponding change in recovery.

Note: The value of lb/min produced used on Figure 6.5 and 6.6 was derived from the hourly quality control samples collected on a timed interim basis to determine rate and then analyzed in the laboratory for the moisture free basis. These individual values were then averaged over a daily period bias and incorporate trends.

The daily production log is given in Appendix 8.3.

6.2.2 Dry Power

During the fourth quarter the following dry powdered coals were prepared and shipped to the combustor contractors:

UE3-143-1-MCO-S	88 drums (~7 tons) of a 1.3-1.5% ash coal for PETC
UE3-143-2-MCO-S	44 drums (~3 tons) of a 1.3-1.5% ash coal for PETC
BZP-147-PCO-N	one ton of pulverized Beulah Zap lignite coal for SAIC

FIGURE 6.6

Production Efficiency

NOTE: RAW COAL SHIPMENT NUMBERS ARE SHOWN ON TOP OF GRAPH

UE3-154-MCO-S	250 lbs of deep cleaned (1.3-1.5% ash) micronized coal for TECOGEN
UE3-155-MCO-S	650 lbs of deep cleaned (1.3-1.5% ash) micronized coal for EER
UE3-158-MCO-S	2 tons of deep cleaned (1.3-1.5% ash) micronized (85% minus 22 microns) coal for UTSI

6.2.3 Coal Water Fuels

During the fourth quarter the following coal water slurry fuels were prepared and shipped to the combustor contractors:

UE3-137-CWF-F	1850 gallons of a standard grind coal-water slurry from deep-cleaned coal for PETC
UE3-138-CWF-F	1200 gallons of a standard grind coal-water slurry from 2.3-3.0% ash coal for Combustion Engineers
UE3-139-MCF-F	7500 gallons of a micronized coal-water slurry from 2.3-3.0% ash coal for Combustion Engineers

An updated listing of all sample shipments is given in Appendix 8.4 Sample Log.

7.0 FUTURE PLANS

The current review of fuel supply requirements and cost reduction options will be continued with the PETC technical project managers. The quantities, specifications, and delivery schedules will be revised to satisfy the contractual and project requirements of PETC and the combustor development contractors. The revised supply and delivery requirements will be determined by PETC. The Energy International/Dravo project team will revise the project schedule and requirements and the cost plan in accordance with those revised requirements.

Fuel delivery schedules current as of the end of the period, October 30, 1987, are attached (Appendix 8.5). The cost plan for FY1988 was prepared and submitted to PETC for review. This cost plan will be revised in accordance with the above discussed review. Energy International will complete the preparation of cost-of-delivery estimates for each contractor requirement anticipated during this quarter.

The review of options for deep-cleaning the Upper Elkhorn #3 coal that was requested by PETC will continue. Arrangements have been made to provide coal from the Wentz Mine and wash plant to both the EPRI coal cleaning facility at Homer City, PA and the Amax Research & Development Center at Golden, CO. They are expected to conduct deep-cleaning experiments during November to confirm or revise their evaluation of the cleanability and costs of cleaning for this coal. Amax will also use their mild acid leaching treatment to determine whether the ash-fusion temperature of the deep-cleaned coal can be adjusted to exceed the 2700°F requirement of UTSI. Preliminary test results and cost estimates are expected to be made available in December.

Based on the initial judgments of EPRI and Amax, they anticipate being able to achieve the stringent quality requirements at a substantially lower cost than is now possible to get with the Dravo pilot-scale unit. This is largely based on expected higher recoveries and lower costs associated with operating higher thruput cleaning circuits. Both EPRI and Amax will provide cost estimates for cleaning the remainder of the FY88 delivery requirements if the experimental results and the revised delivery plans so warrant.

At the same time that alternative sources of deep-cleaning are being evaluated, Dravo will also provide revised cost plans for the deep-cleaning. Recent experience with the pilot plant circuit indicates that improvements in control and operation can enable (1) reducing operator requirements, (2) improvements in yield, and (3) reductions in the costs. Dravo will provide revised cost estimates on this basis.

Dravo will also consider the use of different frothers and operating conditions to lead to higher circuit yield. Because of the early demand to produce coal supply product, the originally planned experiments with the pilot circuit were severely truncated. The consequence was that production was begun without orderly evaluation and selection of frother and operating conditions. This was justifiable at the time because specifications were being met and the earlier-than-planned demand for quantities of fuel were then satisfied. Improved yields have been demonstrated in more recent production runs. In addition, the importance of yield on project cases has been highlighted by the review of costs. Therefore, it is appropriate to determine whether revision of frother selection and operating conditions will enable significant coal cleaning cost reductions while still meeting the required specifications. This will be determined by Dravo.

Following the coal cleaning tests at Dravo, EPRI and Amax and the review of revised delivery schedules and cost estimates, Energy International will meet with PETC to establish the project plans to complete FY88 activities. The current activities under Task 2 should also be completed during December and will be reviewed with PETC.

8.0 APPENDICES

APPENDIX 8.1
COAL RESOURCE ESTIMATES

CANDIDATE COAL RESOURCE ESTIMATES

In response to an inquiry from DOE, the estimates of coal reserves for the designated candidate coals were reviewed, adjusted, and expanded. The purposes were to: (1) explain and clarify the basis for the estimates, (2) explain the apparent differences in the estimated quantities as reported here and elsewhere, and (3) expand the understanding of the quantities of coal represented by the candidates. A slightly modified version of the original table is provided as Attachment 1 to clarify and correct the original estimation basis. The original table was included in our Task 1 Topical Report and the first Quarterly Technical Progress Report. In addition, Attachment 2 expands the categories of resource estimates in order to address the understanding of different estimate bases.

Applicable comments of explanation for the original estimates for the candidate coals are as follows:

1. Using the DOE's bed correlation number, estimates for all bed names with the same correlation number were included in developing the estimate.
2. Estimates were made based upon information available by seam.
3. The most recently available information was used including:
 - Virginia: Reserve Base data, BuMines Information Circular 8680, 1975
 - Tennessee: Reserve Base data, BuMines Information Circular 8680, 1975
 - West Virginia: Estimated Original Tonnage by Minable Seams "1986 Keystone Coal Industry Manual"
 - Eastern Kentucky: Estimated Original Resources "1986 Keystone Coal Industry Manual"
 - Colorado: Keystone "U.S. Coal Mine Production by Seam", 1980

Note that the original resources estimated in the Keystone Manual are for minable seams defined to include bed thickness categories of greater than 12" (West Virginia) and 14" to 28" (eastern Kentucky). Reserve Base data include only beds greater than 28" thick for these states. Further note that the available information provides original resources by seams. The depletion by mining is not presented by seam, but the state and county remaining resources are typically 85 to 95 percent of the original resources.

4. Estimate increases between the publication date of the Reserve Base (1975) and the new reports are included. For example, the Demonstrated Reserve Base (DRB) estimates as reported by the (Energy Information Administration) EIA in "Coal Production 1983" increased for Eastern Kentucky from 12.6 billion tons in 1982 to 19.3 billion tons in 1983.

5. Correlated bed names that were included are shown in Attachment 3. This listing includes all names for the indicated bed correlation number. To prepare the estimates, the following names were used:

- a. Virginia and Tennessee - The Reserve Base as published by the Bureau of Mines in 1975 catalogues the reserves by bed number, rather than name. Therefore, names were not used.

- b. West Virginia -
<u>Bed No.</u>	<u>Name</u>
151	- Cedar Grove (Thacker)
154	- Lower Cedar Grove
157	- Alma
168	- Campbell Creek (No. 2 Gas)

- c. Kentucky (Eastern) -

<u>Bed No.</u>	<u>Name</u>	<u>District Name</u>
151	Upper Elkhorn No. 3	Big Sandy, Hazard, Southwestern
	Jellico	Southwestern
	Little Caney	Licking River
	Van Lear (Tom Cooper, Little Caney)	Princess
	Darby	Upper Cumberland

154	Upper Elkhorn No. 2	Big Sandy, Hazard
	Grassy	Licking River, Princess

157	Upper Elkhorn No. 1	Big Sandy, Hazard, Licking River
	Blue Gem	Southwestern
	Harlan	Upper Cumberland

168	Lower Elkhorn	Big Sandy, Hazard,
	Lower Elkhorn or Vires	Licking River
	Lower Blue Gem	Southwestern

- d. Colorado - Bed 755 known as D or Oliver

6. To summarize, the major difference between the reported reserve base numbers (Bureau of Mines Information Circular 8680 and PETC CTDB) and the reported estimates in our study, we included:

- All correlated beds
- More recently increased estimates as reported by state

geological sources to Keystone Manual

- Thinner seams
- Full seam estimates for original tonnage in minable seams

The expanded table in Attachment 2 shows the substantial differences in resource estimates for the candidate coals depending upon the basis used for the estimate. If the estimate basis discussed above is used, the quantities shown on the bottom line of this table are derived. Note that these numbers differ slightly from previously reported numbers because of incomplete bed correlations and adjusted numerics. Eliminating the thin seams in Eastern Kentucky reduces the total quantity for all five candidates by nearly 8 billion tons (or 21%) to about 28.5 billion tons total from the 36.3 billion tons which includes thin seams. Using the Reserve Base, the total drops to about 12 billion tons (or 33% of bottom line). Including only those reserves reported in the Reserve Base as less than 1% sulfur reduces the estimate total to 6 billion tons (about 17%).

In conclusion, it should be noted that even the most restrictive of these estimates indicates coal resources of over 6 billion tons in those candidate beds alone to satisfy the market need of this program (the Reduced Coal Use Potential -REDCUP- estimates) of about 1 billion tons. While there are seemingly major differences in the estimates, the significance with regard to the representativeness of available coal resources is of little impact.

Attachment 1

Table 6.1A (Revised)

CANDIDATE COALS FOR RESIDENTIAL,
COMMERCIAL, AND LIGHT INDUSTRIAL MARKETS

<u>Bed Number</u>	<u>Coal Bed Name</u>	<u>Related Names</u>	<u>Locations Found</u>	<u>Original Estimated Reserves (tons)</u>
151	Upper Elkhorn #3	Cedar Grove, Jellico, Taggart	WV,VA,KY,TN	13,204,151,148
154	Upper Elkhorn #2	Lower Cedar Grove	WV,VA,KY	3,690,801,408
157	Upper Elkhorn #1	Alma, Blue Gem	WV,VA,KY,TN	8,323,473,292
168	Lower Elkhorn	No. 2 Gas, Pond Creek	WV,VA,KY,TN	11,041,277,148
755	Coal Basin D	Oliver	CO	86,550,000

Note: Table 6.1 is found in Task 1 Topical Report and the first Quarterly Technical Progress Report.

Attachment 2

Table 6.1B

SUPPLEMENTAL RESOURCE INFORMATION FOR
CANDIDATE COALS FOR RESIDENTIAL,
COMMERCIAL, AND LIGHT INDUSTRIAL MARKETS

COAL CANDIDATES

Bed Correlation Number	151	154	157	168	755
Designated Coal Bed Name	Upper Elkhorn #3	Upper Elkhorn #2	Upper Elkhorn #1	Lower Elkhorn	Coal Basin D
Locations Found	WV,VA, TN,KY	WV,VA, TN,KY	WV,VA, TN,KY	WV,VA, TN,KY	CO

ESTIMATED COAL RESOURCE
QUANTITIES (Millions of Tons)

Reserve Base with <1% S	1,570	989	1,280	2,121	87
Reserve Base - All S Levels	3,974	1,404	2,820	3,927	87
Original Movable Coal (excluding thin seams)	9,508	1,854	6,933	10,167	--
Original Movable Coal (including thin seams)	13,204	3,691	8,323	11,041	--

Note: For other correlated bed names,
see Table 6.1C (Attachment 3).

Attachment 3

Table 6.1C

CORRELATED BED NAMES
FOR SOUTHERN APPALACHIAN CANDIDATE COALS

<u>Bed No.</u>	<u>Eastern Kentucky</u>	<u>West Virginia</u>	<u>Virginia</u>	<u>Tennessee</u>
151	Beech Creek C Caney Cedar Grove Darby Darby No. 5 Elkhorn Elkhorn No. 3 Jellico Keokee Little Caney Lower Mason Millers Creek Mingo Nosben No. 5 Stearns No. 5 Straight Creek Thacker Tom Cooper Upper Cedar Grove Upper Elkhorn Upper Elkhorn No. 3 Upper Taggart Upper Van Lear Van Lear	Cedar Grove Mingo Thacker Upper Cedar Grove Red Jacket Upper Thacker Island Creek Marpleton	C Cedar Grove Darby Darby No. 5 Keokee No. 5 Thacker Red Jacket Roda Taggart Upper Thacker	Jellico Mingo Straight Creek Big Brushy Broyles Brushy Mountain Coking Log Mountain Mason Pruden State Westbourne White Oak (North Tenn.)
154	Collier Elkhorn No. 2 Grassy Leonard B Lower Cedar Grove Lower Thacker Lower Van Lear Upper Elkhorn No. 2	Lower Cedar Grove Lower Thacker	Lower Cedar Grove Lower Thacker	

Attachment 3
(Continued)

<u>Bed No.</u>	<u>Eastern Kentucky</u>	<u>West Virginia</u>	<u>Virginia</u>	<u>Tennessee</u>
157	Alma B Blue Gem Elkhorn No. 1 Hance Harlan Harlan No. 3 Lacey Creek No. 3 Penny Upper Elkhorn No. 1 Wilson	Alma B Draper	Alma Harlan No. 3 Jackrock Puckett Creek Upper Standiford Wilson	Blue Gem Billy Goat Rich Mountain Yellow Creek
168	A Bacon Creek Bennett Fork Black Wax Freeburn Imboden Lower Blue Gem Lower Elkhorn Lower Marrowbone No. 2 Gas Pond Creek Shelby Gap Vires Vulcan Warfield Wayland	Lower Elkhorn No. 2 Gas Pond Creek Warfield Burnwell Freeburn Imboden Lower Campbell Creek Upper War Eagle Campbell Creek No. 2 Gas Logan Eagle Rawl War Eagle	Lower Elkhorn Lower Marrowbone No. 2 Gas Pond Creek Warfield Burnwell Campbell Creek Freeburn Imboden Lower Bolling Lower Campbell Creek No. 1 Upper War Eagle	Bennett Fork Coal Creek Dixie Douglas Kent Kings Mountain Little Italy Rector Turner

APPENDIX 8.2
WASHABILITY DATA

COAL: UPPER ELKHORN #1, ALMA SEAM 2 ASH = 6.18
 COAL ID: UE1-103-UPM-D 2 S = 0.83
 SCREENED FROM 1/8"X0 GROUND COAL 2 BTU = 14381

Screen analysis									
Analyses of Screened Fractions									
		Each Fraction				Cumulative			
		(Dry Basis)							
Fraction	Weight	2Utt.	2Ash	2Sul	BTU	2Utt.	2Ash	2Sul	BTU
1/8x28	573.00	45.57	6.13	0.85	14060	45.57	6.13	0.85	14060
28x100	421.15	33.50	5.06	0.86	13997	79.07	5.68	0.85	14033
100x200	111.79	8.89	5.67	0.91	14006	87.96	5.68	0.86	14031
200x270	26.73	2.13	6.17	0.93	14087	90.09	5.69	0.86	14032
270x400	36.94	2.94	7.62	0.99	13843	93.02	5.75	0.87	14026
400x0	87.72	6.98	11.91	0.90	12990	100.00	6.18	0.87	13954
TOTAL	1257.33	100.00							

Size: 1/8" X 0 fraction									
Float /Sink Analysis									
		Each Fraction				Cum. Recovery			
		(Dry Basis)				(Float)			
Specific Gravity	Weight	2Utt.	2Ash	2Sul	BTU	2Utt.	2Ash	2Sul	BTU
Sink Float	1.25	197.33	15.69	1.20	0.65	14959	16.81	0.65	14959
	1.25	401.80	31.96	1.38	0.69	14671	33.57	0.68	14766
	1.275	328.04	26.09	2.44	0.76	14506	27.10	0.71	14674
	1.30	330.16	26.26	18.72	1.39	11980	22.52	0.89	13967
TOTAL		1257.33	100.00			100.00	6.18	0.89	13967

		Cum. Reject			
		(Sink)			
2Utt.	2Ash	2Sul	BTU	2Utt.	2Ash
100.00	6.18	0.89	13967	84.31	7.11
52.35	10.61	1.08	13239	26.26	18.72
26.26	18.72	1.39	11980		

CORAL: UPPER ELKHORN #2, LOWER CEDAR G2 ASH = 5.52
 CORAL ID: UE1-105-UPR-0 2 S = 0.52
 SCREENED FROM 1/8" #0 GROUND CORAL 2 BTU = 14331

Screen analysis						
Analyses of Screened Fractions						
Fraction	Each Fraction (Dry Basis)			Cumulative		
	Weight	24t.	28ash 25ul BTU	24t.	28ash 25ul BTU	
1/8x28	937.00	70.20	5.26 0.56 14003	70.20	5.26 0.56 14003	
28x100	234.23	17.55	5.34 0.57 13726	87.75	5.28 0.56 13948	
100x200	59.58	4.46	5.25 0.59 13909	92.22	5.27 0.56 13946	
200x270	20.99	1.57	5.50 0.60 13680	93.79	5.28 0.56 13941	
270x400	14.15	1.06	5.55 0.56 13954	94.85	5.28 0.56 13941	
400x0	68.72	5.15	10.41 0.52 12957	100.00	5.55 0.56 13891	
TOTAL	1334.67	100.00				

Size: 1/8" X 0 fraction										
Float /Sink Analysis										
Specific Gravity	Each Fraction (Dry Basis)					Cum. Recovery (Float)				
	Weight	24t.	28sh	25ul	BTU	28TU	24t.	28sh	25ul	BTU
Sink Float	Weight	24t.	28sh	25ul	BTU	28TU	24t.	28sh	25ul	BTU
1.25	357.66	26.80	0.94	0.53	14812	28.55	26.80	0.94	0.53	14812
1.25 x 1.275	401.32	30.07	1.10	0.56	14549	31.47	56.87	1.03	0.55	14673
1.275 x 1.30	234.07	17.54	2.60	0.54	14203	17.92	74.40	1.40	0.55	14562
1.30	341.62	25.60	17.60	0.62	11985	22.07	100.00	5.54	0.57	13902
TOTAL	1334.67	100.00								
						</				

Cum. Reject (Sink)				
24t.	28ash	25ul	BTU	28TU
100.00	5.54	0.57	13902	13902
73.20	7.23	0.58	13569	13569
43.13	11.50	0.59	12886	12886
25.60	17.60	0.62	11985	11985

COAL: UPPER ELKHORN #3, TAGGART SEAM 2 ASH = 2.25
 COAL ID: UE1-100-URM-D 2 S = 0.62
 SCREENED FROM 1/8" X 0 GROUND COAL 2 BTU = 14829

Screen analysis

Analyses of Screened Fraction

Fraction	Each Fraction (Dry Basis)		Cumulative			
	Weight	2ut.	2Ash	25ul	BTU	BTU
1/8x28	689.59	55.11	2.17	0.64	14425	14425
28x100	357.97	28.61	1.91	0.63	14614	14490
100x200	79.35	6.34	2.16	0.55	14527	14492
200x270	32.81	2.62	2.75	0.64	14621	14496
270x400	18.16	1.45	3.02	0.62	14688	14499
400x0	73.39	5.87	5.97	0.50	13761	14456
TOTAL	1251.27	100.00				

Size: 1/8" x 0 fraction

Float / Sink Analysis

Specific Gravity	Each Fraction (Dry Basis)		Cum. Recovery (Float)				Cum. Reject (Sink)			
	Weight	2ut.	2Ash	25ul	BTU	2BTU	2ut.	2Ash	25ul	BTU
Sink Float	Weight	2ut.	2Ash	25ul	BTU	2BTU	2ut.	2Ash	25ul	BTU
1.25	115.79	9.25	0.94	0.55	15178	9.71	9.25	0.94	0.55	15178
1.25 x 1.275	717.06	57.31	0.90	0.62	14524	57.52	66.56	0.91	0.61	14615
1.275 x 1.30	286.79	22.92	1.85	0.64	14709	23.30	89.48	1.15	0.62	14639
1.30	131.64	10.52	12.54	0.72	13042	9.48	100.00	2.35	0.63	14471
TOTAL	1251.27	100.00								

22 HSH	=	6.6
22 S	=	0.53
22 BTU	=	12945

Fraction	Weight	Each Fraction (Dry Basis)			Cumulative		
		2wt.	2Ash	%Sul	2wt.	2Ash	%Sul
1/8x28	729.50	66.60	4.90	0.55	66.60	4.90	0.55
20x100	273.38	24.96	4.84	0.57	91.55	4.88	0.56
100x200	59.85	5.46	5.11	0.54	97.02	4.90	0.55
200x270	20.97	1.91	6.52	0.62	98.93	4.93	0.56
270x400	11.71	1.07	8.11	0.58	100.00	4.96	0.56
400x0	60.66	0.00	32.78	0.47	100.00	4.96	0.56
TOTAL	1095.41	100.00					

Float /Sink Analysis

[illegible]

COAL: LOWER ELKHORN, POND CREEK SEAM 2 ASH = 6.90
 COAL ID: LEL-091-UPH-D 2 S = 0.57
 SCREENED FROM 1/8"X0 GROUND COAL 2 BTU = 13763

Screen analysis									
Analyses of Screened Fractions									
		Each Fraction		Cumulative					
Fraction	Weight	24t.	2Ash	2Sul	24t.	2Ash	2Sul	BTU	BTU
1/8x28	818.20	67.84	6.15	0.55	13200	67.84	6.15	0.55	13200
28x100	222.64	18.46	5.97	0.59	13157	86.30	6.11	0.56	13191
100x200	59.56	4.94	5.61	0.65	13141	91.24	6.08	0.56	13188
200x270	19.45	1.61	6.36	0.77	13298	92.85	6.09	0.57	13190
270x400	20.08	1.66	6.19	0.73	13289	94.51	6.09	0.57	13192
400x0	66.16	5.49	11.78	0.61	12176	100.00	6.40	0.57	13136
TOTAL	1206.09	100.00							

Size: 1/8" X 400 M fraction									
Float /Sink Analysis									
		Each Fraction		Cum. Recovery (Float)					
Specific Gravity	Weight	24t.	2Ash	2Sul	24t.	2Ash	2Sul	BTU	BTU
Sink Float	1.25	255.20	22.39	1.17	0.53	13924	23.63	22.39	1.17
	1.25	255.20	22.39	1.17	0.53	13924	23.63	22.39	1.17
	1.25	338.02	29.65	1.89	0.53	13821	31.07	52.04	1.58
	1.275	244.60	21.46	3.82	0.53	13564	22.06	73.50	2.24
	1.30	302.10	26.50	16.79	0.69	11568	23.24	100.00	6.09
TOTAL		1139.93	100.00						

		Cum. Reject (Sink)	
24t.	100.00	24t.	6.09
28t.	77.61	28t.	7.51
32t.	47.96	32t.	10.99
36t.	26.50	36t.	16.79
40t.		40t.	0.69

APPENDIX 8.3
PRODUCTION LOG

03-DEC-87

E503-03

DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status
SKIP #

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS
4-21- 1	1.71					0	
4-21- 2	1.71					0	
4-21- 3	1.33					0	
4-21- 4	1.60					0	
4-22- 1	1.24	6.53	PENN RILTON	5-07-87	291	112	
4-22- 2	1.33	6.07	PENN RILTON	5-07-87	246	112	
4-22- 3	1.23	11.36	OXCE	7-10-87	237	130	RECORE 11.67% Moist
4-23- 1	1.27	14.46	OXCE	5-28-87	244	119	
4-23- 2	1.28	8.04	PENN RILTON	5-07-87	227	112	
4-23- 3	1.20	3.54	PENN RILTON	5-07-87	246	112	
4-23- 4	1.36	5.02	PENN RILTON	5-07-87	257	112	
4-23- 5	1.27	6.73	PENN RILTON	5-07-87	240	112	
4-23- 6	1.38	8.25	OXCE	5-28-87	228	119	
4-24- 1	1.39	20.19	OXCE	5-28-87	284	119	
4-24- 2	1.37	11.51	OXCE	5-28-87	245	119	
4-24- 3	1.33	11.13	OXCE	5-12-87		115	
4-24- 4	1.25	19.13	OXCE	5-12-87		115	
4-27- 1	1.48	13.23	OXCE	5-28-87	275	119	
4-27- 2	1.35	18.49	OXCE	5-12-87		115	
4-27- 3	1.31	18.85	OXCE	5-12-87		115	
4-27- 4	1.29	18.07	OXCE	5-12-87		115	
4-27- 5	1.33	19.97	OXCE	5-12-87		115	
4-27- 6	1.38	23.33	OXCE	5-28-87	262	119	
4-27- 7	1.27	23.74	OXCE	5-28-87	274	119	
4-27- 8	1.23	15.61	OXCE	5-12-87		115	
4-27- 9	1.26	24.40	OXCE	7-10-87	260	130	RECORE 21.37% Moist.
4-27- 10	1.19	13.20	OXCE	5-12-87		115	
4-27- 11	1.18	19.11	OXCE	5-12-87		115	
4-27- 12	1.11	21.16	OXCE	5-12-87		115	
4-27- 13	1.08	15.91	OXCE	5-12-87		115	
4-28- 1	1.12	21.67	OXCE	5-12-87		115	
4-28- 2	1.76	11.46	OXCE	5-28-87	262	119	
4-28- 3	1.19	23.66	OXCE	5-28-87	267	119	
4-28- 4	1.37	25.00	OXCE	7-10-87	231	130	RECORE 24.03% Moist. @ 1.36% ASH
4-28- 5	1.32	11.87	OXCE	5-12-87		115	
4-28- 6	1.21	11.08	OXCE	5-12-87		115	
4-28- 7	1.30	16.30	OXCE	5-28-87	260	119	
4-29- 1	1.25	22.51	OXCE	7-10-87	242	130	RECORE 21.64% Moist.
4-29- 2	1.33	12.58	OXCE	5-12-87		115	
4-29- 3	1.30	3.10	OXCE	5-12-87		115	
4-29- 4	1.17	15.62	OXCE	5-28-87	268	119	
4-29- 5	1.18	7.78	OXCE	5-12-87		115	
4-29- 6	1.23	15.34	OXCE	5-12-87		115	
4-29- 7	1.29	16.40	OXCE	5-12-87		115	
4-29- 8	1.22	20.45	OXCE	5-12-87		115	
4-29- 9	1.25	17.45	OXCE	5-12-87		115	
4-29- 10	1.26	14.04	OXCE	5-28-87	269	119	
4-29- 11	1.20	13.46	OXCE	5-12-87		115	
4-29- 12	1.16	12.58	OXCE	7-10-87	218	130	REDRY 7.63% Moist. @ 1.18% ASH
4-29- 13	1.26	16.17	OXCE	5-28-87	280	119	
4-30- 1	1.22	18.49	OXCE	7-10-87	247	130	RECORE 14.82% Moist. @ 1.35% ASH
4-30- 2	1.35	16.27	OXCE	5-28-87	250	119	
4-30- 3	1.34	7.27	OXCE	5-12-87		115	

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status
SKIP #

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS
4-30- 4	1.31	7.68	PENN RILTON	5-07-87	250	112	
4-30- 5	1.75	6.97	PENN RILTON	5-07-87	220	112	
4-30- 6	1.32	5.27	PENN RILTON	5-07-87	226	112	
4-30- 7	1.51	11.29	OXCE	5-28-87	269	119	
4-30- 8	1.39	10.22	OXCE	5-28-87	229	119	
4-30- 9	1.28	20.14	OXCE	5-28-87	258	119	
4-30- 10	1.33	4.53	PENN RILTON	5-07-87	241	112	
4-30- 11	1.33	2.19	OXCE	5-28-87	256	119	
4-30- 12	1.25	4.71	OXCE	5-12-87		115	
5-01- 1	1.34	6.81	OXCE	5-28-87	255	119	
5-01- 2	1.42	18.50	OXCE	5-28-87	263	119	
5-01- 3	1.37	1.36	OXCE	5-28-87	234	119	
5-01- 4	1.57	10.82				0	REDRY 7.07% Moist @
5-01- 5	1.40	12.31	OXCE	5-28-87	266	119	
5-01- 6	1.27	13.07	OXCE	5-28-87	228	119	
5-01- 7	1.25	19.19	OXCE	5-12-87		115	
5-01- 8	1.33	17.75	OXCE	5-12-87		115	
5-01- 9	1.15	0.63	OXCE	5-28-87	246	119	
5-01- 10	1.23	9.46	OXCE	5-28-87	252	119	
5-04- 1	1.24	4.75	OXCE	5-28-87	236	119	
5-04- 2	1.23	4.78	OXCE	5-28-87	247	119	
5-04- 3	1.29	8.36	OXCE	5-28-87	272	119	
5-04- 4	1.38	19.99	OXCE	5-28-87	253	119	
5-04- 5	1.30	12.08	SCHUTZ O'	8-14-87	252	145	RECORE 12.08% H2O @ REDRIED 4.41% H2O @ 1.40%
5-04- 6	1.32	14.92	OXCE	5-28-87	296	119	
5-04- 7	1.31	4.84	OXCE	5-28-87	274	119	
5-04- 8	1.36	0.86	PENN RILTON	7-14-87	247	134	RECORE 2.20% Moist @
5-04- 9	1.35	16.98	OXCE	5-28-87	298	119	
5-04- 10	1.28	10.44	OXCE	5-12-87		115	
5-04- 11	1.26	19.15	OXCE	5-12-87		115	
5-05- 1	1.13	18.76	OXCE	5-28-87	279	119	
5-05- 2	1.42	17.94	OXCE	5-28-87	274	119	
5-05- 3	1.37	15.26	OXCE	5-28-87	271	119	
5-05- 4	1.33	12.25	OXCE	5-28-87	320	119	
5-05- 5	1.41	14.91	OXCE	5-28-87	260	119	
5-05- 6	1.34	14.56	OXCE	5-28-87	263	119	
5-05- 7	2.00	14.33				0	RECORE 12.70 % Moist
5-05- 8	2.46	15.21				0	
5-05- 9	2.50	3.15				0	
5-05- 10	1.61	14.09				0	
5-06- 1	1.72	12.56				0	
5-06- 2	1.88	13.22				0	
5-11- 1	1.61	3.83				0	
5-11- 2	1.58	17.99				0	
5-12- 1	1.48	4.69				0	
5-12- 2	1.73	9.91				0	
5-12- 3	1.62	9.76				0	
5-12- 4	1.65	10.97				0	
5-12- 5	1.66	4.93				0	
5-12- 6	1.37	11.93				0	
5-12- 7	1.37	8.89	OXCE	5-28-87	286	119	
5-12- 8	1.38	13.26	OXCE	5-28-87	311	119	
5-12- 9	1.32	18.04	OXCE	5-28-87	263	119	

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status
SKIP #

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS
5-12- 10	1.32	11.12	OXCE	5-28-87	257	119	
5-13- 1	1.42	10.91	OXCE	5-28-87	300	119	
5-13- 2	1.34	8.58	OXCE	5-28-87	259	119	
5-13- 3	1.44	14.53	OXCE	5-28-87	266	119	
5-13- 4	1.37	5.40	OXCE	5-28-87	240	119	
5-13- 5	1.34	16.40	OXCE	5-28-87	271	119	
5-13- 6	1.33	15.30	OXCE	5-28-87	286	119	
5-13- 7	1.34	12.82	OXCE	7-10-87	269	130	
5-13- 8	1.29	15.17	OXCE	5-28-87	286	119	
5-13- 9*	1.33	5.75	OXCE?	5-28-87	252	119?129	
5-14- 1	1.36	1.20	PRS	6-22-87	243	129	
5-14- 2	1.48	1.78	SHUTZ O'	7-31-87	258	142	RECORE 2.37% Moist @ 1.49% Ash
5-14- 3	1.40	3.86	SHUTZ O'	7-31-87	235	142	RECORE 1.93% Moist @ 1.41% Ash
5-14- 4	1.37	1.05	PRS	6-22-87	241	129	
5-14- 5	1.18	4.93	PRS	6-22-87	243	129	
5-15- 1	1.24	15.10	OXCE	7-10-87	228	130	
5-15- 2	1.35	6.44	PRS	6-22-87	240	129	
5-15- 3	1.39	18.58	OXCE	7-10-87	264	130	
5-15- 4	1.38	15.60	OXCE	7-10-87	268	130	
5-15- 5	1.39	15.93	OXCE	7-10-87	267	130	RECORE 12.17% Moist @ 1.28% Ash
5-15- 6	1.32	18.42	OXCE	5-28-87	281	119	
5-15- 7	1.31	12.04	OXCE	5-28-87	266	119	
5-15- 8	1.35	13.37	OXCE	5-28-87	244	119	
5-15- 9	1.48	10.93	OXCE	5-28-87	246	119	
5-15- 10	1.57	11.09				0	
5-15- 11	1.53	17.22				0	
5-15- 12	1.50	15.03	OXCE	8-05-87	254	144	
5-18- 1	1.29	15.51	OXCE	5-28-87	248	119	
5-18- 2	1.41		PENN RILTON	7-15-87	226	134	RECORE 0.76% Moist @ 1.31% Ash
5-18- 3	1.28	11.92	OXCE	7-10-87	245	130	
5-18- 4	1.37	0.89	PRS	6-22-87	?	129	
5-18- 5	1.54	8.50				0	
5-18- 6	1.48	4.72	OXCE	8-05-87	246	144	
5-18- 7	1.46	14.22	OXCE	7-10-87	265	130	
5-18- 8	1.44	7.97	OXCE	7-10-87	245	130	
5-18- 9	1.45	11.49	OXCE	7-10-87	243	130	
5-18- 10	1.40	17.87	OXCE	5-28-87	267	119	
5-18- 11	1.29		SCHUTZ O'	8-14-87	249	145	RECORE 10.07% Moist @ 1.41% Ash REDRY 0.19%M
5-18- 12	1.50	14.76				0	
5-19- 1	1.34	16.95	OXCE	7-10-87	233	130	
5-19- 2	1.29	10.84	OXCE	7-10-87	213	130	
5-19- 3	1.44	11.74	OXCE	7-10-87	270	130	
5-19- 4	1.43	13.05	OXCE	7-10-87	205	130	
5-19- 5	1.43	16.35	OXCE	7-10-87	246	130	
5-19- 6	1.47	16.41	OXCE	7-10-87	284	130	
5-19- 7	1.25	18.08	OXCE	7-10-87	199	130	
5-19- 8	1.26	13.19	OXCE	7-10-87	210	130	
5-20- 1	1.52	11.60				0	
5-20- 2	1.48	7.31				0	
5-20- 3	1.52	19.41				0	
5-20- 4	1.54	15.28				0	
5-20- 5	1.43	14.59	OXCE	7-10-87	237	130	
5-20- 6	1.43	14.32	OXCE	7-10-87	247	130	

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status
SKIP #

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS
5-20- 7	1.37	12.55	OXCE	7-10-87	240	130	
5-20- 8	1.34	17.95	OXCE	7-10-87	275	130	
5-20- 9	1.38	11.86	OXCE	7-10-87	230	130	
5-20- 10	1.36	15.79	OXCE	7-10-87	243	130	
5-20- 11	1.38	10.84	OXCE	7-10-87	265	130	
5-20- 12	1.40	8.93	OXCE	7-10-87	260	130	
5-20- 13						?	
5-21- 1	1.56	5.70				0	
5-21- 2	1.48	0.48	PENN RILTON	7-15-87	211	134	RECORE 0.48% MOIST @ 1.54% ASH
5-21- 3	1.49	3.06	SCHUTZ 0'	7-31-87	268	142	
5-21- 4	1.47	3.48	SCHUTZ 0'	7-31-87	245	142	
5-21- 5	1.39	6.15	SCHUTZ 0'	8-14-87	230	145	REDRIED 4.68% MOIST @ 1.34% ASH
5-21- 6	1.26	7.18	PRS	6-02-87	258	122	
5-21- 7	1.24	4.22	PRS	6-02-87	241	122	
5-21- 8	1.48	17.39	OXCE	7-10-87	221	130	
5-21- 9	1.29	11.30	OXCE	7-10-87	230	130	
5-21- 10	1.29	15.82	OXCE	7-10-87	279	130	
5-21- 11	1.26	13.95	OXCE	7-10-87	250	130	
5-22- 1	1.56		PENN RILTON	7-15-87	265	134	RECORE 2.55% MOIST @ 1.21% ASH
5-22- 2	1.39	1.56	PRS	6-02-87	259	122	
5-22- 3	1.32	16.89	OXCE	7-10-87	278	130	
5-22- 4	1.22	12.31	OXCE	7-10-87	277	130	
5-22- 5	1.25	7.53	PRS	6-02-87	233	122	
5-22- 6	1.14	8.95	OXCE	7-10-87	238	130	
5-22- 7	1.18	2.62	PRS	6-02-87	296	122	
5-22- 8	1.26	4.35	PRS	6-22-87	272	129	
5-22- 9	1.23	4.20	PRS	6-22-87	?	129	
5-22- 10	1.15	13.56	OXCE	7-10-87	265	130	
5-27- 1	1.39	0.64	PRS	6-02-87	257	122	
5-27- 2	1.22	9.61	OXCE	7-10-87	235	130	
5-27- 3	1.31	3.95	PRS	6-02-87	224	122	
5-27- 4	1.23	0.22	PRS	6-02-87	243	122	
5-27- 5	1.26	10.68	OXCE	7-10-87	221	130	
5-27- 6	1.23	6.19	PRS	6-22-87	236	129	
5-27- 7	1.24	8.21	PRS	6-02-87	240	122	
5-28- 1	1.23	6.91	PRS	6-02-87	239	122	
5-28- 2	1.26	6.32	PRS	6-02-87	253	122	
5-28- 3	1.25					1	
5-28- 4	1.23		PRS	6-02-87	270	122	
5-28- 5	1.13	9.82	OXCE	7-10-87	258	130	
5-28- 6	1.16	2.50	PRS	6-02-87	251	122	
5-28- 7	1.20	0.71	PRS	6-02-87	243	122	
5-28- 8	1.22	4.35	PRS	6-02-87	236	122	
5-28- 9	1.26	8.35	OXCE	7-10-87	275	130	
6-09- 1	1.46	1.94	SCHUTZ 0'	7-31-87	248	142	
6-09- 2	1.49	2.61	SCHUTZ 0'	7-31-87	201	142	
6-09- 3	1.51	3.35	SCHUTZ 0'	8-14-87	??	145	
6-09- 4	1.53	8.45				0	
6-10- 1	1.47		SCHUTZ 0'	7-31-87	255	142	RECORE 3.78% MOIST
6-10- 2	1.31	3.63	PENN RILTON	7-15-87	226	134	
6-10- 3	1.29	2.51	PRS	6-22-87	193	129	
6-11- 1	1.27	**				1	IGNITION
6-11- 2	1.26	1.03				1	MISSING

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS	SKIP #
6-11- 3	1.33	**				1	IGNITION	
6-11- 4	1.35		PENN RILTON	7-15-87	247	134	RECORE 1.08% MOIST @ 1.42% ASH	
6-12- 1	1.35	1.71	SCHUTZ O'	7-31-87	238	142		
6-12- 2	1.45	1.94	SCHUTZ O'	7-31-87	233	142		
6-12- 3	1.44	2.34	SCHUTZ O'	7-31-87	255	142		
6-12- 4	1.43	2.48	PENN RILTON	7-15-87	248	134		
6-12- 5	1.44	5.17	PENN RILTON	7-15-87	239	134		
6-15- 1	1.38	9.27	OXCE	7-10-87	250	130	REDRIED 2.49% MOIST @ 1.28% ASH	
6-15- 2	1.44	5.25	SCHUTZ O'	8-14-87	273	145	REDRIED 2.90% MOIST @ 1.55% ASH	
6-15- 3	1.62	3.62				0		
6-15- 4	1.34	12.89	OXCE	7-10-87	235	130		
6-15- 5	1.32	12.02	OXCE	7-10-87	244	130		
6-15- 6	1.28	2.06	PRS	6-22-87	233	129		
6-16- 1	1.49					0	SAMPLE 1695 9.64% MOIST @ 1.72 % ASH	
6-16- 2*	1.26	5.04	PRS	6-22-87	255	129		
6-16- 3	1.50	4.27	SCHUTZ O'	7-31-87	236	142		
6-16- 4	1.21	2.76	PRS	6-22-87	205	129		
6-16- 5	1.21	7.59	PRS	6-22-87	218	129		
6-17- 1	1.16	6.59	PRS	6-22-87	246	129		
6-17- 2	1.29					0	RECORE 6.21% MOIST @ 1.38% ASH ALSO 3.29% M @	
6-17- 3	1.24	13.46				0	REDRIED 2.90% MOIST	
6-17- 4	1.49	6.28	OXCE	8-05-87	227	144	REDRIED 0.75% MOIST @ 1.35% ASH	
6-17- 4A						236	148	
6-17- 5	1.44		SCHUTZ O'	7-31-87	254	142	RECORED 1.11% MOIST @ 1.45% ASH	
6-17- 6	1.35		SCHUTZ O'	7-31-87	258	142	RECORED 1.08% MOIST @ 1.39% ASH	
6-17- 7	1.32		SCHUTZ O'	8-14-87	221	145	RECORED 12.57%M @ 1.14% ASH	
6-17- 8	1.21	9.98	SCHUTZ O'	8-14-87	192	145	SAMPLE 1694 15.27% MOIST @ 1.95% ASH	
6-19- 1	1.29					1	MISSING	
6-19- 2	1.29					1	MISSING	
6-19- 3	1.28					1	MISSING	
6-19- 4	1.19	1.03	PENN RILTON	7-15-87	243	134		
6-19- 5	1.11	1.15	PENN RILTON	7-15-87	255	134		
6-19- 6	1.14	1.31	PENN RILTON	7-15-87	212	134		
6-19- 7	1.05	1.69	PENN RILTON	7-15-87	228	134		
6-19- 8	1.05	1.94	PENN RILTON	7-15-87	217	134	EXTRA ANALYSIS 1.74% MOIST	
6-19- 9	1.21		PENN RILTON	7-15-87	239	134	RECORED 1.89% MOIST @ 1.31% ASH	
6-22- 1						---		
6-24- 1	1.40	3.04	SCHUTZ O'	7-31-87	266	142		
6-24- 2	1.52	0.15	SCHUTZ O'	7-31-87	240	142		
6-24- 3	1.42		SCHUTZ O'	8-14-87	268	145	RECORED 0.23% MOIST @ 1.52% ASH	
6-24- 4	1.83					0	RECORED 0.11%M @ 1.68% ASH	
6-24- 5	1.69	0.68				0		
6-24- 6	1.74	3.22				0		
6-24- 7	1.69	5.54				0		
6-24- 8						---		
6-25- 1	1.35		SCHUTZ O'	8-14-87	282	145	REDRIED 0.58% MOIST @ 1.42% ASH	
6-25- 2	1.07	0.98	SCHUTZ O'	8-14-87	277	145	RECORED 1.04%M @ 1.34% ASH ALSO 1.14%M @ 1.31	
6-25- 2A						316	148	
6-25- 3	1.41	4.86	SCHUTZ O'	7-31-87	245	142		
6-25- 4	1.47	3.35	SCHUTZ O'	8-14-87	262	145	RECORED 3.48%M @ 1.34% ASH	
6-25- 5	1.49					---		
6-25- 6	1.45	0.95	SCHUTZ O'	8-14-87	248	145	REDRIED 0.14% MOIST @ 1.48% ASH (0.18%M @ 1.4	
6-25- 7	1.48		SCHUTZ O'	8-14-87	253	145	REDRIED 3.30% MOIST @ 1.45% ASH	

03-DEC-87

2503-03

DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status
SKIP #

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS
6-25- 8	1.24	0.78	SCHUTZ O'	7-31-87	275	142	
6-25- 9	1.26	0.66	SCHUTZ O'	7-31-87	250	142	
6-25- 10	1.32	4.25	SCHUTZ O'	7-31-87	239	142	
6-25- 11		3.77	SCHUTZ O'	7-31-87	103	142	
6-29- 1			SCHUTZ O'	9-08-87	232	148	REDRIED 9.87% MOIST @ 1.30% ASH
6-30- 1			SCHUTZ O'	8-14-87	317	145	REDRIED 1.72% MOIST @ 1.29% ASH
7-01- 1	1.26		SCHUTZ O'	8-14-87	249	145	
7-01- 2	1.26	1.65	SCHUTZ O'	7-31-87	257	142	
7-01- 3	1.26	13.33	SCHUTZ O'	8-14-87	232	145	REDRIED 0.55% MOIST @ 1.21% ASH
7-01- 4	1.23	8.13	OXCE	8-05-87	200	144	REDRIED 9.65% MOIST @ 1.47% ASH
7-01- 5	1.17	8.66	SCHUTZ O'	8-14-87	??	145	REDRIED 5.12% MOIST @ 1.19% ASH
7-01- 6	1.25	4.35	PENN RILTON	7-14-87	210	134	
7-01- 7	1.20	11.03	SCHUTZ O'	8-14-87	213	145	REDRIED 4.83% MOIST @ 1.16% ASH
7-01- 8	1.23	0.61	PENN RILTON	7-14-87	237	134	
7-01- 9		6.00	SCHUTZ O'	8-14-87	212	145	REDRIED 0.82% MOIST @ 1.26% ASH
7-02- 1	1.23	0.49	OXCE	8-05-87	258	144	
7-02- 2	1.26	1.71	PENN RILTON	7-14-87	227	134	
7-02- 3	1.26	?	PENN RILTON	7-14-87	267	134	
7-02- 4	1.35	7.95	OXCE	8-05-87	204	144	RECORED 7.95%M @ 1.26% ASH
7-02- 5	1.28	10.05	SCHUTZ O'	8-14-87	243	145	RECORE 8.35%M @ 1.24% ASH REDRIED 4.62% MOIST
7-02- 6	1.22	5.59	OXCE	8-05-87	209	144	ALSO PENN RILTON 7-14-87 247#
7-02- 7	1.24	1.38	PENN RILTON	7-14-87	209	134	
7-02- 8	1.25	6.65	SCHUTZ O'	8-14-87	226	145	REDRIED 1.63% MOIST @ 1.24% ASH
7-06- 1	1.26	7.73	SCHUTZ O'	8-14-87	199	145	REDRIED 8.47% MOIST @ 1.30% ASH
7-06- 2	1.21					1	MISSING
7-06- 3	1.18	1.10	SCHUTZ O'	7-31-87	234	142	RECORED 1.50%M @ 1.18% ASH
7-06- 4	1.24	0.53	SCHUTZ O'	7-31-87	243	142	
7-06- 5	1.34	17.17				---	REDRIED 7.26% MOIST @ 1.30% ASH
7-06- 6	1.29	16.77				---	REDRIED 9.76% MOIST @ 1.27% ASH
7-06- 6A			SCHUTZ O'	9-08-87	189	148	
7-06- 6B			SCHUTZ O'	9-08-87	204	148	
7-06- 7	1.28	3.72	SCHUTZ O'	7-31-87	238	142	
7-06- 8	1.18	11.08	OXCE	8-05-87	214	144	REDRIED 16.25% MOIST @ 1.11 % ASH
7-06- 9	1.46		SCHUTZ O'	8-14-87	261	145	REDRIED 2.08% MOIST @ 1.20% ASH
7-07- 1	1.27	0.22	SCHUTZ O'	7-31-87	282	142	
7-07- 2	1.18	0.98	SCHUTZ O'	7-31-87	248	142	
7-07- 3	1.16	0.84	SCHUTZ O'	7-31-87	227	142	
7-07- 4	1.14	1.58	SCHUTZ O'	7-31-87	225	142	
7-08- 1	1.32	8.17	SCHUTZ O'	7-31-87	252	142	
7-08- 2	1.19	0.76	SCHUTZ O'	7-31-87	243	142	
7-08- 3	1.48	3.06	SCHUTZ O'	7-31-87	222	142	
7-08- 4	1.24	2.00	SCHUTZ O'	7-31-87	252	142	
7-08- 5	1.17	7.02	OXCE	8-05-87	214	144	
7-08- 6	1.13	11.86	OXCE	8-05-87	191	144	REDRIED 9.28% MOIST @ 1.05% ASH
7-08- 7	1.08	12.41	SCHUTZ O'	8-14-87	204	145	REDRIED 2.36% MOIST @ 1.09% ASH
7-08- 8	1.08	2.40	SCHUTZ O'	7-31-87	240	142	
7-08- 9		1.80	SCHUTZ O'	7-31-87	228	142	RECORE 3.29% MOIST
7-09- 1	1.22	1.66	SCHUTZ O'	7-31-87	220	142	
7-09- 2	1.18	3.49	SCHUTZ O'	7-31-87	243	142	
7-09- 3	1.22	2.29	SCHUTZ O'	7-31-87	227	142	
7-09- 4	1.23	2.07	SCHUTZ O'	7-31-87	236	142	
7-09- 5	1.20	1.39	SCHUTZ O'	7-31-87	235	142	
7-09- 6	1.21	0.92	SCHUTZ O'	7-31-87	225	142	

DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status
SKIP #

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS
7-09- 7	1.20	7.14	OXCE	8-05-87	238	144	
7-09- 8	1.21	5.74	OXCE	8-05-87	236	144	
7-10- 1	1.43	1.44	SCHUTZ O'	7-31-87	245	142	
7-10- 2	1.52	1.57	SCHUTZ O'	7-31-87	234	142	
7-10- 3	1.50	2.70	SCHUTZ O'	7-31-87	219	142	RECORDED 3.34%M @ 1.38% ASH ALSO 2.79%M @ 1.26
7-10- 4	1.43	2.54	SCHUTZ O'	7-31-87	198	142	
7-10- 5	1.39	6.16	SCHUTZ O'	9-08-87	216	148	REDRIED 7.01% (8.44)MOIST @ 1.38% (1.37)ASH
7-10- 6	1.32	5.47	SCHUTZ O'	8-14-87	205	145	REDRIED 0.21% (0.29)MOIST @ 1.31% (1.31)ASH
7-10- 7	1.27	0.73	SCHUTZ O'	7-31-87	179	142	
7-10- 8	1.25	1.22	SCHUTZ O'	7-31-87	224	142	
7-10- 9	1.25	0.41	SCHUTZ O'	7-31-87	217	142	
7-10- 10	1.28					---	
7-10- 10A			SCHULTZ O'	9-08-87	275	148	
7-10- 11	1.28	1.69	SCHUTZ O'	7-31-87	210	142	
7-10- 12	1.24	1.32	SCHUTZ O'	7-31-87	231	142	
7-10- 13						---	
7-13- 1	1.17	2.60	SCHUTZ O'	7-31-87	197	142	
7-13- 2	1.17	2.18	SCHUTZ O'	7-31-87	226	142	
7-13- 3	1.21	1.31	SCHUTZ O'	7-31-87	232	142	
7-13- 4	1.31	7.28	SCHUTZ O'	8-14-87	234	145	REDRIED 5.12% MOIST @ 1.30% ASH
7-13- 5	1.21	8.24	SCHUTZ O'	8-14-87	243	145	RECORDED 8.24%M @ 1.10% ASH REDRIED 0.98% MOIS
7-13- 6			SCHUTZ O'	8-14-87	207	145	
7-14- 1	1.14	1.40	SCHUTZ O'	7-31-87	267	142	
7-14- 2	1.16	5.78	OXCE	8-05-87	208	144	REDRIED 6.95% MOIST @ 1.19% ASH
7-14- 3	1.20	1.29	SCHUTZ O'	7-31-87	229	142	
7-14- 4	1.14	1.00	SCHUTZ O'	7-31-87	235	142	
7-14- 5	1.16	7.16	SCHUTZ O'	8-14-87	210	145	REDRIED 1.19% MOIST @ 1.23% ASH
7-14- 6	1.29	8.21	SCHUTZ O'	8-14-87	192	145	REDRIED 3.82% MOIST @ 1.23% ASH
7-14- 7			SCHUTZ O'	7-31-87	215	142	
7-15- 1	1.22	6.88	SCHUTZ O'	7-31-87	199	142	
7-15- 2	1.31		SCHUTZ O'	9-08-87	182	148	REDRIED 1.27%A @ .85%M
7-15- 3	1.30		SCHUTZ O'	9-08-87	182	148	
7-15- 4	1.30					---	
7-15- 5	1.31	11.37	SCHUTZ O'	8-14-87	210	145	REDRIED 4.99% MOIST @ 1.24% ASH
7-15- 6	1.21	6.02	SCHUTZ O'	8-14-87	221	145	REDRIED 0.92% MOIST @ 1.28% ASH
7-15- 7	1.36	9.78	SCHUTZ O'	8-14-87	217	145	REDRIED 0.31% (4.01) MOIST @ 1.22% ASH
7-15- 8							REDRIED 0.84% MOIST @ 1.24% ASH
7-16- 1	1.35	5.42	SCHUTZ O'	8-14-87	213	145	REDRIED +0.57% MOIST @ 1.10% ASH
7-16- 2	1.28	9.00	OXCE	8-05-87	235	144	REDRIED 6.65% MOIST @ 1.27% ASH
7-16- 3	1.18	7.08	SCHUTZ O'	7-31-87	187	142	REDRIED +0.07% MOIST @ 1.32% ASH (4.34%M @ 1.
7-16- 4	1.23		SCHUTZ O'	7-31-87	247	142	RECORDED 0.29%M @ 1.25% ASH
7-16- 5	1.28	0.53	SCHUTZ O'	7-31-87	244	142	
7-16- 6	1.24	0.71	SCHUTZ O'	7-31-87	159	142	
7-16- 7	1.23		SCHUTZ O'	8-14-87	88	145	REDRIED 0.31%M @ 1.22% ASH
7-16- 8	1.38	7.77	SCHUTZ O'	8-14-87	232	145	
7-17- 1							
7-17- 2			SCHUTZ O'	8-14-87	275	145	REDRIED 0.84%M @ 1.24% ASH
7-28- 1	1.27	9.25	SCHUTZ O'	7-31-87	189	142	REDRIED 0.00%M @ 1.32% ASH
7-28- 2	1.32	9.26	SCHUTZ O'	8-14-87	230	145	REDRIED 0.14%M @ 1.37% ASH
7-28- 3	1.38	10.88	SCHUTZ O'	7-31-87	194	142	REDRIED 4.71%M @ 1.38% ASH
7-28- 4	1.33	10.64	SCHUTZ O'	8-14-87	203	145	REDRIED 0.00%M @ 1.35% ASH
7-28- 5	1.35	6.40	SCHUTZ O'	7-31-87	202	142	REDRIED 2.31%M @ 1.37% ASH
7-28- 6	1.29	4.59	SCHUTZ O'	8-14-87	204	145	REDRIED 5.86% MOIST @ 1.27% ASH (5.31%M @ 1.3

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8503-03

DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
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SKIP #

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS
7-28- 7	1.27	4.54	SCHUTZ O'	8-14-87	230	145	RECORED 4.51% MOIST @ 1.27% ASH
7-29- 1	1.33	9.21				---	
7-29- 2	1.28	7.79				---	
7-29- 3			OXCE	8-05-87	214	144	RECORED 5.17% MOIST @ 1.23% ASH
7-30- 1						---	
8-04- 1	1.25	12.72	OXCE	8-05-87	215	144	
8-04- 2	1.23	8.18	OXCE	8-05-87	231	144	
8-04- 3	1.23	5.51	OXCE	8-05-87	239	144	
8-04- 4	1.37	8.30	OXCE	8-05-87	219	144	
8-04- 5	1.35	4.91	OXCE	8-05-87	228	144	
8-04- 6	1.28	8.28	OXCE	8-05-87	249	144	
8-04- 7	1.26	10.06	SCHUTZ O'	8-14-87	213	145	REDRIED 1.18%M @ 1.29% ASH
8-04- 8	1.29	8.77				1	REDRIED 0.98%M @ 1.30% ASH "IGNITION"
8-04- 9	1.29	10.45				1	IGNITION
8-04- 10	1.39	6.49	SCHUTZ O'	8-14-87	230	145	REDRIED 3.78%M @ 1.31% ASH
8-04- 11	1.47	8.16	SCHUTZ O'	8-14-87	222	145	REDRIED 1.98%M @ 1.40% ASH
8-04- 12	1.42	5.76	SCHUTZ O'	8-14-87	237	145	REDRIED 0.84%M @ 1.46% ASH
8-04- 13	1.49	5.35	SCHUTZ O'	8-14-87	239	145	REDRIED 0.75%M @ 1.27% ASH
8-05- 1A	1.29	10.66	SCHUTZ O'	8-14-87	127	145	
8-05- 2A	1.24	5.77	SCHUTZ O'	8-14-87	226	145	
8-06- 1	1.61	4.28	SCHUTZ O'	8-14-87	259	145	
8-06- 2	1.27	10.10	SCHUTZ O'	8-14-87	232	145	
8-06- 3	1.24	6.37	SCHUTZ O'	8-14-87	218	145	
8-06- 4	1.29	5.40	SCHUTZ O'	8-14-87	152	145	
8-07- 1	1.29	6.80	SCHUTZ O'	8-14-87	210	145	
8-07- 2	1.29	6.37	SCHUTZ O'	8-14-87	179	145	
8-07- 3	1.71	4.40	SCHUTZ O'	8-14-87	225	145	
8-07- 4	1.28	8.66			187	148	
8-07- 5	1.31	5.75	SCHUTZ O'	8-14-87	233	145	
8-07- 6	1.33	9.85	SCHUTZ O'	8-14-87	202	145	
8-07- 7	1.33	4.05	SCHUTZ O'	8-14-87	232	145	
8-07- 8	1.31	7.32	SCHUTZ O'	8-14-87	233	145	
8-07- 9	1.30	6.85	SCHUTZ O'	8-14-87	184	145	
8-07- 10	1.25	4.17	SCHUTZ O'	8-14-87	235	145	
8-07- 11	1.27	3.88	SCHUTZ O'	8-14-87	223	145	
8-07- 12	1.29	4.15					
8-07- 13	1.25	2.13	SCHUTZ O'	8-14-87	241	145	
8-10- 1	1.69	4.21	SCHUTZ O'	8-14-87	218	145	
8-10- 2	1.72	7.21					
8-10- 3	1.58	8.51					
8-10- 4	1.32	9.10	SCHUTZ O'	9-08-87	159	148	
8-10- 5			SCHUTZ O'	8-14-87	249	145	
8-11- 1	1.44	2.16	SCHUTZ O'	8-14-87	245	145	
8-11- 2	1.39	2.86	SCHUTZ O'	8-14-87	249	145	
8-11- 3			SCHUTZ O'	8-14-87	224	145	
8-11- 4							
8-12- 1	1.33	1.91	SCHUTZ O'	8-14-87	236	145	
8-12- 2							
8-12- 3	1.29	0.38	SCHUTZ O'	8-14-87	253	145	
8-12- 4	1.71	0.44	SCHUTZ O'	8-14-87	244	145	
8-12- 5	1.49	2.56	SCHUTZ O'	8-14-87	247	145	
8-12- 6	1.39	3.65	SCHUTZ O'	8-14-87	259	145	
8-12- 7	1.37	1.79	SCHUTZ O'	8-14-87	248	145	

DRAVO SHIPMENT DRUM LOG

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SKIP #

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS
8-12- 8	1.32	2.21	SCHUTZ O'	8-14-87	224	145	
8-12- 9	1.28	2.64	SCHUTZ O'	8-14-87	209	145	
8-12- 10	1.31	3.39	SCHUTZ O'	8-14-87	230	145	
8-12- 11	1.39	1.69	SCHUTZ O'	8-14-87	243	145	
8-12- 12	1.38	1.73	SCHUTZ O'	8-14-87	228	145	
8-12- 13	1.37	3.27	SCHUTZ O'	8-14-87	243	145	
8-12- 14	1.32	3.06	SCHUTZ O'	8-14-87	240	145	
8-12- 15	1.26	3.04	SCHUTZ O'	8-14-87	253	145	
8-12- 16			SCHUTZ O'	8-14-87	273	145	
8-13- 1	1.25	0.65	SCHUTZ O'	8-14-87	270	145	
8-13- 2	1.36	0.73	SCHUTZ O'	8-14-87	262	145	
8-13- 3	1.31	0.66	SCHUTZ O'	8-14-87	84	145	
8-18- 1	1.30	1.14	SCHUTZ O'	9-08-87	262	148	
8-18- 2	1.39	0.77	SCHUTZ O'	9-08-87	269	148	
8-18- 3	1.34	0.70	SCHUTZ O'	9-08-87	255	148	
8-18- 4	1.30	1.01	SCHUTZ O'	9-08-87	261	148	
8-18- 5	1.33	6.99	SCHUTZ O'	9-08-87	216	148	
8-18- 6	1.31	8.80	SCHUTZ O'	9-08-87	164	148	
8-19- 1	1.30	1.25	SCHUTZ O'	9-08-87	264	148	
8-19- 2	1.33	0.84	SCHUTZ O'	9-08-87	252	148	
8-20- 1	1.35	1.21	SCHUTZ O'	9-08-87	264	148	
8-20- 2	1.35	1.29	SCHUTZ O'	9-08-87	260	148	
8-20- 3	1.33	2.31	SCHUTZ O'	9-08-87	242	148	
8-20- 4	1.36	1.06	SCHUTZ O'	9-08-87	249	148	
8-20- 5	1.34	0.74	SCHUTZ O'	9-08-87	260	148	
8-20- 6	1.29	1.65	SCHUTZ O'	9-08-87	229	148	
8-21- 1			SCHUTZ O'	9-08-87	126	148	
8-24- 1	1.36	1.43	SCHUTZ O'	9-08-87	244	148	
8-24- 2	1.33	1.22	SCHUTZ O'	9-08-87	276	148	
8-24- 3	1.36	2.32	SCHUTZ O'	9-08-87	274	148	
8-24- 4	1.39	1.70	SCHUTZ O'	9-08-87	264	148	
8-25- 1	1.33	5.41	SCHUTZ O'	9-08-87	219	148	REDRIED 1.36XA @ .88XM
8-25- 2	1.31	5.76	SCHUTZ O'	9-08-87	200	148	REDRIED 1.35XA @ 3.21XM
8-25- 3	1.30	6.81					
8-25- 4	1.30	8.52					
8-25- 5	1.27	4.96	SCHUTZ O'	9-08-87	240	148	
8-25- 6	1.31	2.29	SCHUTZ O'	9-08-87	265	148	
8-26- 1	1.60	1.08	SCHUTZ O'	9-08-87	269	148	
8-26- 2	1.40	1.03	SCHUTZ O'	9-08-87	267	148	
8-26- 3	1.34	1.22	SCHUTZ O'	9-08-87	272	148	
8-26- 4	1.34	3.00	SCHUTZ O'	9-08-87	262	148	
8-26- 5	1.32	1.75	SCHUTZ O'	9-08-87	247	148	
8-26- 6	1.35	0.94	SCHUTZ O'	9-08-87	266	148	
8-26- 7	1.33	0.55			220?243?	153?148?	20
8-26- 8	1.3	2.61	SCHUTZ O'	9-08-87	243	148	
8-26- 9	1.31	2.62	SCHUTZ O'	9-08-87	245	148	
8-26- 10	1.26	3.13	SCHUTZ O'	9-08-87	262	148	
8-26- 11	1.3	1.58	SCHUTZ O'	9-08-87	244	148	
8-26- 12	1.31	1.26	SCHUTZ O'	9-08-87	246	148	
8-26- 13	1.31	1.11	SCHUTZ O'	9-08-87	253	148	
8-26- 14	1.35	2.03	SCHUTZ O'	9-08-87	244	148	
8-27- 1	1.38	0.79			270	153	20
8-27- 2	1.37	1.25	SCHUTZ O'	9-08-87	271	148	

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS	SKIP #
8-27- 3	1.41	1.21	SCHUTZ O'	9-08-87	240	148		
8-27- 4	1.42	1.82	SCHUTZ O'	9-08-87	273	148		
8-27- 5	1.37	0.7	SCHUTZ O'	9-08-87	241	148		
8-27- 6	1.36	0.84	SCHUTZ O'	9-08-87	238	148		
8-27- 7	1.35	1.05	SCHUTZ O'	9-08-87	236	148		
8-28- 1	1.31	1.4	SCHUTZ O'	9-08-87	279	148		
8-28- 2	1.28	0.94	SCHUTZ O'	9-08-87	270	148		
8-28- 3	1.37	0.78	SCHUTZ O'	9-08-87	259	148		
8-28- 4	1.33	0.98	SCHUTZ O'	9-08-87	256	148		
8-28- 5	1.36	1.07	SCHUTZ O'	9-08-87	248	148		
8-28- 6	1.34	1.82	SCHUTZ O'	9-08-87	278	148		
8-28- 8	1.34	2.01	SCHUTZ O'	9-08-87	246	148		
8-28- 9	1.4	1.14	SCHUTZ O'	9-08-87	243	148		
8-28- 10	1.42	0.77	SCHUTZ O'	9-08-87	234	148		
8-28- 11	1.39	0.88	SCHUTZ O'	9-08-87	229	148		
8-31- 1	1.35	2.35	SCHUTZ O'	9-08-87	245	148		
8-31- 2	1.34	6.19			257	153	REDRIED 1.50% @ .64%M	20
8-31- 3	1.26	5.77			213	153	REDRIED 1.55% @ 1.78%M	7
8-31- 4	1.33	4.84	SCHUTZ O'	9-08-87	266	148	REDRIED 1.44% @ .25%M	
8-31- 5	1.48	7.18			255	153	REDRIED 1.32% @ .91%M	7
8-31- 6	1.46	6.36			248	153	REDRIED 1.44% @ .50%M	8
8-31- 7	1.45	8.66			248	153		8
9-01- 1	1.31	1.73	SCHUTZ O'	9-08-87	273	148		
9-01- 2	1.37	1.56	SCHUTZ O'	9-08-87	248	148		
9-01- 3	1.63	0.67				0	RECORE 1.62% @ .66%M	
9-01- 4	1.55	0.27				0	RECORE 1.62% @ .46%M	
9-01- 5	1.54	0.28				0	RECORE 1.72% @ .43%M	
9-01- 6	1.46	0.21	SCHUTZ O'	9-08-87	263	148	RECORE 1.50% @ .16%M	
9-01- 7	1.33	0.3	SCHUTZ O'	9-08-87	216	148		
9-02- 1	1.3	0.26			268	153		21
9-02- 2	1.44	0.12			314	153		7
9-02- 3	1.52	0.05				1	IGNITION	
9-02- 4	1.46	0.39			295	153		8
9-03- 1	1.38	0.34	SCHUTZ O'	9-08-87	261	148		
9-03- 2	1.21	0.4				1	IGNITION	
9-03- 3	1.28	0.42	SCHUTZ O'	9-08-87	276	148		
9-03- 4	1.28	0.74	SCHUTZ O'	9-08-87	254	148		
9-03- 5	1.28	1.52	SCHUTZ O'	9-08-87	288	148		
9-03- 6	1.45	2.36	SCHUTZ O'	9-08-87	230	148		
9-04- 1	1.26	0.92			253	163		15
9-04- 2	1.31	1.29			261	153		6
9-04- 3	1.25	1.15			263	163		15
9-04- 4	1.19	1.01			263	163		15
9-04- 5	1.2	0.84			256	163		15
9-04- 6	1.28	0.74			261	163		13
9-04- 7	1.32	1.13			242	153		6
9-04- 8	1.32	1.85			245	153		8
9-04- 9	1.3	0.96			244	153		6
9-08- 1						1	IGNITION	
9-08- 2	1.33	0.67			269	153		21
9-08- 3	1.34	0.62			243	153		20
9-08- 4	1.31	2.8			253	153		7
9-16- 1	1.47	5.84			253	153		38

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS	SKIP #
9-16- 2	1.56	0.58			249	153		38
9-17- 1A	1.45	4.62			250	153		38
9-17- 1B					218	153		39
9-17- 2	1.53	4.28			249	153		39
9-21- 1	1.32	0.56			247	153		1
9-21- 2	1.33	2.75			251	153		1
9-22- 1	1.24	0.89			249	163		24
9-22- 2	1.24	0.93			254	163		17
9-22- 3	1.23	1.06			257	163		14
9-22- 4	1.22	3.59			264	163		14
9-22- 5	1.24	3.51			265	163		14
9-22- 6	1.38	1.34			251	153		16
9-22- 7	1.4	1.06			279	153		9
9-22- 8	1.23	0.68			258	163		14
9-22- 9	1.3	0.96			239	153		9
9-23- 1	1.35	1.28			283	153		19
9-23- 2	1.38	1.47			258	153		18
9-23- 3	1.45	1.55			261	153		19
9-23- 4	1.48	1.58			241	153		18
9-23- 5	1.47	1.71			38	1	DRUMS 5 AND 1 ADDED FOR THE TOTAL WEIGHT OF 2	21
10-06- 1	1.39	0.15			253	153		23
10-06- 2	1.45	1.32			252	153		23
10-06- 3	1.47	1.19			252	153		23
10-06- 4	1.55	1.39						
10-07- 1						1	IGNITION	
10-07- 2	1.51	1.77			264	153		1
10-07- 3	1.48	2.11			270	153		1
10-08- 1	1.27	1.1			259	163		13
10-08- 2	1.24	1.32			294	163		13
10-08- 3	1.28	0.98			255	163		25
10-08- 4	1.31	1.77			254	153		26
10-08- 5	1.34	1.28			263	153		26
10-08- 6	1.31	0.93			269	153		26
10-08- 7	1.41	0.79			271	153		22
10-08- 8	1.4	1.35			251	153		22
10-08- 9	1.37	1.8			258	153		22
10-08- 10	1.31	1.75			284	153		22
10-08- 11	1.28	1.31			261	153		23
10-08- 12	1.26	1.39			265	163		24
10-09- 1	1.3	0.94			276	153		10
10-09- 2	1.33	1.49			273	153		10
10-09- 3	1.33	0.88			256	153		11
10-09- 4	1.26	1.15			267	163		25
10-09- 5	1.22	1.22			266	163		25
10-09- 6	1.23	1.41			266	163		25
10-09- 7	1.24	1.81			283	163		13
10-09- 8	1.31	0.89			284	153		9
10-09- 9	1.35	3.43			283	153		19
10-09- 10	1.37	4.91			241	153		19
10-09- 11	1.34	4.04			237	153		10
10-09- 12	1.31	1.1			288	153		10
10-12- 1	1.36	0.96			269	153		28
10-12- 2	1.42	0.68			278	153		28

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS	SKIP #
10-12- 3	1.43	0.67			277	153		30
10-12- 4	1.32	2.05			269	153		30
10-12- 5	1.28	1.77			245	163		29
10-12- 6	1.28	0.62			285	163		29
10-12- 7	1.25	1.46			248	163		33
10-12- 8	1.25	0.37			299	163		33
10-12- 9	1.37	0.33			285	153		30
10-12- 10	1.42	0.78			295	153		30
10-13- 1	1.37	1.38			239	153		12
10-13- 2	1.38	0.39			283	153		12
10-13- 3	1.3	2.06			265	153		12
10-13- 4	1.32	3.99			274	153		27
10-13- 5	1.32	2.54			223	153		27
10-13- 6	1.3	2.22			252	153		27
10-13- 7	1.34	5.24			267	153		27
10-13- 8	1.43	5.97			259	153		12
10-13- 9	1.56	1.42			293	153		11
10-13- 10	1.59	1.76			297	153		11
10-13- 11	1.57	3.62			290	153		11
10-13- 12	1.48	3.93			262	153		9
10-13- 13	1.55	3.59				0		
10-13- 14	1.49	1.41			263	153		16
10-14- 1	1.9	0.12				1	REJECTED HIGH ASH	
10-14- 2	1.74	0.83				1	REJECTED HIGH ASH	
10-14- 3	1.58	0.41				1	REJECTED HIGH ASH	
10-14- 4	1.51	1.11			279	153		5
10-14- 5	1.52	1.12			250	153		5
10-14- 6	1.45	2.02			252	153		5
10-14- 7	1.48	1.78			242	153		5
10-14- 8	1.45	1.81			270	153		6
10-14- 9	1.49	0.98			273	153		4
10-14- 10	1.49	0.85			272	153		4
10-14- 11	1.41	0.76			285	153		4
10-14- 12	1.4	0.63			279	153		4
10-15- 1	1.34	4.86			254	153		26
10-15- 2	1.38	1.97			263	153		21
10-15- 3	1.33	5.38			237	162		3
10-15- 4	1.28	4.44			279	163		29
10-15- 5	1.22	7.45			271	162		2
10-15- 6	1.21	11.47			330	163		29
10-15- 7	1.20	6.03			255	162		2
10-15- 8	1.23	6.70			236	162		2
10-15- 9	1.18	6.94			264	162		31
10-15- 10	1.21	8.58			242	162		3
10-15- 10	1.21	8.78			245	162		3
10-15- 10	1.24	10.08			243	162		3
10-16- 1	1.23	8.73			255	162		2
10-16- 2	1.40	8.93			248	0		
10-16- 3	1.46	7.86			214	0		
10-16- 4	1.43	5.00			219	153		18
10-16- 5	1.39	4.90			246	153		18
10-16- 6	1.32	4.54			253	153		16
10-16- 7	1.27	4.81			233	153		24

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS	SKIP #
10-16- 8	1.31	2.94				236	153	16
10-16- 9	1.27	3.14				243	163	24
10-16- 10	1.30	2.76				234	153	23
10-16- 11	1.23	3.96				249	163	17
10-16- 12	1.17	2.90				239	163	17
10-16- 13	1.21	4.57				244	163	17
10-19- 1	1.20	5.26				242	162	31
10-19- 2	1.21	5.04				253	162	31
10-19- 3	1.18	6.52				252	162	31
10-19- 4	1.18	5.98				241	162	32
10-19- 5	1.14	9.13				270	162	32
10-19- 6	1.25	5.88				242	162	32
10-19- 7	1.33	3.91				244	153	28
10-19- 8	1.40	3.19				258	153	28
10-19- 9	1.56	1.56				243	0	
10-19- 10	1.61	3.02				273	0	
10-19- 11	1.65	4.59					0	
10-20- 1	1.25	7.53				252	162	32
10-20- 2	1.30	8.02				225	0	
10-20- 3	1.21	7.61				243	162	34
10-20- 4	1.31	5.84				236	0	
10-20- 5	1.27	5.43				222	162	34
10-20- 6	1.28	7.83				239	162	34
10-20- 7	1.23	6.16				240	162	34
10-20- 8	1.22	8.99				258	162	35
10-20- 9	1.22	7.46				237	162	35
10-20- 10	1.29	6.55				235	162	35
10-20- 11	1.26	7.81				235	162	35
10-21- 1	1.18	10.08				236	162	36
10-21- 2	1.22	6.16				245	162	36
10-21- 3	1.20	7.24				235	162	36
10-21- 4	1.24	12.55				233	162	36
10-21- 5	1.18	6.65				250	162	37
10-21- 6	1.26	6.39				257	162	37
10-21- 7	1.20	9.16				241	162	37
10-21- 8	1.43	8.36				236	1 REBLENDED	
10-21- 9	1.38	9.21				213	1 REBLENDED	
10-21- 10	1.33	5.82				230	1 REBLENDED	
10-21- 11	1.38	5.23				270	153	38
10-22- 1	1.18	6.59				256	162	37
10-22- 2	1.21	8.50				236	162	40
10-22- 3	1.13	6.85				254	162	40
10-22- 4	1.19	7.76				250	162	40
10-22- 5	1.17	7.92				244	162	40
10-22- 6	1.17	7.49				243	162	41
10-22- 7	1.19	8.92				241	162	41
10-22- 8	1.18	8.60				240	162	41
10-22- 9	1.14	6.91				237	162	41
10-22- 10	1.17	5.98				242	162	42
10-22- 11	1.16	8.57				242	162	42
10-22- 12	1.24	11.99				230	162	42
10-23- 1	1.28	6.81				276	162	42
10-23- 2	1.24	6.13				249	162	43

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS	SKIP #
10-23- 3	1.25	3.78			240	163		33
10-23- 4	1.29	5.44			251	162		43
10-23- 5	1.23	5.70			243	162		43
10-26- 1	1.18	6.28			245	162		43
10-26- 2	1.22	8.06			233	162		44
10-26- 3	1.16	8.44			213	162		44
10-26- 4	1.16	7.91			237	162		44
10-26- 5	1.16	7.54			228	162		44
10-26- 6	1.23	10.53			239	162		45
10-26- 7	1.23	6.24			267	162		45
10-26- 8	1.24	5.61			252	162		45
10-26- 9	1.22	5.56			257	162		45
10-26- 10	1.15	7.01			247	162		46
10-26- 11	1.14	4.81			260	162		46
10-27- 1	1.26	10.09			224	162		46
10-27- 2	1.29	6.96			262	162		46
10-27- 3	1.29	3.50			268	162		47
10-27- 4	1.25	5.45			250	162		47
10-27- 5	1.26	5.11			274	162		47
10-27- 6	1.25	5.54			232	162		47
10-27- 7	1.22	7.25			242	162		48
10-27- 8	1.19	5.84			257	162		48
10-27- 9	1.23	4.72			279	162		48
10-27- 10	1.30	5.97			255	1	REBLENDED	
10-27- 11	1.31	5.75			261	1	REBLENDED	
10-27- 12	1.33	6.30			256	1	REBLENDED	
10-27- 13	1.32	6.30			273	1	REBLENDED	
10-27- 14	1.26	10.53			277	162		48
10-28- 1	1.35	4.66			245	153		51
10-28- 2	1.39	3.67			241	153		39
10-28- 3	1.35	2.49			246	153		39
10-28- 4	1.29	7.61			269	162		49
10-28- 5	1.24	8.63			230	162		49
10-28- 6	1.23	9.06			249	162		49
10-28- 7	1.19	9.35			246	162		49
10-28- 8	1.15	7.39			238	162		50
10-28- 9	1.09	5.97			251	162		50
10-28- 10	1.14	10.07			254	162		50
10-29- 1	1.16	10.23			203	162		50
10-29- 2	1.14	6.91			186	162		52
10-29- 3	1.19	5.10			213	162		54
10-29- 4	1.11	8.40			206	162		54
10-29- 5	1.07	4.72			201	162		55
10-29- 6	1.03	7.05			219	162		52
10-29- 7	1.09	5.93			211	162		52
10-29- 8	1.07	6.88			232	162		52
10-29- 9	1.07	6.20			221	162		54
10-29- 10	1.20	4.50			239	162		54
10-29- 11	1.12	5.10			247	162		53
10-29- 12	1.10	5.19			256	162		53
10-29- 13	1.10	3.48			256	162		53
10-29- 14	1.05	6.53			254	162		55
10-29- 15	1.10	9.15			252	162		53

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DRAVO SHIPMENT DRUM LOG

* KEY 0= Drum Available
1= Alternate Status
SKIP #

DRUM #	% ASH	% MOIST	SHIP TO	DATE	WT.	SHIPMENT ID#	COMMENTS
10-30- 1	1.18	0.15	SCHUTZ O'	11-18-87	284	168	
10-30- 2	1.19	0.11	SCHUTZ O'	11-18-87	268	168	
10-30- 3	1.20	0.05			282	163	56
10-30- 4	1.16	0.31			297	163	56
10-30- 5	1.15	0.04			278	163	56
10-30- 6	1.10	0.00			285	163	57
10-30- 7	1.08	0.28	SCHUTZ O'	11-17-87	266	167	
10-30- 8	1.07	0.27	SCHUTZ O'	11-17-87	289	167	
10-30- 9	1.17	0.37			291	163	57
10-30- 10	1.21	0.18			285	163	58
10-30- 11	1.16	0.19			272	163	58

APPENDIX 8.4
SAMPLE SHIPMENT LOG

Table 1

file:list4

Update: 10-Dec-87

Serial No.	Sample I.D.	Previous Sample I.D.	From	To	Quantity	Description	P.O.#	Date Shipped
=====								
000-010	unassigned							
011	UE3-011-RM-A	RM coal	Westmoreland Coal Co.	EPRI	~20 tons	high ash ROM coal for cleaning trials at Hower City	EI-282	10/20/87
012	UE3-012-WRM-A	parent	Westmoreland Coal Co.	EPRI	~20 tons	cleaned coal from Wentz prep plant	EI-282	10/20/87
013	UE3-013-WRM-H	parent	EPRI	Dravo	small samp.	for analytical check		
014	UE3-014-WRM-H	parent	EPRI	EI	small samp.	for analytical check		
=====								
015-088	unassigned							
089	UE2-089-WRM-A	parent	Central Coal Co.	Dravo	11 tons	Off-spec, Lower Cedar Grove, Virginia Energy mine #1065	EI-125	2/19/87
090	LEL-090-WRM-A	parent	MAPCO	Dravo	2 drums	Pond Creek Coal, Pontiki plant		
091	LEL-091-WRM-D	LEL-090-WRM-A	Dravo	E.I.	5 gal	Pond Creek Coal, Pontiki plant, 1/8x0 for washability studies		
092	CB0-092-WRM-A	parent	Westmoreland Coal	Dravo	2 drums	Colorado, Coal Bed D		
093	CB0-093-WRM-D	CB0-092-WRM-A	Dravo	E.I.	5 gal	Colorado, Coal Bed D, 1/8x0 for washability studies		
094	UE2-094-WRM-A	parent	Central Coal Co.	Dravo	11 ton	22 ash, Lower Cedar Grove, Virginia Energy mine #1085		
=====								
095-099	Unassigned							
100	UE3-100-WRM-A	parent	Westmoreland Coal	Dravo	2 drums	Taggart Seam		
101	UE3-101-WRM-D	UE3-100-WRM-A	Dravo	E.I.	5 gal	Taggart Seam, 1/8x0 for washability studies		
102	UE1-102-WRM-A	parent	Old Ben Coal Co.	Dravo	2 drums	Alma Seam		
103	UE1-103-WRM-D	UE1-102-WRM-A	Dravo	E.I.	5 gal	Alma Seam, 1/8x0 for washability studies		
104	UE2-104-WRM-A	parent	Beth Energy Coal Co.	Dravo	2 drums	Lower Cedar Grove		
105	UE2-105-WRM-D	UE2-104-WRM-A	Dravo	E.I.	5 gal	Lower Cedar Grove, 1/8x0 for washability studies		
106	UE3-106-WRM-A	parent	Westmoreland Coal	Dravo	20 ton	3.5% ash coal, Wentz plant, Taggart seam (1st shipment)	EI-148	4/13/87
107	ELC-107-WRM-F	parent				Elk Creek Coal from OICE		
108	ELC-108-CMF-F	ELC-107-WRM-F	OICE	PEIC	350 gal	Std. grind slurry	EI-151	4/16/87
109	UE3-109-WRM-A	parent	Westmoreland Coal	Dravo	23 tons	~3.5% ash, Taggart Seam, Wentz Plant	EI-162	5/1/87
110	UE3-110-WRM-A	parent	Westmoreland Coal	Dravo	26 tons	6% ash, Taggart Seam, Holton Plant	EI-167	5/7/87

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file:list4a

Update: 10-Dec-87

Serial No.	Sample I.D.	Previous Sample I.D.	From	To	Quantity	Description	P.O.#	Date Shipped	Hauler
111	UES-111-WRM-D	UES-110-WRM-D	Dravo	QICE	26 tons	From UES-110-WRM-A	EI-168	5/11/87	
112	UES-112-WRM-A	UES-106-WRM-A	Dravo	Penn Rilliton	2000 lbs	Deep Cleaned UES-106-WRM-A	Dravo	5/6/87	
113	UES-113-PCO-C	UES-112-DCC-D	Penn Rilliton	MICI	2000 lbs	Pulverized UES-112-DCC-D	EI-176	5/8/87	
114	UES-114-MCO-C	UE2-094-WRM-A	PRS	PETC	5 ton	Micronized UE2-094-WRM-A	EI-158	5/4/87	
115	UES-115-DCC-D	UES-106-WRM-A	Dravo	QICE	28 drums/5040 lbs	Filter cake from deep cleaned UES-109-WRM-A	EI-179	5/13/87	
116	UES-116-UCM-F	UES-115-DCC-D	QICE	EER,MICI,tec	6 drums	Ultrafine slurry from filter cake UES-115-DCC-D	EI-175	6/22/87	
117	UES-117-CWF-F	UES-111-WRM-D	QICE	PETC	2000 gal	Std grind slurry from UES-111-WRM-D	EI-171	5/27/87	
118	UES-118-WRM-A	parent	Westmoreland Coal	Dravo	23 tons	*3.5% ash, Taggart Seam, Wentz Plant	EI-182	5/22/87	
119	UES-119-DCC-D	UES-109-WRM-A	Dravo	QICE	56 drums/10865 lbs	From UES-109-WRM-A, 1.3-1.5% ash	EI-190	5/28/87	
120	UES-120-CWF-F	UES-119-DCC-D	QICE	MICI/PETC	600 gal/110 gal	Std. grind slurry, 1.2% ash, from UES-119-DCC-D	EI-191	7/27/87	
121	UES-121-UCM-F	UES-119-DCC-D	QICE	MICI	600 gal/11 drums	Ultrafine slurry, 1.2% ash, from UES-119-DCC-D	EI-192	6/23/87	
122	UES-122-DCC-D	UES-118-WRM-A	Dravo	PRS	15 drums	Cleaned to 1.75 to 2.25% ash, from UES-118-WRM-A	EI-202	6/11/87	
123	UES-123-MCO-C	UES-122-DCC-D	PRS	MICI	24 drs/5412 lbs	From UES-122-DCC-D	EI-231	7/22/87	Preston
124	UE2-124-WRM-D	UE2-089-WRM-A	Dravo	PRS	70 drums	From UE2-089-WRM-A	EI-194	6/1/87	
125	UE2-125-MCO-C	UE2-124-WRM-D	PRS	PETC	5 tons	From UE2-124-WRM-D	EI-211	6/24/87	Carlucci
126	UE2-126-MCO-C	UE2-094-WRM-A	PRS	PETC	39 drums/9615 lbs	From UE2-094-WRM-A	EI-205	6/11/87	Carlucci
127	UES-127-WRM-A	parent	Westmoreland Coal	Dravo	25 tons	Stoker Coal, Taggart seam, 3.5% ash, Wentz plant	EI-195	6/3/87	Five Star
128	UE2-128-MCO-C	UE2-089-WRM-D	PRS	EER	55 gal drum	Air freighted (from UE2-089-WRM-D) same as UE2-126-MCO-C	Dravo	6/8/87	
129	UES-129-DCC-D	UES-118 & 127	Dravo	PRS	13 drums	Blend of deep cleaned UES-118 & UES-127	EI-211	6/22/87	Carlucci
130	UES-130-DCC-D	UES-129-DCC-D	Dravo	QICE	47 drums/8640 lbs	1.3-1.5% ash - same as UES-129	EI-226	7/10/87	Preston
131	UES-131-WRM-A	parent	Westmoreland Coal	QICE	44 tons	Taggart Seam, Wentz plant	EI-212	6/26/87	Five Star
132	UES-132-WRM-A	parent	Westmoreland Coal	Dravo	22 tons	Taggart Seam, Wentz plant	EI-212	6/25/87	Five Star
133	UES-133-MCO-C	UES-127-DCC-D	PRS	EER	55 gal drum	Micronized from UES-122	Dravo	6/24/87	Amer Air
134	UES-134-DCC-D	UES-127/132	Dravo	Penn Rilliton	20 drums	Deep cleaned coal	EI-229	7/15/87	Carlucci

Table 1 (Cont.)

file: list4b

Update: 10-Dec-87

Serial No.	Sample I.D.	Previous Sample I.D.	From	To	Quantity	Description	P.O.#	Date Shipped	Hauler
135	UE3-135-PCD-C	UE3-134-DCC-D	Penn Rilton	MICI	20 drums/2 tons	Pulverized coal	EI-232	7/16/87	Preston
136	UE3-136-WRN-A	parent	Westmoreland Coal Co.	Dravo	23 tons	Stoker Coal (*3.5Z ash), Taggart Seam, Wentz Plant	EI-233	7/20/87	Five Star
137	UE3-137-CMF-F	UE3-130-DCC-D	OICE	PETC	1870 gal	same spec as UE3-120-CMF-F	EI-240	8/19/87	Leanan
138	UE3-138-CMF-F	UE3-131-WRN-A	OICE	C-E	1200 gal		EI-238	8/28/87	
139	UE3-139-MCW-F	UE3-131-WRN-A	OICE	C-E	7500 gal		EI-241	9/9/87	
140	LEL-140-MCO-E	LEL-091-WRN-A	EI	United Tech	one pound	Micronized *as received* Lower Elkhorn	--	8/3/87	US Mail
141	LEL-141-MCO-E	LEL-140-MCO-E	EI	United Tech	one pound	Deep Cleaned LEL-140-MCO-E (froth flotation)	--	8/3/87	US Mail
142	UE3-142-DCC-D	UE3-132-WRN-A	Dravo	Schutz/DNeil	46 drums/4.6 tons	Deep cleaned	EI-246	7/31/87	Saith
143(1)	UE3-143-MCO-C	UE3-142/145	Schutz/O'Neil	PETC	88 drums		EI-265	9/1/87	Loway
143(2)	UE3-143-MCO-C	UE3-142/145	Schutz/O'Neil	PETC/EER	44 drums/1 drum		EI-268	9/9/87	Saith
144	UE3-144-DCC-D	UE3-132-WRN-A	Dravo	OICE	21 drums		EI-248	8/5/87	Saith
145	UE3-145-DCC-D	UE3-132/136	Dravo	Schutz/DNeil	70 drums/7 tons	Deep cleaned dried filter cake	EI-251	8/24/87	Preston
146	B2P-146-WRN-N	parent	UNDERC	EI	10 gal	Western lignite coal	UNDERC	8/6/87	RPS
147	B2P-147-PCD-N	B2P-146-WRN-N	UNDERC	SAIC/EI	1 ton/5 gal	Pulverized Buelah Zap lignite coal	UNDERC	8/3/87	RPS
148	UE3-148-DCC-D	UE3-149-WRN-A	Dravo	Schutz/DNeil	75 drums/7.5 tons	for 25 ton shipment of micronized coal for PETC	EI-267	9/8/87	Saith
149	UE3-149-WRN-A	parent	Westmoreland Coal Co.	Dravo	23 tons	Taggart Seam, Wentz plant stoker coal	EI-261	8/24/87	Five Star
150	B2P-150-RDM-N	parent	UNDERC	EI	10 gallons	Buelah-Zap lignite coal			
151	B2P-151-MCO-N	B2P-150-RDM-N	UNDERC	Avco/EI	1000 lbs/5 gal	Micronized lignite coal			
152	UE3-152-MCO-C	UE3-148-DCC-D	Schutz/O'Neil	PETC	10,096 lbs				
153	UE3-153-DCC-D	UE3-149/156	Dravo		*95 drums	Light industrial grade held in storage			
154	UE3-154-MCO-S	UE3-153-DCC-D	Schutz/O'Neil	Tecogen	1 drum		Dravo	9/23/87	Yellow
155	UE3-155-MCO-S	UE3-153-DCC-D	Schutz/O'Neil	EER	3 drums		Dravo	9/23/87	Yellow
156	UE3-156-WRN-A	parent	Westmoreland Coal Co.	Dravo	23 tons	Stoker coal, Taggart seam, *3.5Z ash, Wentz Plant	EI-272	9/25/87	Five Star
157	B2P-157-CMF-M	B2P-150-RDM-N	UNDERC	Avco/EI	1000 lbs/5 gal	Coal-methanol-water slurry prepared from lignite coal	EI-278	12/15/87 est.	

Table 1 (Cont.)

Update: 10-Dec-87

Sample I.D.	Previous Sample I.D.	From	To	Quantity	Description	P.O.#	Date Shipped	Hauler
158 UES-158-MCO-S	UES-148-DCC-D	Schutz/D'Neill	UTSI	2 tons	85% minus 22 microns	EI-279	10/5/87	Yellow
159 KMR-159-RON-N	parent	UNDERC	EI	10 gallons	western subbituminous coal	EI-262	11/16/87	
160 KMR-160-PCO-M	KMR-159-RON-N	UNDERC	SATC/EI	1 ton/5 gal	pulverized to 80% minus 200 mesh	EI-262	11/16/87	
161 UES-161-WRN-A	parent	Westmoreland Coal Co.	Dravo	24 ton	Wentz plant stoker coal ~3.5% ash	EI-281	10/20/87	Five Star
162 UES-162-DCC-D	UES-161/164-WRN	Dravo			Residential grade coal held in storage for future use			
163 UES-163-DCC-D	UES-161/164-WRN	Dravo			Commercial grade coal held in storage for future use			
164 UES-164-WRN-A	parent	Westmoreland Coal Co.	Dravo	25 ton	Wentz plant stoker coal ~3.5% ash	EI-285	10/27/87	Five Star
165 UES-165-WRN-A	parent	Westmoreland Coal Co.	Dravo	25 ton	Wentz plant stoker coal ~3.5% ash	EI-297	11/3/87	Five Star
166 UES-166-WRN-D	UES-165-WRN-A	Dravo	ANAX	2 drums	for cleaning trials	EI-303	11/6/87	Smith
167 UES-167-DCC-D	UES-161/164-WRN	Dravo	Schutz/D	2 drums	for particle size reduction	EI-303	11/17/87	Smith
168 UES-168-DCC-D	UES-161/164-WRN	Dravo	Schutz/D	2 drums	for particle size reduction	EI-303	11/18/87	Smith
169 UES-169-MCO-S	UES-167-DCC-D	Schutz/D'Neil	Avco	2 drums	residential grade micronized coal	Dravo		
170 UES-170-MCO-S	UES-168-DCC-D	Schutz/D'Neil	Tecogen	2 drums	residential grade micronized coal	Dravo		
171 B7P-171-MCO-N		UNDERC	AVCO			EI-278		
172								
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APPENDIX 8.5
FUEL DELIVERY SCHEDULE

SCHEDULE OF DELIVERIES OF COAL WATER SUPPLIES
including quantity and properties as of 10-29-87

PM 10-30-87
filling 1050

CONTRACTOR (Application)	COAL WATER SUPPLY PROPERTIES	Notes	FY 88				FY 89			
			November	December	Second Quarter	Third Quarter	Fourth Quarter	12 months		
MCO Research Lab (residential) (pulse combustor)	lignite, W55%, 30000 <1% ash, 0.3% S, 1% H ₂ O 10000 Btu, F45%, 70% solids, low vis, top 100 revised Jun 23	specs & schedule per letter Feb 9								
	3 to 6% ash, 1500 2600 Btu, 1% S, 5% FC 13500 Btu, 64% solids 30000, 2.2% R	revised schedule & spec June 22	UE3-139-MCU-F Sept 11, 7500 gallons to be used at MIT 00% -50 topsize	UE3-135-CUF-F 1,700 gal 1200 gal to be used at MIT std g and CUF 140 u topsize	1000 lbs lignite March 1	1000 lbs. subbituminous CUF April 1				
ORUSTION ENGINEERING (Industrial retro)	70% solids, 50 WFO 40u top, vis 1000cp 1% ash, 0.5 S, 45% VM	per 1st Apr 3	UE3-116-UCU-F, Jun 18, 55 gal		100g MCM fuel	7500g 3-6%SH <45u	3 to 6% ash 15,000gal <140u topsize	20,000gal		
REDY & ENVIRONMENTAL RESEARCH, Inc. (residential)										
ATCI (residential)	<1% ash micronized 10u meanst, 30u topsz	05-70% solids	UE3-116-UCU-F, Jun 18, 2.0 gal						2000 lb 30u top 10u meanst -Nov	
(Industrial)	<1% ash, micronized 10u meanst, 30u topsz	-	UE3-121-UCU-F, Jun 29, 600 gal							
(residential)	<1% ash, pulverized 30u meanst, 140u topsz	-	UE3-120-CUF-F, July 27, 600 gal							
(Industrial)	1% ash, pulverized 30u meanst, 140u topsz	-								
WFO Catholic Univ. (Commercial) (combustor develop.)	70% solids, 2000cps 0-50 recip sec ultrafine coal	awaiting written specs & schedule MFEL in CA								
Long-CATHOLIC UNIVERSITY (Commercial) (welding)	low ash low sulfur	Hash.D.C awaiting specs & schedule draw quantities								
ETC IN-HOUSE GILBERT COMMERCIAL INC. (Industrial & commercial boilers)	eastern bituminous 0.6% S, 50% solids 500-700cp 1000-1100 mesh		FLC-108-CUF-F, April 10, 350 gal UE3-117-CUF-F, May 27, 2000 gal UE3-120-CUF-F, July 27, 110 gal UE3-137-CUF-F, Aug 10, 2000 gal	20%g -1.5% ash		2000g 5-10%ash 2000g <1% ash	2000g 5-10%ash 2000g <1% ash	15 tons MCF -Oct 1, -40u topsz, 100% -400 mesh (38u) 718 ash & <0.58 S/Mtbtu		
REDYEN (residential)	55% solids, 1% ash 1.5, 5u meanst, 20u topsz 2350 Btu	letter 4-22-87	UE3-116-UCU-F, Jun 18, 55gal used at 1 gal hr	1500 gal	1500 gal	1000 gal	1000 gal			
ENR (Industrial)		awaiting written specs & schedule								
Porter (sub BCLR) (Industrial)	1 to 8% ash iron is concern	slurry next year needs coal specs now					20 to 25 tons (6000 gal.) mid-June	1000 gallons		

REUSE SMC recovery to deep clean coal.
In FY 88-89 this totals 371,200 lbs coal made into CUF.
This includes 140,700 lbs DCC and 230,500 lbs other coals not deep cleaned.

SCHEDULE OF DELIVERIES OF COAL
(Including quantity and properties as of Oct 29)

PAC/10-30-87
File:coal1029

FY 88
FY 87 & 88
FY 89

12 months

APPLICATION (CONTRACTOR)	COAL PROPERTIES	Notes	Actual deliveries	NOVEMBER	DECEMBER	SECOND QTR	THIRD QTR	FOURTH QTR
20 Research Lab (Residential)	lignite < 0.5% ash 0.3-5 10,000 Btu/lb 35 micron topsize 12u searize	letter Feb 9 specs; schedule revised June 25 & August 6			1000 lbs.			
	subbituminous MCO same specs				1000 lbs.			
EXHAUSTION ENGINEERING (Industrial) (Sorbent add'n 1.8L/hr during injection).	dry micronized <6% ash (UE3 Coal)	same coal as for slurry; CE to grind it at their expense to 18u MTD				70 tons UE3, same coal as QCF about March 1		
EDDY & ENVIRONMENTAL RESEARCH, Inc. (Residential)	high volatile A bituminous 40u topsize 10u searize >2700 ash fus. temp. 5 <0.5% <2% ash	UE3 & UE2 are acceptable	UE2-128-MCO-C June 8, 220 lbs. UE3-133-MCO-C June 24, 220 lbs. UE3-143-MCO-S Sept 9, 220 lbs. UE3-155-MCO-S Sept 23, 650 lbs. 90% -20u					
EI (Residential) & Industrial)	< 1% ash dry micronized 30u topsz, 10u seariz		UE3-123-MCO-C July 22, 5412 lbs.				2000 lb <30u tpszz, 10u seariz (indus. in NJ)	2000 lb 30u tpszz, 10u seariz (resid)
(Residential & Industrial)	<1% ash dry pulverized 149 topsz, 30u seariz		UE3-113-PCO-C May 12, 2000 lbs. UE3-135-PCO-C July 16, 6000 lbs.				2000 lb <149u tpszz, 30u seariz (indus. in NJ)	2000 lb 149u tpszz, 30u seariz (resid)
NY-C.U. at NUEL in OR (Commercial) (combustor development)	bituminous 18 ash 111 Btu <0.58 S.M.Btu, >2600° FBT 40u topsize; 100% -400 mesh 1400 Btu/lb	2 to 4 M Btu/hr		2 drums 5.5% ash PC Nov 5		1 ton DCC Mar 1		15 ton DCC Oct 1
NY-CATHOLIC UNIV. at Wash. (Commercial) (modeling)		awaiting specs & schedule						
ETC IN-HOUSE GILBERT-CORNWELL (Industrial boiler)	low % ash micronized bituminous	UE2 acceptable. Now want same coal used by UE3-143-MCO-C Sept 2, 8.8 tons UE3-143-MCO-C Sept 9, 4.4 tons	UE2-114-MCO-C May 4, 5 tons UE2-126-MCO-C June 11, 5 tons UE2-125-MCO-C June 24, 5 tons UE3-143-MCO-C Sept 2, 8.8 tons UE3-143-MCO-C Sept 9, 4.4 tons	UE3-152-MCO-C 12 tons <1.5% ash	10 tons <1.5% ash	10 tons <1.5% ash	10 tons <1.5% ash	10 tons <1.5% ash
Science Applications IC (wet oxidation)	lignite+subbituminous PC (R02: <200 mesh) N2 inerted in drums	2 coals	B3P-147-PCO-M Aug 19, 1 ton N7B-160-PCO-M Oct 20, 1 ton					
Ecogen (Residential)	bitum.'s <1.5% ash 40 u topsize, 20u searize		UE3-154-MCO-S Sept 23, 240 lbs.					
IN (Industrial) (sorbent injection)	eastern bituminous, 2-5 to 3% S, 1250 B2700 to 2800 degrees, low to high slaggers two coals	awaiting written specs & schedule						
Inv.Tem.SpaceIntitude (Commercial) (fire-tube boiler)	subbitum.'s low ash 74u tpszz 8 bituminous <1% ash AFT >2600		UE3-158-MCO-S Oct 5, 2 tons for shutdown run 85% -22u					
Vortec (sub BCL) (Industrial) (glass melting)	1 to 8% ash, pulverized 1 bitum. coals, 5-10% iron 70% -200mesh					10 tons	10 tons	1 ton

During FY88-89 this totals 552,000 lbs PC of which 250,000 lbs is DCC, 302,000 lbs is ROM. Of the DCC UNDERPC will prepare 2000 lbs.

**DATE
FILMED**

8 / 5 / 93

END