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QUARTERLY TECHNICAL PROGRESS REPORT NO. 24

FOR PERIOD

JULY 1, 1994 THROUGH SEPTEMBER 30, 1994

DOE CONTRACT #DE-AC22-88PC88881

ICF KAISER ENGINEERS JOB NO. 88107

We have no objection from a patent standpoint to the publication or dissemination of this material.

Mark P Dvorscak Feb 21, 1995

Office of Intellectual Property Counsel
DOE Field Office, Chicago

Date

MASTER

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1.0 INTRODUCTION

A study conducted by Pittsburgh Energy Technology Center of sulfur emissions from about 1,300 United States coal-fired utility boilers indicated that half of the emissions were the result of burning coals having greater than 1.2 pounds of SO_2 per million BTU. This was mainly attributed to the high pyritic sulfur content of the boiler fuel. A significant reduction in SO_2 emissions could be accomplished by removing the pyrite from the coals by advanced physical fine coal cleaning.

An engineering development project was prepared to build upon the basic research effort conducted under a solicitation for research into Fine Coal Surface Control. The engineering development project is intended to use general plant design knowledge and conceptualize a plant to utilize advanced froth flotation technology to process coal and produce a product having maximum practical pyritic sulfur reduction consistent with maximum practical BTU recovery.

1.1 Scope of this Document

The Department of Energy (DOE) awarded a contract entitled "Engineering Development of Advanced Physical Fine Coal Cleaning Technology - Froth Flotation", to ICF Kaiser Engineers with the following team members, Ohio Coal Development Office, Babcock and Wilcox, Consolidation Coal Company, Eimco Process Equipment Company, Illinois State Geological Survey, Virginia Polytechnic Institute and State University, Process Technology, Inc. The organizational chart for this project is presented in Figure 1.1.

This document a quarterly report prepared in accordance with the project reporting requirements covering the period from October 1, 1993 to December 31, 1993. This report provides a summary of the technical work undertaken during this period, highlighting the major results. A brief description of the work done prior to this quarter is provided in this report under the task headings.

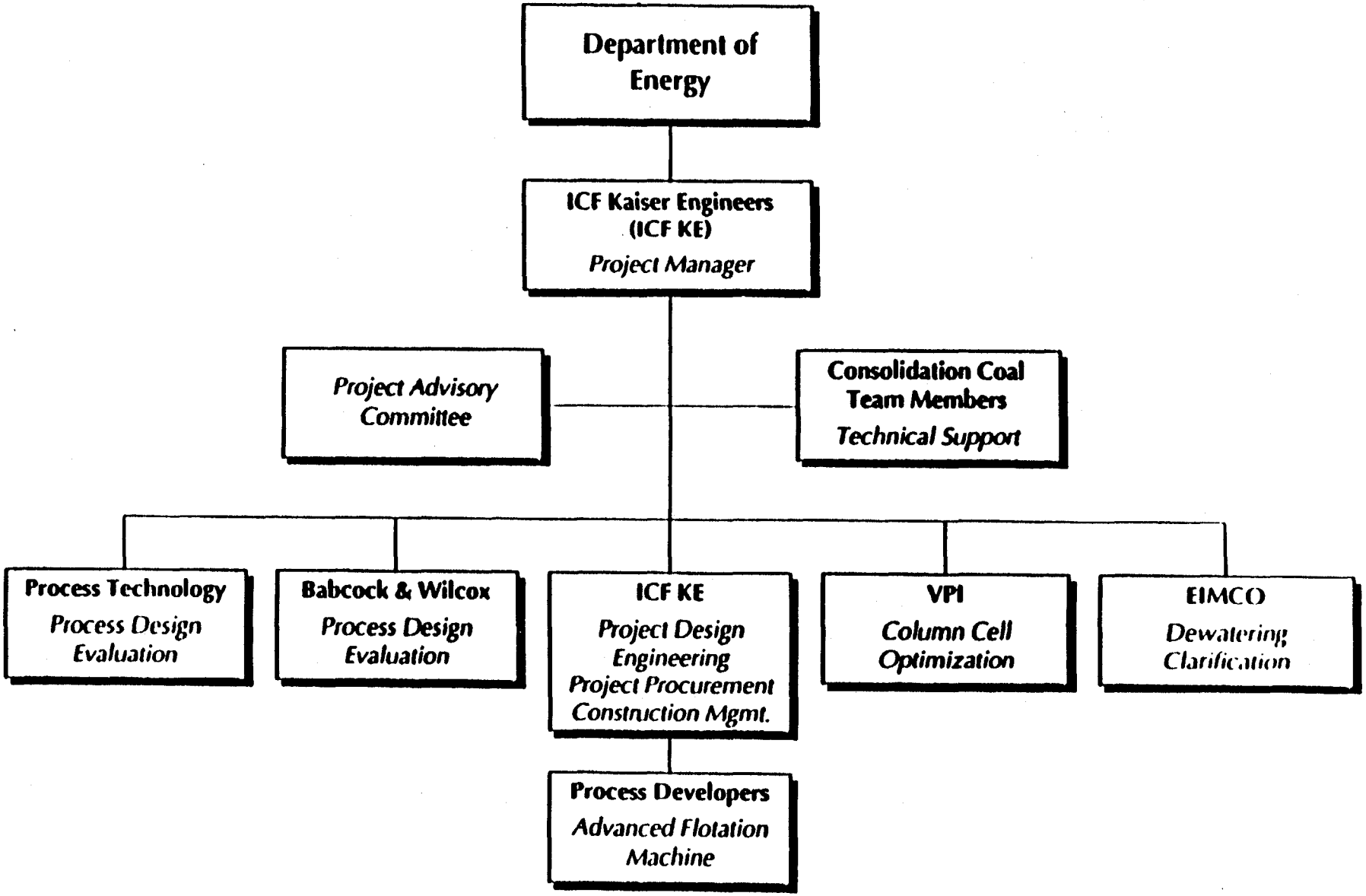
1.2 Overall Project Scope

The overall project scope of the engineering development project is to conceptually develop a commercial flowsheet to maximize pyritic sulfur reduction at practical energy recovery values. This is being accomplished by utilizing the basic research data on the surface properties of coal, mineral matter and pyrite obtained from the Coal Surface Control for Advanced Fine Coal Flotation Project, to develop this conceptual flowsheet. The conceptual flowsheet must be examined to identify critical areas that need additional design data. This data will then be developed using batch and semi-continuous bench scale testing. In addition to actual bench scale testing, other unit operations from other industries processing fine material will be reviewed for potential application and incorporated into the design if appropriate.

The conceptual flowsheet will be revised based on the results of the bench scale testing and areas will be identified that need further larger scale design data verification, to prove out the design. The

Figure 1-1

Project Organization Chart



proof-of-concept will be accomplished by designing, constructing, operating and testing a 2-3 ton per hour proof-of-concept plant. This plant will be designed for continuous operation and will include two consecutive 5 days, 24 hour per day runs on each of the three test coals to demonstrate process performance on a commercial basis.

The data from the basic research on coal surfaces, bench scale testing and proof-of-concept scale testing will be utilized to design a final conceptual flowsheet.

The economics of the flowsheet will be determined to enable industry to assess the feasibility of incorporating the advanced fine coal cleaning technology into the production of clean coal for generating electricity. This concept should provide an ability to reduce sulfur oxide emissions more economically than FGD systems when compared on a dollar per ton of sulfur removed basis.

1.3 Work Executed at Different Locations

The project team consists of research and engineering groups at ICF Kaiser Engineers, Babcock and Wilcox, Consolidation Coal Company, Eimco Process Equipment Company, Illinois State Geological Survey, Virginia Polytechnic Institute and State University, Process Technology, Inc. and Michigan Technological University Institute of Materials Processing with ICF Kaiser Engineers as the prime contractor with DOE. The work being conducted by different organizations is based upon their area of expertise and this has been incorporated into the project Work Plan. The work undertaken by the different organizations is identified in Table 1.1. This report is prepared in an integrated manner combining work done by each organization by task. This is considered to be a more effective way of presenting the technical data developed by each organization.

Table 1.1
Task and the Responsible Team Member

Task 1	Project Planning	ICF KE
Task 2	Preliminary Conceptual Design	ICF KE, B&W, EIMCO, TSG, TAC
Task 3	Determination of Critical Areas	ICF KE, B&W, EIMCO, TSG, TAC
Task 4	Test Plan Formulation	ICF KE, B&W, EIMCO, TSG
Task 5	Bench Scale Testing	ICF KE, B&W, EIMCO, PTI, TSG, TAC
Task 6	Component Development	VPI, TSG
Task 7	Analysis of Test Results	ICF KE, B&W, EIMCO, VPI, TSG
Task 8	Revised Conceptual Design	ICF KE
Task 9	POC Module Design	ICF KE, B&W, EIMCO, TSG, TAC
Task 10	POC Procurement and Fabrication	ICF KE
Task 11	POC Installation and Startup	ICF KE, B&W, EIMCO, TSG
Task 12	POC Test Plan Formulation	ICF KE, B&W, EIMCO, TSG, TAC
Task 13	POC Testing and Operation	ICF KE, B&W, EIMCO, TSG
Task 14	Analysis of POC Test Results	ICF KE, B&W, EIMCO, TSG
Task 15	Final Conceptual Design	ICF KE, B&W, EIMCO, TSG
Task 16	POC Module Removal	ICF KE

2.0 TASK 2 PRELIMINARY CONCEPTUAL DESIGN

2.1 Overview and Scope

The previous completion of this task resulted in the preliminary conceptual design of a 20TPH semi-works advanced froth flotation facility. The non-site-specific plant was designed using the best available information and technology to achieve continuous, steady-state process operation with 90% availability. The process plant is a fully instrumented, integrated, stand-alone facility. A greenfield site was assumed for the plant.

Throughout the project, the work was organized along a task/sub-task basis with each sub-task logically assigned to provide necessary information for the next sub-task, ultimately resulting in completion of the conceptual design. For Task 2, the first sub-task determined the design criteria needed to meet or exceed the advanced froth flotation process specifications. At completion, work under this sub-task provided information to design the flowsheet of the process, and provided an energy and material balance of all process streams. A list of all major process equipment was prepared and used as a basis for a factored estimate for the capital, operating and maintenance costs of the semi-works process and plant.

ICF Kaiser Engineers, assisted by the project sub-contractors and Technical Support Group, was responsible for the performance and completion of this task. This conceptual design is the basis for Tasks 3, 4, 5, and 6 and will be revised in Task 8 for use as a basis for the 2-3TPH POC module design in Task 9.

2.2 Review of Work Completed This Quarter

On August 15, 1989, DOE approved Task 1.2 as submitted. With this as a basis, ICF KE and the team members proceeded with the remainder of the project. No additional work was planned nor completed during this quarter.

3.0 TASK 3 CRITICAL AREA DETERMINATION

3.1 Overview and Scope

Work performed during the conceptual design of Task 2 identified areas where uncertainties exist in the design of the unit operations for the advanced froth flotation process. Some of these problem areas could not be solved based on currently available information or technology. The objective of this task was to determine those critical areas where more information would be necessary and outline the work needed to obtain the design information.

A design deficiency list was generated, and the project team determined the parameters needed for final design of the unit operation - either by further engineering analysis or by experimental data obtained from bench-scale tests. Other solids processing industries, such as phosphate and clay beneficiation, were examined to assess the means by which they effectively process ultra fine particles.

Each identified design deficiency was then ranked according to its relative importance to the successful continuous operation of the advanced froth flotation process. Both a technical and economic analyses of the consequences of not being able to gather the required design information for each deficiency was evaluated.

ICF Kaiser Engineers, Consolidation Coal and the other members of the Technical Support Team (B&W, VPI and EIMCO) have contributed to this task. The process deficiencies identified in this task will be addressed in Tasks 4, 5, and 6 through additional engineering computation and analysis and experimental techniques.

3.2 Review of Work Completed This Quarter

The final report of this task has been submitted to DOE. No additional work was planned nor completed during this quarter.

4.0 TASK 4 TEST PLAN FORMULATION

4.1 Overview and Scope

Work completed in this task produced the criteria for additional engineering analysis, computation and detailed experimental bench-scale testing for areas of uncertainty identified in Task 3. The engineering analysis, computation, bench-scale testing and component development was formulated to produce necessary design information to define a commercially operating system.

In order to produce the required information by means of bench-scale testing and component development, a uniform coal sample was procured. After agreement with DOE, a selected sample of coal from those previously listed was secured.

The test plan was developed in two parts. The first part listed procedures for engineering and computational analyses of those deficiencies previously identified that could be solved without bench scale testing. Likewise, the second part prepared procedures for bench-scale testing and component development for those deficiencies previously identified in Task 3.

The first part, engineering analysis and computation, provided for means of employing presently know theory from other industries to address deficiencies. This included examinations of literature and contacting proven experts and operating personnel in fields related to this deficiency. From the information gathered, engineering calculations will be utilized to resolve this type of deficiency.

The second part, bench-scale testing and component development, became necessary when the part one information was unavailable or when the theory had never been commercially applied. Justification for the test work was provided to show that technical data and process needs could only be obtained by test work and that the test work results would produce necessary information to define a commercially operating system.

The test work planned was based upon non-continuous and/or semi-continuous bench-scale units of general laboratory design and would include only those unit operations identified as deficiencies in Task 3.

The detailed, quantified tests addressed obtaining data necessary for solving problems uncovered in the deficiency review. Each identified deficiency had a plan developed to address the reason for the testing, the means for the test matrix to obtain results and the expected results. Each test plan established procedures, adhering as much as possible, to known and industry-acceptable procedures for sampling and data collection. Raw data collection would be reduced to minimize expenses and to better be able to compare results and obtain meaningful information, especially scale-up factors.

The Development Test Plan for both parts one and two contained schedules, manpower requirements, and resources necessary to obtain information to define a commercially available system.

The plan for use of the team members was developed to comply with the results of the DOE uniform coal sample procurement and storage procedures. The quantity of coal necessary for each testing program was calculated. A sample of all three of the referenced coals was to be obtained, preferably from the same source as the Surface Control contractor. This coal would be stored and handled as outlined in the coal procurement and storage plan. These procedures, when properly followed, should minimize physical and chemical changes to the raw coal.

4.2 Review of Work Completed This Quarter

The Task 4 Report was submitted to DOE as a final report. No additional work was planned nor completed during this quarter.

5.0 TASK 5 BENCH-SCALE PROCESS TESTING

5.1 Overview and Scope

The overall goal of Task 5, "Bench-Scale Process Testing" is to develop the necessary unit operation design and process performance data required to 1) reduce or eliminate the technical and engineering uncertainties of the preliminary 20TPH advanced location semi-works plant and 2) design, build and operate a 2-3 TPH advanced flotation POC module.

The unit operation performance and process design information required to support development of the advanced flotation process is being examined in a multi-tier program at B&W and Process Technology, Inc. Laboratory scale studies are being conducted in several key process areas - conventional precleaning of the raw coal, microgrinding of the pre-cleaned coal, advanced froth flotation of the fine coal and dewatering of the product streams. The results of these studies are then being used to guide small, semi-continuous and continuous testing of the key unit operations at approximately 100 lb/hr.

The bench-scale and semi-continuous process design evaluation test programs will provide detailed information for developing process material and energy balances. The material balance data will be used to correctly design and size the equipment for the POC module. The energy balance information will allow for estimation the cost effectiveness of the design.

The bench-scale test programs will also identify the optimum conditions for microgrinding the coal for maximum pyritic sulfur rejection in advanced flotation and the most promising advanced flotation technique which will then be integrated into the overall processing scheme. The 100 lb/hr test program will provide verification of the laboratory tests results and demonstration that these results can be scaled-up for application in the 20TPH semi-works plant design.

Both the bench-scale, semi-continuous and continuous process design evaluation tests will serve as critical reviews of the preliminary process flowsheet. Process deficiencies and limitations discovered in these programs will require modification of the original conceptual flowsheet. This information will aid in identifying solutions to the successful implementation of advanced flotation technology.

The bench-scale and process testing consists of eleven major subtasks performed over a period of 12 months.

5.2 Review of Work Completed This Quarter

This task has been completed and the results of this task are reported in the Task 7 report. No additional work was planned nor completed during this quarter.

6.0 COMPONENT AND UNIT OPERATIONS DEVELOPMENT

6.1 Overview and Scope

The Task 6 effort involves three main elements including column cell development, flotation circuit testing and flotation cell modeling. The work outlined is to research column designs and operation parameters in developing an optimized column flotation cell (OCFC) to meet the overall program objectives. The test results obtained through this effort will be evaluated against the results obtained from the round-robin test program in Task 5. Any design parameters or operating conditions that are unique with the round-robin test winner that were not evaluated as part of the optimized column development work will be reviewed and tested so as to incorporate all possible scenarios in presenting DOE with the best available flotation process for use in the 2 to 3 ton per hour POC.

Following development of the OCFC, various flotation circuit configurations will be evaluated determine the "best" circuit design for the 2 to 3 ton per hour POC. Single and multiple stage flotation, grab and run, rougher/scavenger/cleaner, etc., test circuits will be tested as part of this effort. Upon completion of this test work, the "best" possible flotation cell will have been tested in a number of possible flotation circuit designs to possibly provide the "best" flotation approach in meeting the design criteria.

In conjunction with the flotation test effort, model development work will be conducted to provide a tool in evaluating the various flotation circuit configurations and in predicting flotation performance. The model will be useful in selecting operating conditions in the POC and in evaluating the performance of the POC.

6.2 Review of Work Completed this Quarter

This task has been completed and the results of this task are reported in the Task 7 Report. No additional work was planned or completed during this quarter.

7.0 EVALUATION OF BENCH-SCALE AND COMPONENT TEST RESULTS

7.1 Overview and Scope

A bench-scale and component testing report was prepared and submitted to DOE after completing Task 5 and Task 6.

The report included the preparation, presentation and analysis of all the experimental data obtained in the bench-scale and component unit operations, development and testing. A comparison of the results obtained with the expected limitations and deficiencies that occurred from bench-scale testing was compiled.

Following the evaluation of the bench-scale and component testing results, a residual needs analysis was prepared. This was prepared after comparing results learned in Tasks 5 and 6 with the original residual needs analysis.

Finally, a bench-scale testing summary was prepared. It specifically addressed the results of the bench-scale component testing in respect to the information necessary to define a commercially operating system. This included equipment selection, sizing, evaluation and operation to achieve both coal cleaning as well as the cost of system operation.

7.2 Review of Work Completed this Quarter

This task has been completed and the Task 7 Report submitted to DOE in its final version. No additional work was planned or completed during this quarter.

8.0 REVISED CONCEPTUAL DESIGN OF SEMI-WORKS PLANT

8.1 Overview and Scope

Following DOE authorization to proceed with this task, the preliminary conceptual design of a 20TPH semi-works plant (Task 2) was redesigned from all information available at this point in the project. This update of the conceptual design incorporated information derived about fine grinding, advanced froth flotation, and dewatering in Tasks 5 and 6. The summary report produced in Task 7 describing bench-scale test results and component development was used as a basis.

This task complied with all of the design requirements discussed in Task 2. The process flowsheet was updated with complete energy and material balances for all process flowstreams. The equipment list was updated and supplied the base for a recalculation of the factored estimate of the capital, operating and maintenance costs. In addition, differences between the designs in Task 8 and Task 2 was highlighted and their effects on process and plant design credibility, efficiency, maintenance, operation, complexity, control, performance, and economics were discussed.

ICF Kaiser Engineers, with assistance from its sub-contractors and the Technical Support Group, were responsible for the completion of this task. This design will serve as a basis for the POC design in Task 9 and the final semi-works design in Task 15.

8.2 Review of Work Completed this Quarter

This task has been completed and a final report submitted to DOE. No additional work was planned or completed during this quarter.

9.0 POC MODULE DESIGN

9.1 Overview and Scope

In order to develop additional confidence in the conceptual design of the advanced froth flotation circuit, a 2-3 TPH Proof-of-Concept (POC) facility was necessary. During operation of this facility, the ICF KE team will demonstrate the ability of the conceptual flowsheets to meet the program goals of maximum pyritic sulfur reduction coupled with maximum energy recovery on three DOE specified coals. The POC circuit was designed to be integrated into the Ohio Coal Development's facility near Beverly, Ohio.

OCDO's facility will provide the precleaning unit operations and ICF KE will add the advanced froth flotation circuitry. The work in this task will include the POC conceptual design, flowsheet development, equipment list, fabrication and construction drawings, procurement specifications and bid packages and a facilities estimate at the completion of design. After DOE approval, the design was finalized for the next task.

9.2 Review of Work Completed this Quarter

This task has been completed and the Task 9 report submitted to DOE. No additional work was planned or completed during this quarter.

10.0 POC MODULE FABRICATION

10.1 Overview and Scope

The overall objective of this task is to obtain the equipment, materials and shop labor to fabricate and assemble each of the individual modules which constitute the POC Module. The ICF KE procurement team will solicit bids, place orders, and expedite all vendors, materialmen and fabricators. Procurement will utilize the drawings and specifications produced in Task 1.9 as the basis for these activities. At the completion of the assembly procedure, a ICF KE representative will inspect and perform a functional check of each module before it leaves the shop.

Several sub-tasks have been identified for their importance in the successful completion of this task. Work will include placing purchase orders, procurement of the equipment and materials, fabrication of the modules, functionally checking the modules, shipping the modules to the jobsite and preparing the installation and maintenance manuals.

10.2 Review of Work Completed this Quarter

This task has been completed. No additional work was planned or completed during this quarter.

11.0 POC INSTALLATION AND START-UP

11.1 Overview and Scope

This task covers the functions necessary to install and successfully start-up the POC module at the jobsite. The installation was carried out by an installation subcontractor with construction management provided by ICF KE. The start-up was supervised by ICF KE and conducted using process engineers from the entire team and craft labor supplied by the installation subcontractor.

This task includes several major subtasks which was carried out to assure a successful, on-schedule installation and start-up. ICF KE will conduct work on installation and interconnection of the modules, preparation of start-up plans and procedures, the start-up functions and the finalization of the operations manual.

DOE's TPO was kept informed of construction progress and has access to the site for inspection of the work. ICF KE's construction manager was assigned prior to the start of construction activities and maintained the job progress through on-site assessment of the work and was using the construction schedule produced in Task 9 for control.

11.2 Review of Work Completed this Quarter

All construction has been completed. No additional work was planned or completed during this quarter.

12.0 POC TEST PLAN FORMULATION

12.1 Overview and Scope

The project team will coordinate its expertise and develop a testing plan that will provide performance data, quality data, scale-up data and operating data. The plan was submitted to DOE for approval after completion of Tasks 9 and 10.

This plan, after approval/revisions, will become the final test plan. The test plan will include long term testing, steady-state operation and effects of recycle operation. The testing program will demonstrate 90% onstream capability, evaluate process control instrumentation, develop information for scale-up, demonstrate compliance with regulatory requirements, evaluate materials of construction, and determine process economics. Ancillary information such as quality of waste stream materials was gathered.

The finalized plan will include a budget and schedule to complete all required tests and to produce batches of material for testing of beneficiated coal.

12.2 Review of Work Completed this Quarter

This Task has been completed. No additional work was planned or completed during this quarter.

13.0 POC OPERATION

13.1 Overview and Scope

This task is the actual demonstration of the advanced froth flotation technology. All previous work has led to this task. ICF KE technicians and process engineers from the team will operate the plant over a 10 month period to demonstrate the capability of the technology to remove 85% of the pyritic sulfur from three different test coals while covering at least 85% of the as-mined coal's energy content.

Six major subtasks have been included to better define the overall work scope for this task. The ICF KE team will test the Pittsburgh #8 seam, the Illinois #6 seam and the Upper Freeport seam; the team will operate the circuit in a continuous run; the team will analyze all samples generated in those runs and will develop a plan to store and dispose of the coal and refuse products.

All laboratory data generated will be accessible to all team members and the DOE. The TPO will be notified of all run days in advance for the purpose of planning his trips to the site. Sufficient time will be allowed in the test plan, developed in Task 12, to permit quick analysis of data generated from a completed test before continuing to the next test.

13.2 Review of Work Completed This Quarter

This Task has been completed. No additional work was planned or completed during this quarter.

14.0 TASK 14 POC OPERATIONS ANALYSIS

14.1 Overview and Scope

The completion of this task will result in a complete analysis of the results from all the test runs on all of the coals cleaned in the POC module. The work will include, in an organized and readily accessible manner, all available laboratory data and operating results from the Advanced Flotation technology. The information will be utilized to generate results that will be compared to the batch and semi-continuous results with respect to quality and equipment design parameters. This information will then be used for the Final Conceptual Design of the 20 TPH semi-works facility. The results will be contained in a formal POC Testing Summary Report.

14.2 Review of Work Completed This Quarter

As stated above, the Task 14 report resulted in a complete analysis of the results from all the test runs on all the coals processed in the POC module. This quarterly report will highlight the results from the three seams of coal tested in the POC, Pittsburgh No. 8, Upper Freeport, and Illinois No. 6 during the demonstration operation.

24-HOUR DEMONSTRATION TESTS

The 24-hour demonstration runs are described in the following paragraphs. The tests were conducted using the best operating conditions for the heavy-media cyclone, water-only cyclone, and the mill circuit. The tests were composites of eight (8)-hour shifts.

Based on the Box-Behnken tests results, the best operating conditions were identified for each of the three base coals. These best conditions are summarized in Table 14.1. As shown, the same collector dosage (i.e., 1.0 lb/ton) and column feed rate (i.e., 2.0 tph) were found to be best for all three coals. However, the Pittsburgh No. 8 seam coal was found to require a slightly higher air holdup than the other two coals. This indicates that the Pittsburgh No. 8 seam coal required a slightly higher frother dosage to achieve maximum performance.

Table 14.1
Test Conditions Examined During the 24-Hour Demonstration

Coal Seam	Plant Feed Rate (tph)	Column Feed Rate (tph)	Collector Dosage (lb/ton)	Air Holdup (%)
Pittsburgh No. 8	3.1	2.0	1.0	24
Upper Freeport	2.3	2.0	1.0	21
Illinois No. 6	2.6	2.0	1.0	21

The test data and performance calculations for the long-duration testing of the Pittsburgh No. 8, Upper Freeport, and Illinois No. 6 seam coals are summarized in Appendices H-J, respectively.

The data obtained from the HMC circuit during the 24-hour demonstration POC tests are given in Figures 14.1 - 14.3 for each of the three base coals. The average results obtained for Btu recovery, ash rejection, and pyritic sulfur rejections are summarized in Table 14.2. Although very high Btu recoveries (>95%) were achieved in all cases, the ash rejections were typically very poor (<5-10%). The HMC circuit did reject a significant amount of pyritic sulfur, usually in the range of 45-60%. The pyritic sulfur rejections showed considerable variability throughout the test program. These variations were found to be primarily related to fluctuations in the pyritic sulfur content of the feed coals. The long-duration test data suggest that, as a rule of thumb, the HMC circuit can be expected to reject approximately half of the pyritic sulfur.

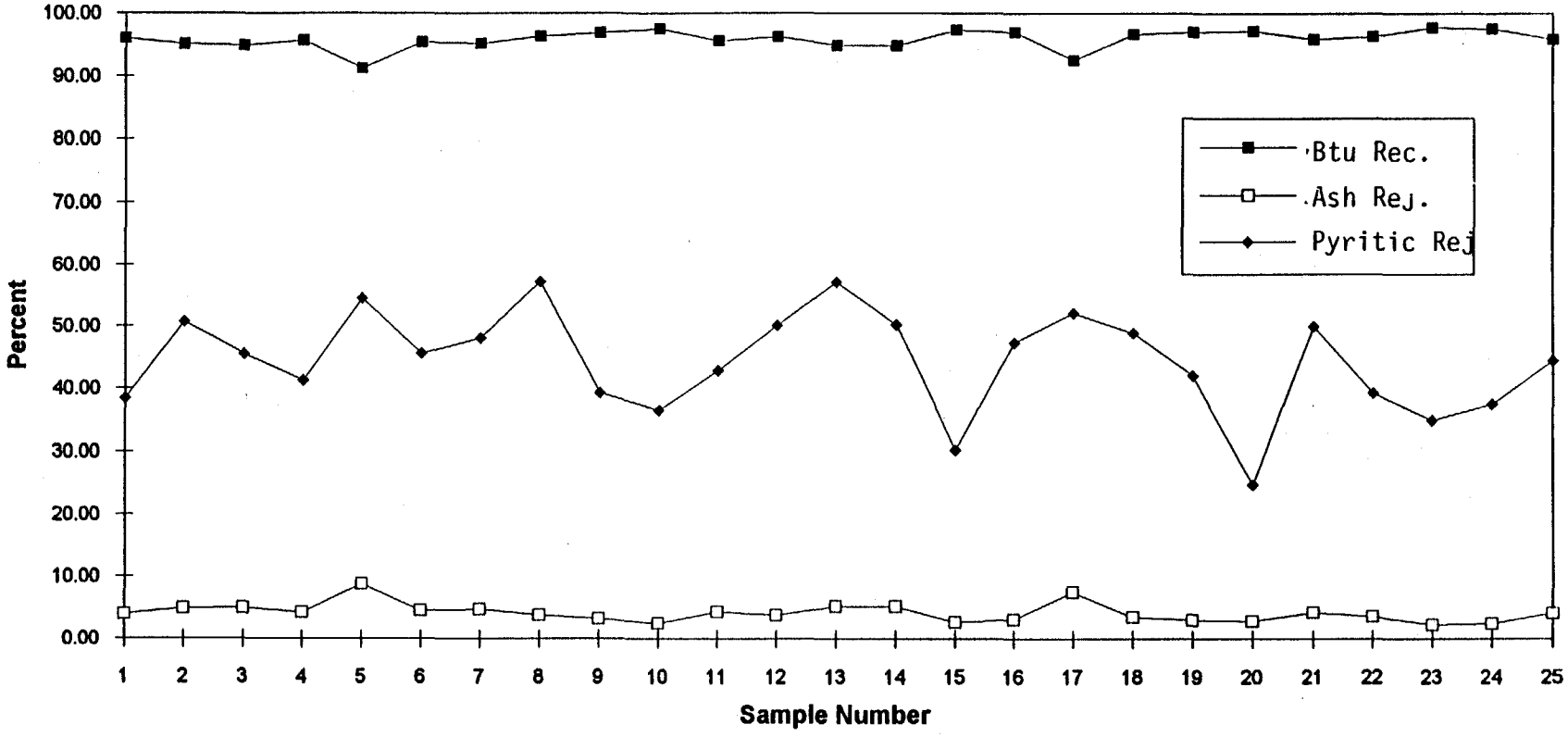


Figure 14.2

Heavy-Media Cyclone Btu Recovery, Ash Rejection, and

PYritic Sulfur Rejection for the Long-Duration Testing of the Pittsburgh No. Coal

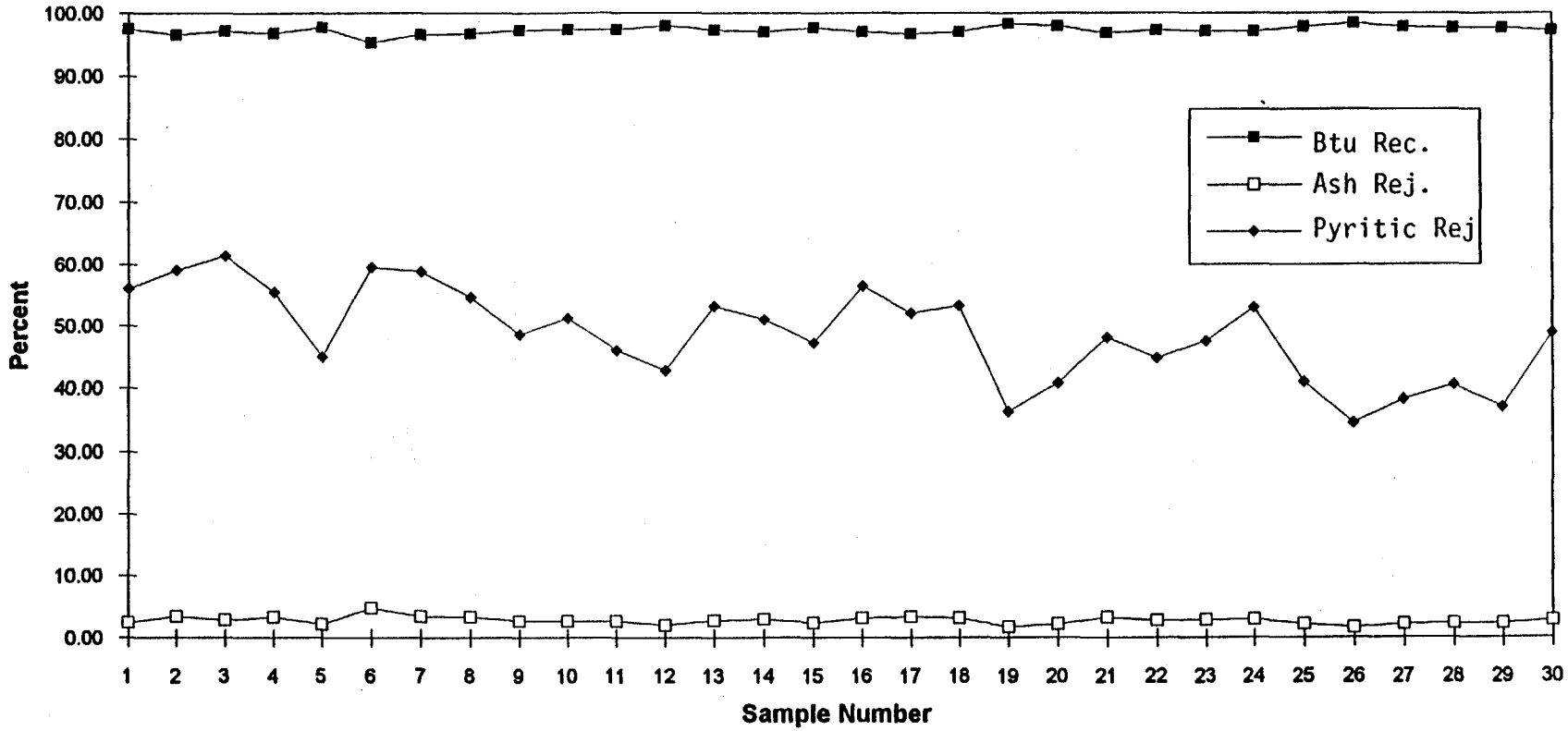


Figure 14.2
Heavy-Media Cyclone Btu Recovery, Ash Rejection, and
Pyritic Sulfur Rejection for the Long-Duration Testing of the Upper Freeport Coal

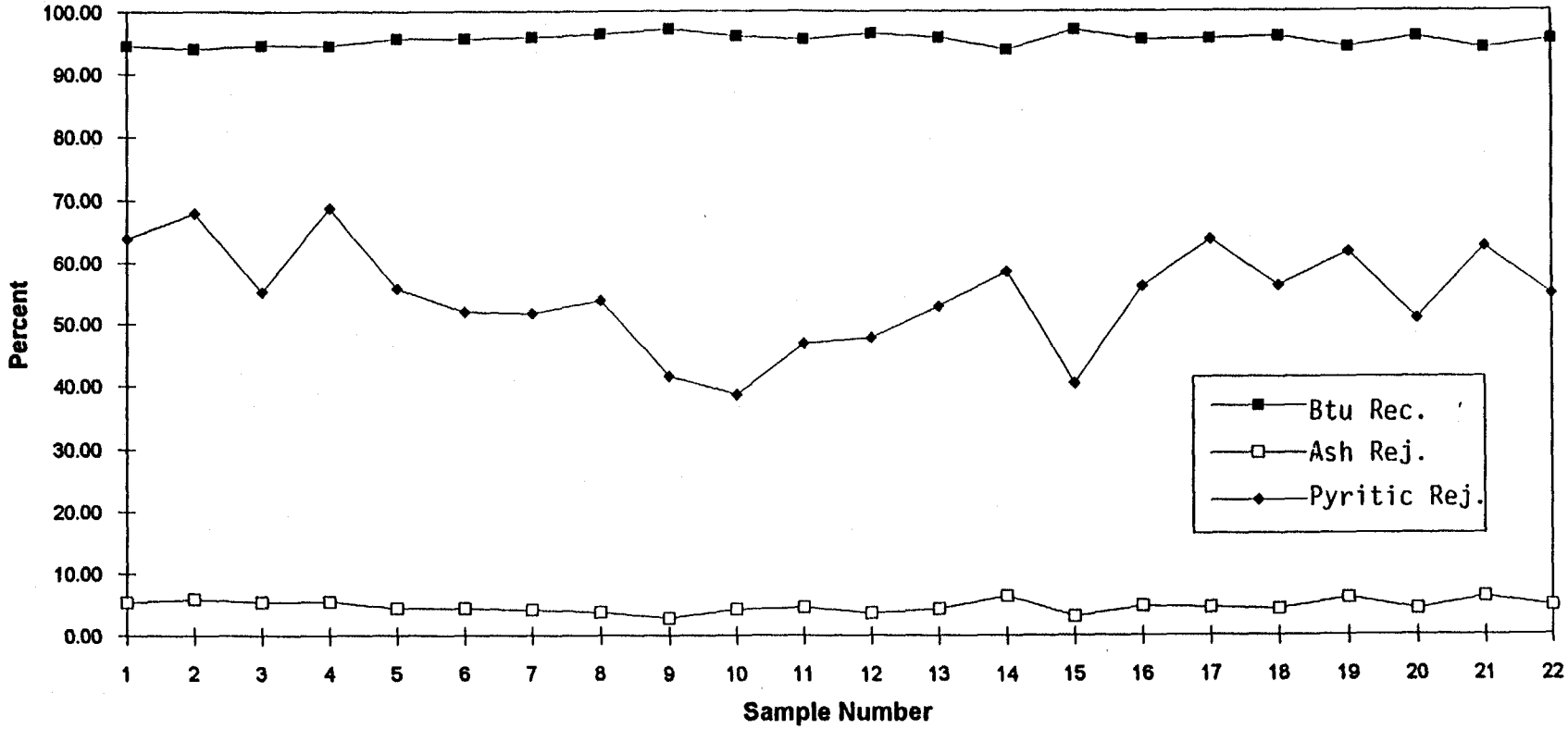


Figure 14.3

Heavy-Media Cyclone Btu Recovery, Ash Rejection, and

Pyritic Sulfur Rejection for the Long-Duration Testing of the Illinois No. 6 Coal

Table 14.2
Average 24-hour Demonstration Test Results for the HMC circuit

Coal Seam	Btu Recovery (%)	Ash Rejection (%)	Pyritic Sulfur Rejection (%)	Separation Efficiency (%)
Pittsburgh No. 8	95.9	4.2	44.3	40.1
Upper Freeport	95.3	2.7	48.6	45.9
Illinois No. 6	95.4	4.6	54.4	49.8

Figures 14.4 - 14.6 show the Btu recovery, ash rejection, and pyritic sulfur rejection data obtained from the WOC circuit for each of the three base coals. Average values obtained are reported in Table 14.3. The WOC circuit achieved very good Btu recoveries (95%). However, both the ash and pyritic sulfur rejections were relatively poor. For the case of ash, rejections less than 5-10% were typically achieved. The corresponding pyritic sulfur rejections averaged less than 30% for the Pittsburgh No. 8 coal and less than 25% for the Illinois No. 6 Seam Coal. For the Upper Freeport Coal, pyritic sulfur rejections less than 20% were obtained. The pyritic sulfur rejected was liberated pyrite. This was removed by the water-only cyclone prior to column flotation.

Table 14.3
Average 24-hour Demonstration Test Results For the WOC circuit

Coal Seam	Btu Recovery (%)	Ash Rejection (%)	Pyritic Sulfur Rejection (%)	Separation Efficiency (%)
Pittsburgh No. 8	96.0	11.7	29.6	25.6
Upper Freeport	99.1	4.7	15.3	14.4
Illinois No. 6	97.8	9.3	22.6	20.4

The results obtained from the column circuit during the 24-hour demonstration tests are shown in Figures 14.7 - 14.9. Average performance values are provided in Table 14.4. As with the other POC unit operations, the column achieved very good Btu recoveries (90%). The ash rejections were also found to be very good, usually in the order of 60-75%. The corresponding pyritic sulfur rejections were somewhat lower (30-45%), although still quite reasonable.

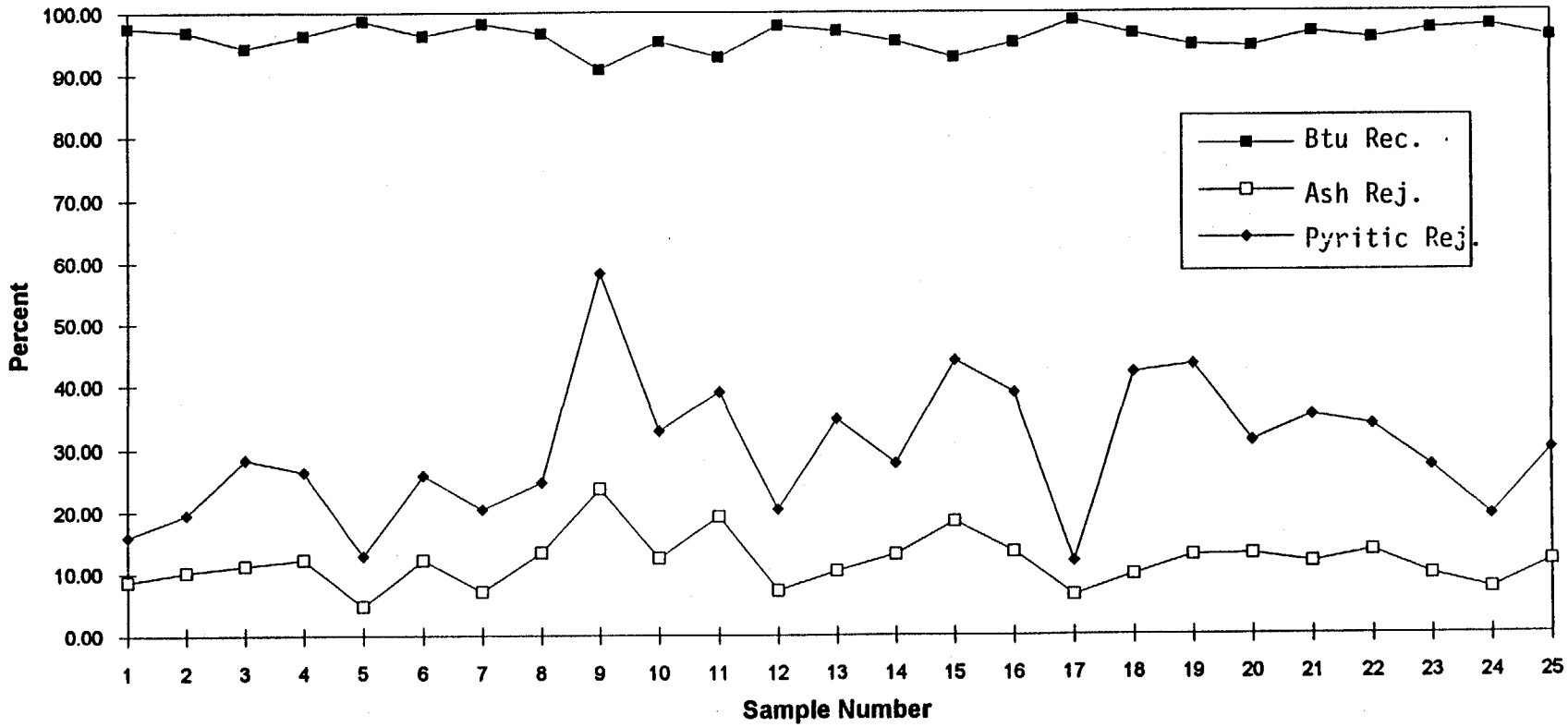


Figure 14.4

Water-Only Cyclone Btu Recovery, Ash Rejection, and

Pyritic Sulfur Rejection for the Long-Duration Testiong of the Pittsburgh No. 8 Coal

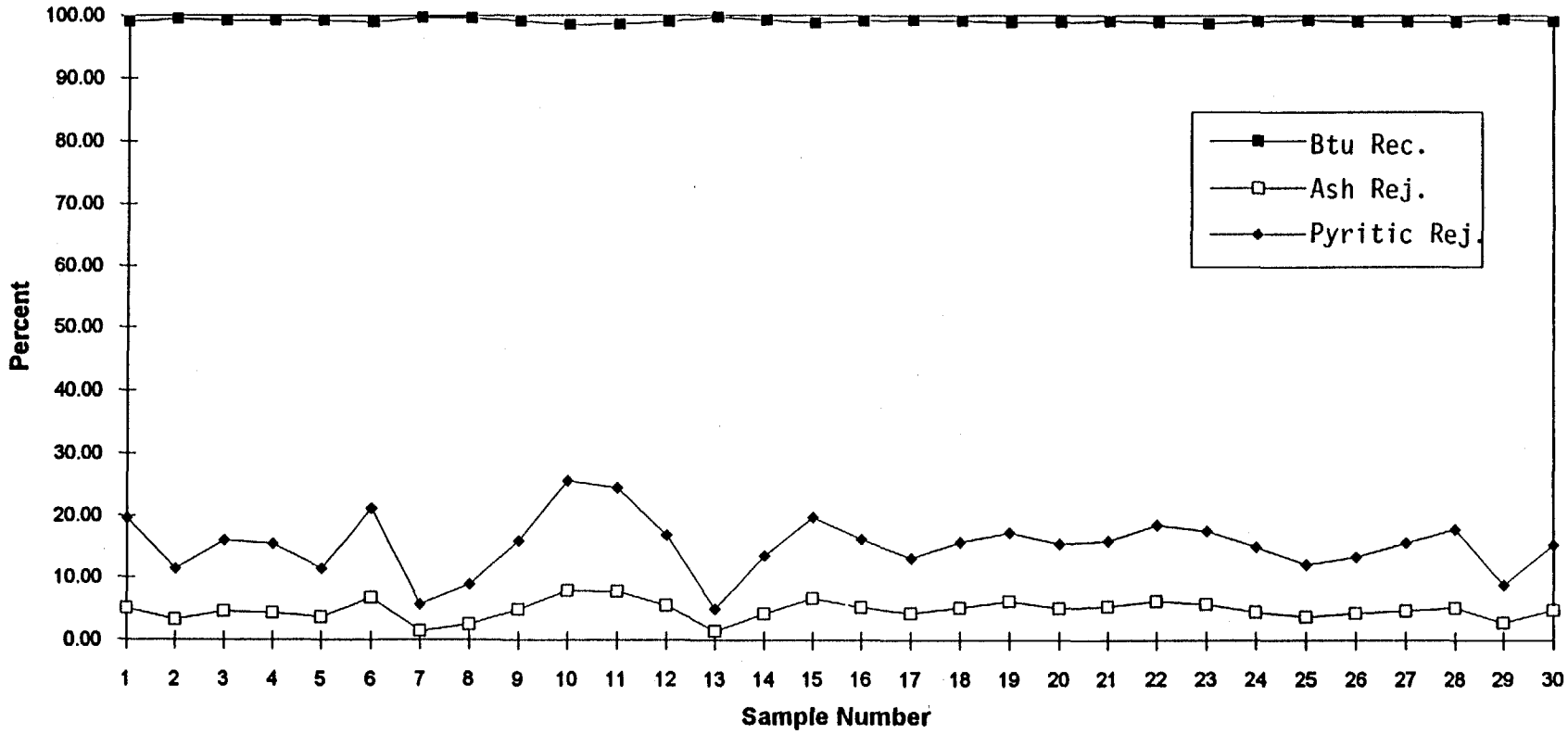


Figure 14.5

Water-Only Cyclone Btu Recovery, Ash Rejection, and

Pyritic Sulfur Rejection for the Long Duration Testing of the Upper Freeport Coal

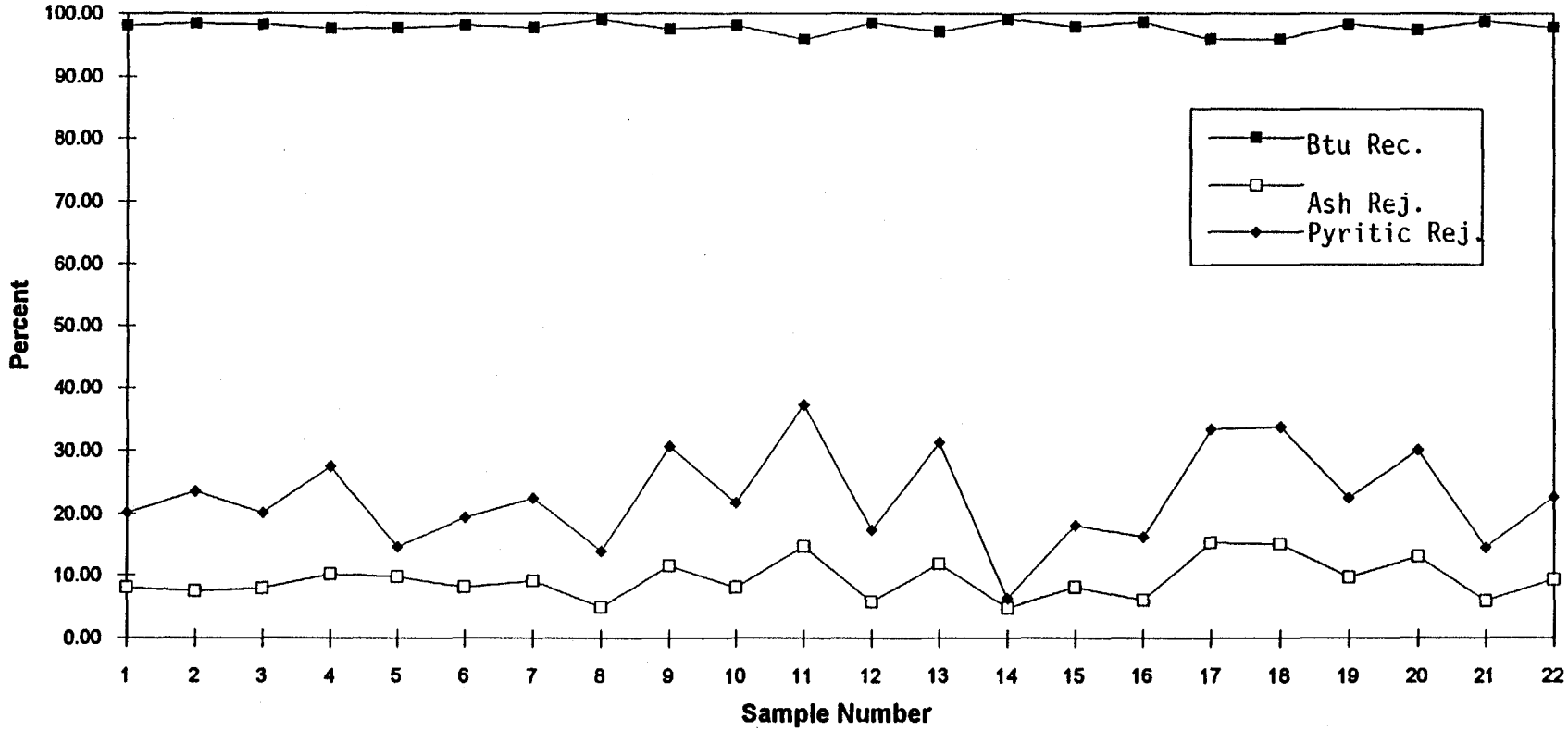


Figure 14.6

Water-Only Cyclone Btu Recovery, Ash Rejection, and
Pyritic Sulfur Rejection for the Long-Duration Testing of the Illinois No. 6 Coal

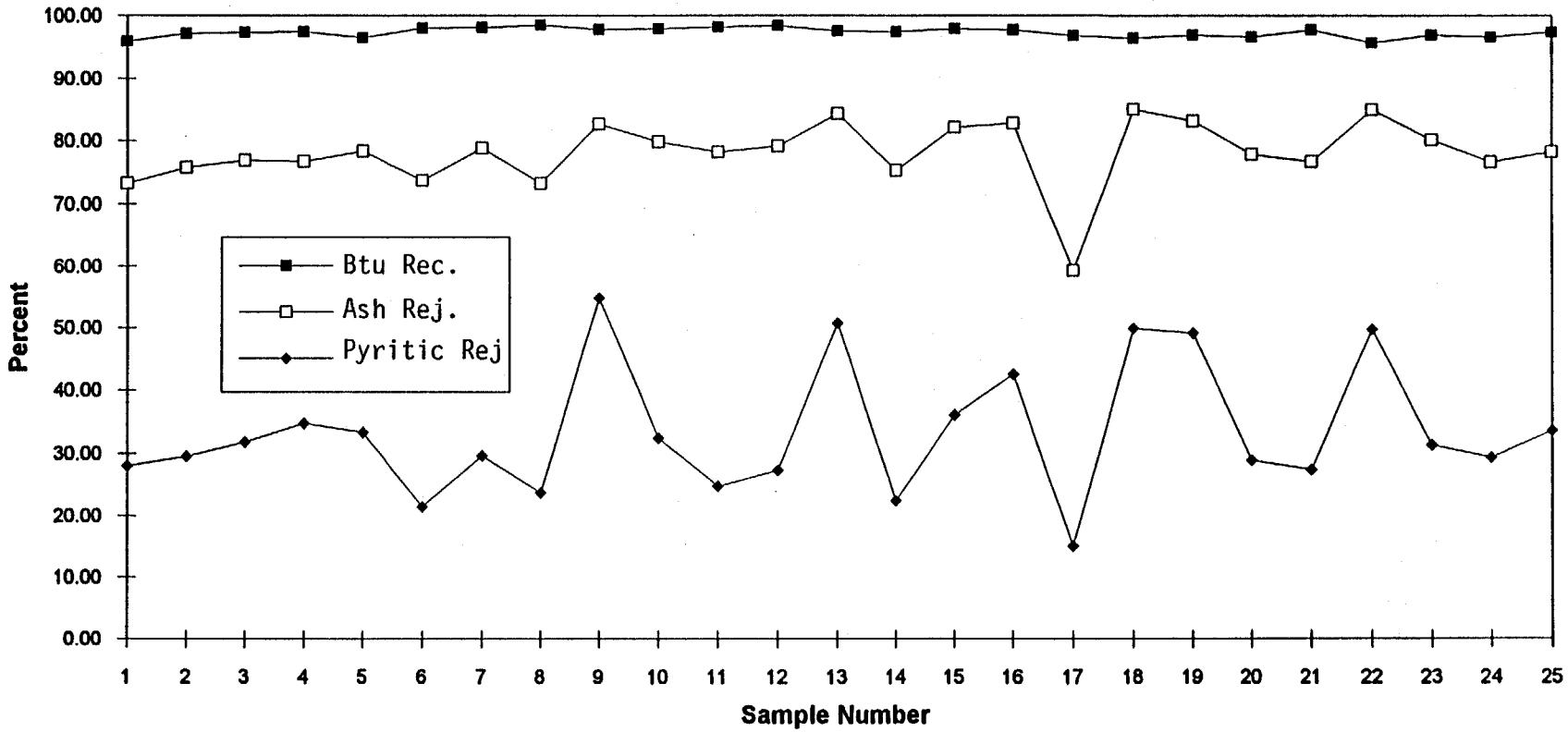


Figure 14.7

Advanced Column Flotation Btu Recovery, Ash Rejection, and

Pyritic Sulfur Rejection for the Long-Duration Testing of the Pittsburgh No. 8 Coal

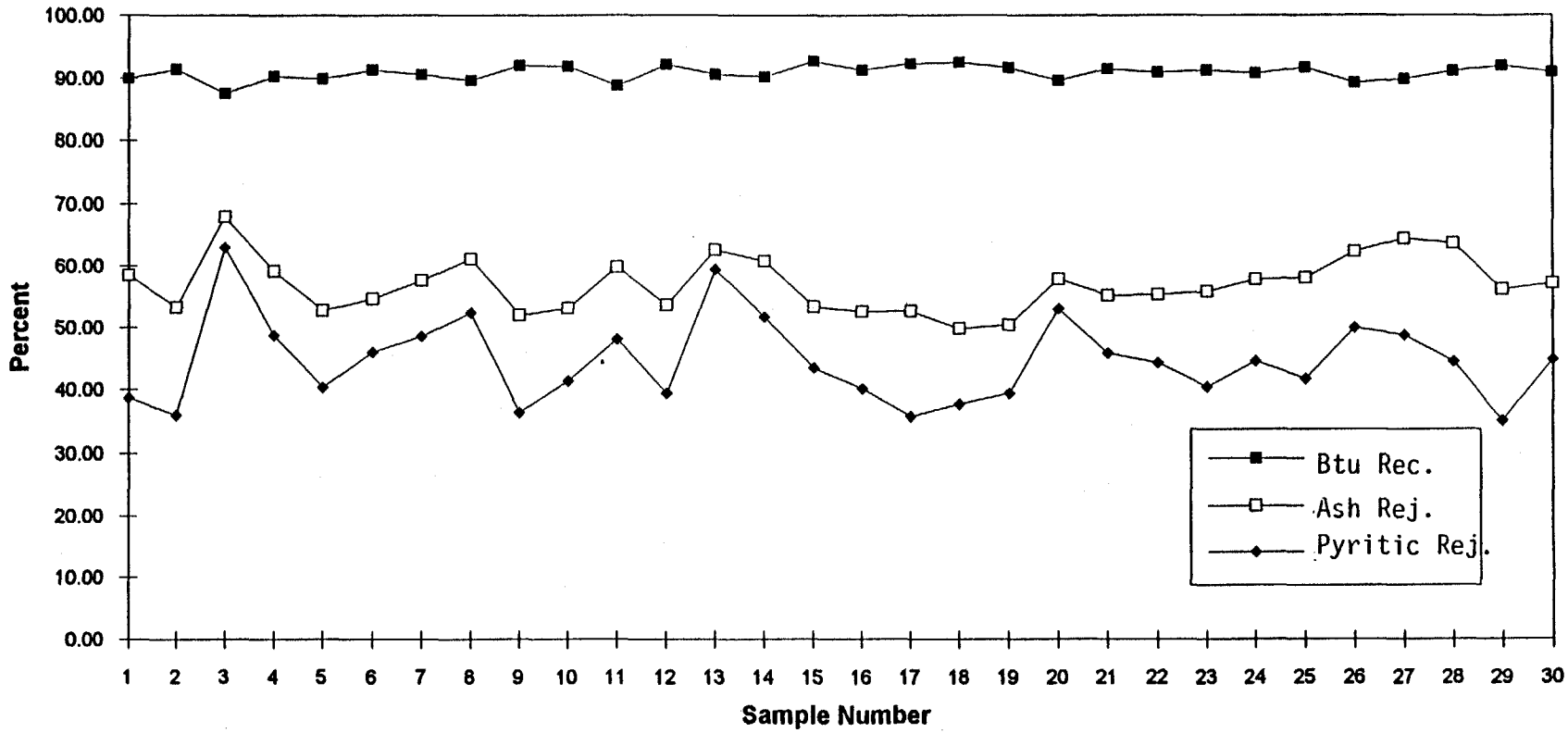


Figure 14.8

Advanced Column Flotation Btu Recovery, Ash Rejection, and
Pyritic Sulfur Rejection for the Long-Duration Teesting of the Upper Freeport Coal

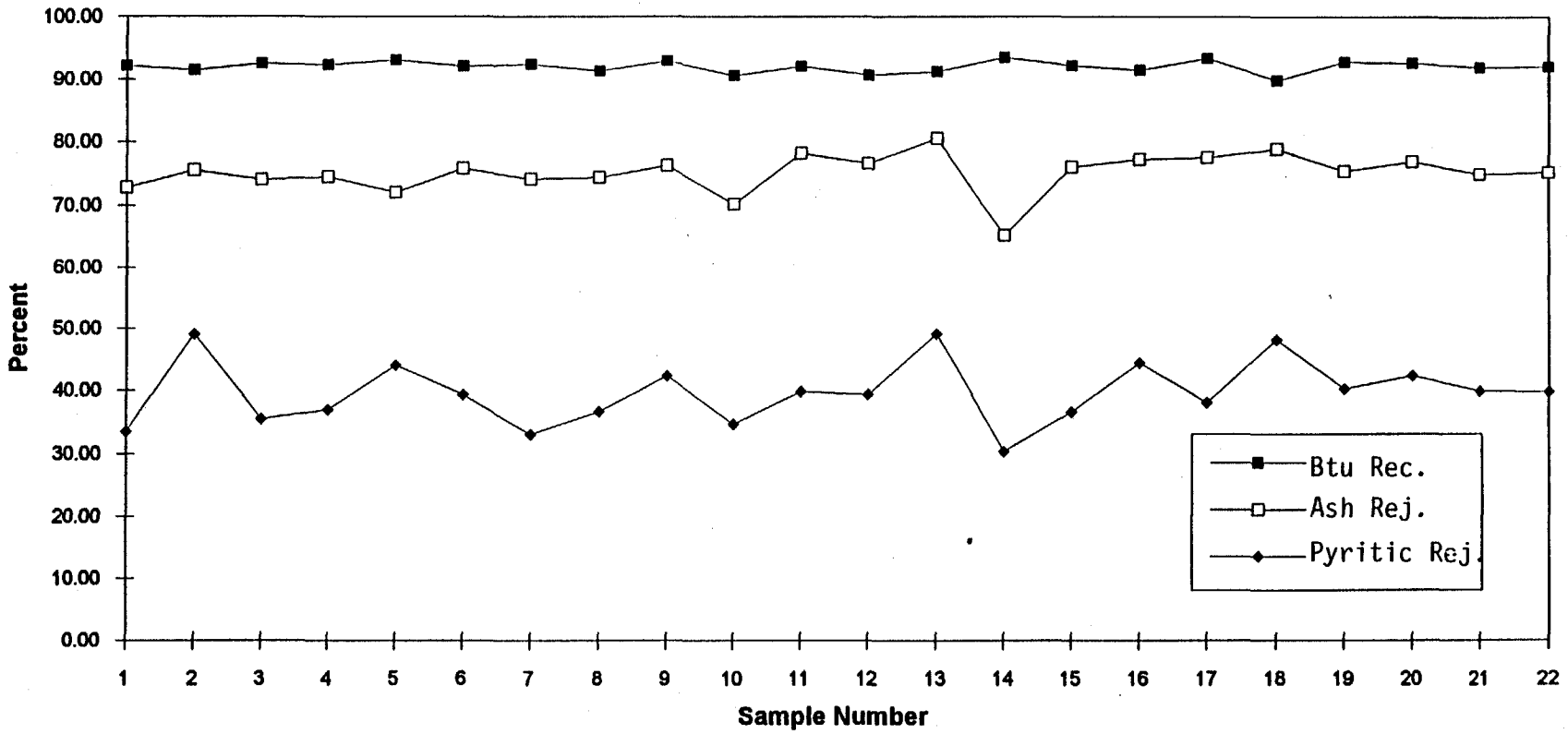


Figure 14.9

Advanced Column Flotation Btu Recovery, Ash Rejection, and

Pyritic Sulfur Rejection for the Long-Duration Testing of the Illinois No. 6 Coal

Table 14.4
Average 24-hour Demonstration Test Results for the Column Circuit

Coal Seam	Btu Recovery (%)	Ash Rejection (%)	Pyritic Sulfur Rejection (%)	Separation Efficiency (%)
Pittsburgh No. 8	97.3	78.0	33.4	30.7
Upper Freeport	90.9	56.8	44.5	35.3
Illinois No. 6	92.0	75.0	39.6	31.6

Based on the results obtained from the HMC, WOC, and column circuits, the overall performance of the POC circuit was calculated. These results are summarized in Figures 14.10 - 14.12 for each of the three base coals. The average performance values are given in Table 14.5 for reference purposes. As shown, the POC circuitry typically achieved Btu recoveries in the range of 85-90%. Corresponding ash rejections were in the order 90% for the Pittsburgh No. 8 and Illinois No. 6 coals, and 70% for the Upper Freeport coal. Average pyritic sulfur rejections were typically in the range of 73-79% for all three coals. These results indicate that the proposed POC circuit is quite effective in reducing both the ash and pyritic sulfur contents of the base coal samples with little loss in heating value.

Table 14.5
Average 24-hour Demonstration Test Results for the Overall Plant Circuit

Coal Seam	Btu Recovery (%)	Ash Rejection (%)	Pyritic Sulfur Rejection (%)	Separation Efficiency (%)
Pittsburgh No. 8	89.5	91.9	73.7	63.2
Upper Freeport	87.5	69.2	75.8	63.3
Illinois No. 6	85.8	88.2	78.6	64.4

A 2 TPH POC test circuit was constructed to test the effectiveness of an advanced multi-stage processing scheme for the deep cleaning of moderate-to-high sulfur coals. Using this circuit, parametric studies were performed to investigate the effects of various operating parameters on circuit performance. After identifying the best operating conditions for each coal, long-duration tests were performed to validate the steady-state performance of the POC circuitry. For the Pittsburgh No. 8 coal, an Btu recovery of nearly 90% was achieved at ash and pyritic sulfur rejections of 92% and 74%, respectively. A slightly lower Btu recovery of 87% and significantly lower ash rejection of 69% was achieved for the Upper Freeport coal. However, a slightly higher pyritic sulfur rejection

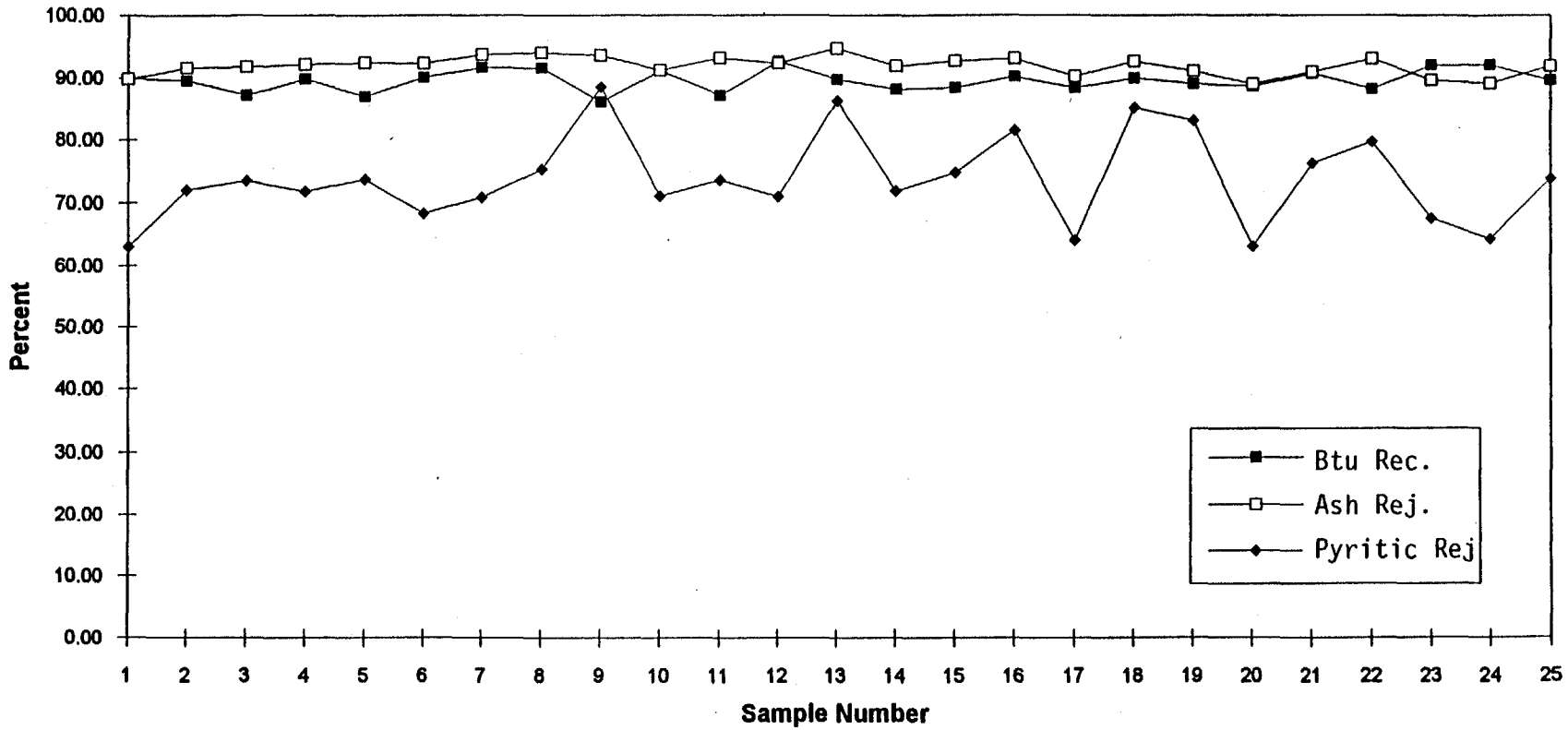


Figure 14.10

Overall POC Circuit Btu Recovery, Ash Rejection, and Pyritic Sulfur Rejection

for the Long-Duration Testing of the Pittsburgh No. 8 Coal

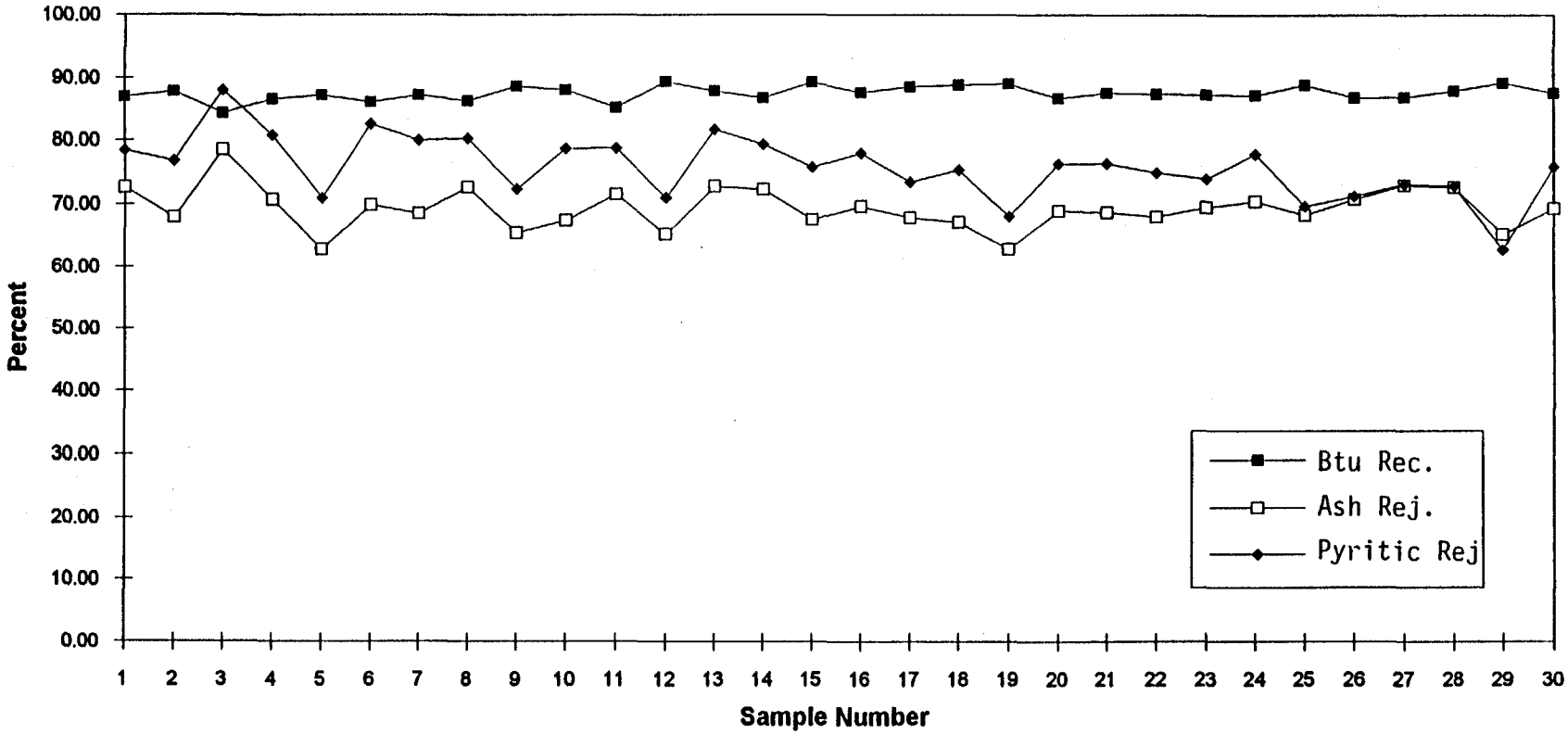


Figure 14.11

Overall POC Circuit Btu Recovery, Ash Rejection, and

Pyritic Sulfur Rejection for the Long-Duration Testing of the Upper Freeport Coal

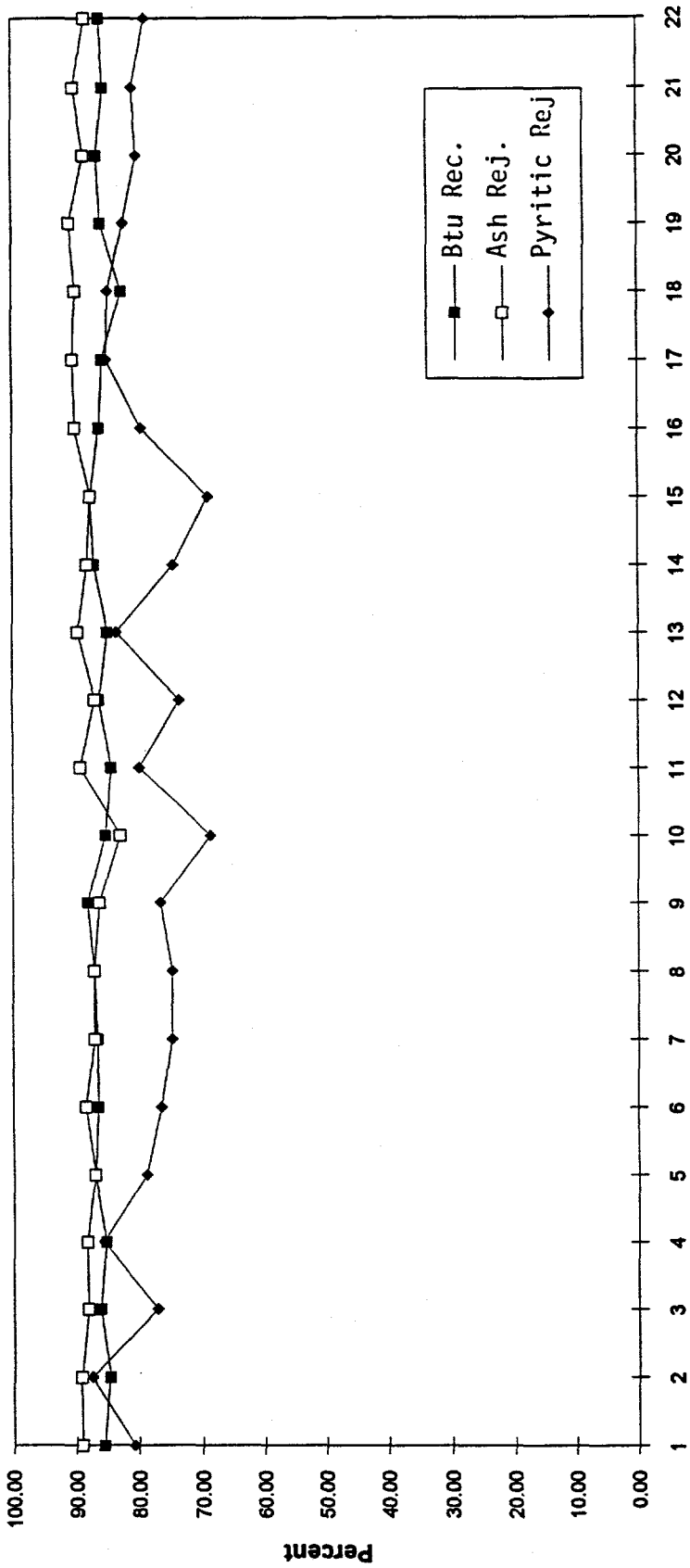


Figure 14.12

Overall POC Circuit Btu Recovery, Ash Rejection, and Pyritic Sulfur Rejection for the Long-Duration Testing of the Illinois No. 6 Coal

of 76% was obtained. Although the lowest overall Btu recovery of 85% was obtained for the Illinois No. 6 coal, a significantly higher ash rejection (88%) and pyritic sulfur rejection (79%) was achieved for this particular coal.

Table 14.6 shows a comparison of the results with the project objectives set forth at the beginning of the contract. Generally, the Btu recovery met or exceeded the objective of 85% Btu recovery. The pyritic sulfur rejection was somewhat lower than the objective by about 10%. The Btu recovery and pyritic sulfur rejection are inverse, i.e. the higher the Btu recovery, the lower pyritic sulfur rejection. Therefore, if the Btu recovery were reduced for the Pittsburgh No. 8 and Upper Freeport to 85%, the pyritic sulfur rejection would increase upwards to approach that of the Illinois No. 6 product. In no case would pyritic sulfur rejection exceed 80% and still maintain 85% Btu recovery.

The same scenario holds true for the final ash of the product. As Btu recovery is reduced, the ash in the final product would decrease. Again, at 85% Btu recovery, the goal of 6% ash probably would not be obtained. Ash in the final product is a function of the coal's mineral matter distribution.

The surface moisture of the product and the reject were established to be 30% and 35% respectively. As Table 14.6 shows, in no case were these objectives fulfilled. In the case of the product, the dewatering device selected (hyperbaric filter) did not continuously operate, and for this reason was removed from the POC. A solid bowl centrifuge was then used to dewater the final product. These are the moisture results reported. The hyperbaric filter product, when the unit operated, was in the range of 25-30% surface moisture. The reject reported is the product of the refuse centrifuge only. The fine refuse was disposed of in an impoundment. The dewatering device selected for fine refuse dewatering was a belt press. This unit operation performed as designed and produced a final product with a moisture of 30%. However, because of contamination of the recirculated water by excess flocculant usage for the machine, it was removed from the POC.

Table 14.6
Summation of 24-Hour Demonstration Results

	Objective	Pittsburgh No. 8	Upper Freeport	Illinois No. 6
BM Rec. %	85	89.5	87.5	85.8
Pyr. Rej. %	85	73.7	75.8	78.6
Product Ash %	6	7.6	10.3	7.20
Product Mst.%	30	35.0	35.0	35.0
Reject Mgt. %	30	10.0*	10.0*	10.0*

*Does not include fine reject material.

ENVIRONMENTAL PERFORMANCE

The environmental performance of the POC facility was as anticipated. There were no adverse impacts to the environment during the operation of the POC. The reagents used during operation, kerosene, MIBC frother, anionic flocculant, cationic coagulant and with the Upper Freeport, sodium hydroxide, are standard reagents used in commercial coal preparation plants every day. The reagents' storage and handling were according to the environmental audit plan and complied completely with the Ohio Power Company's rules and regulations which are stricter than the current Federal, state, and local regulations.

Refuse disposal was handled by the Ohio Power Company. The coarse refuse was hauled by truck to the present refuse storage pile. The fine refuse was pumped to the present refuse impoundment. The monitoring of the water outfalls, according to the Federal and state water permits, showed no violations during the operation of the POC as a result of the refuse material from the plant.

The clean coal was stored and reclaimed by the Ohio Power Company and delivered to a power station. Again, the monitoring of the water outfalls according to the Federal and State water permits, showed no violation during the operation of the POC.

Air quality was maintained at permitted levels. The POC reactivated pollution control dust collectors and during the operation of the POC no violations for Federal and state air pollution permits occurred.

Based on the above, if proper precautions are instituted at the beginning of a project incorporating the advanced flotation circuit there should be no impact on the water or air quality in and around the plant.

ENGINEERING PERFORMANCE

The engineering performance of the unit operations in the precleaning and advanced circuits were according to the initial design except for the grinding mill. A unit operation-by-unit operation discussion is contained in the Task 14 report. The report describes whether the unit operation conformed to the design criteria, and if not, what should be done in order to meet the design criteria.

The conclusion that can be drawn from the operation of the POC can be divided into three topics: the precleaning circuit, the advanced circuit, and the instrumentation. The precleaning equipment is composed of conventionally-designed coal preparation equipment and should not be any problem to scale-up to the semi-works size plant. The advanced circuit has the only equipment design consideration and this concerns designing for increased recirculated load to the ball mill. Otherwise, this circuit should have no problems in scale-up. The conventional instrumentations presented no problems and should scale-up to the semi-works plant. The advanced instruments should

not be included in the semi-works plant because of operating problems and/or reliability with the instruments. The only instrument to be included should be the automatic flocculant control system. The modification to be made is that the settling rate instrument needs to be a calorimeter instead of the density measurement device.

The semi-works plant should be easily scaled-up based on the experience gained in the POC operation. In fact, there were no major surprises. A philosophical adjustment developed in the disposal of the fine refuse in that an impoundment should be incorporated in the final design. Otherwise all other unit operations are scaleable to the semi-works size or greater.

The major scale-up calculations are for the advanced column flotation cell. Table 14.7 indicates the design criteria for the advanced column.

Table 14.7
Column Design Criteria

FEED RATE = 0.0708 TpH/FT^2
WASH WATER RATE = 0.4730 FT/MIN VELOCITY DOWN
AIR RATE = 4.95 cfm/FT^2 OF CELL AREA

These numbers agree closely with the scale-up values for column cell for larger commercial units.

In addition to the engineering design data for the unit operations, several operational variables were also determined from the POC operation. These variables were the rates of reagent usage for flotation, rates of flocculant for dewatering , and the amount of magnetite used during operation. A systematic method for all three coals was developed to reach the actual usage of the consumables during the 24-hour demonstration runs.

Magnetite consumption during operation was a function of the loss of magnetite on the refuse stream and the tailings of the magnetic separator. During the 24-hour demonstration runs, samples of the refuse streams for all three coals were analyzed for magnetite adhering to the material as it discharged out of the media circuit. In addition, the feed to the refuse static thickener was also analyzed for magnetite. This stream would contain magnetite lost from the clean coal from the heavy-media cyclone and the tailings from the magnetic separator.

Magnetite loss was determined generally on a pounds-per-ton-of-coal feed to the media circuit. Losses were a direct measurement of the efficiency of rinsing the magnetite from the products and the efficiency of operation of the magnetic separator. The best efficiency of a magnetic separator is 99.8% magnetic recovery under the best operating conditions. This means for every one

thousand pounds of magnetite processed in the magnetic separator, two pounds is lost to the tailings.

The normal feed rate of media to the magnetic separators during the 24-hour demonstration tests was 10,000-12,000 pounds per hour. Therefore, the loss of magnetite at peak efficiency would run 20-24 pounds per hour. If the efficiency of the magnetic separator would be less than this, magnetite loss would increase. An example would be if the efficiency dropped to 99.7%, the loss would be 30-36 pounds per hour. The purpose of this discussion is to explain the loss of magnetite when expressed in pounds per ton of feed appears to be totally out of control, when in fact, it was not. The POC circuit was processing 1.5-2.0 tph of feed, and the circuit was capable of processing 40-45 tph. If the same magnetite losses are assumed for both feed rates to the circuit, the pounds of magnetite lost per ton of feed changes from 9 pounds per ton to 0.45 pounds per ton.

For the Pittsburgh No. 8, all tests were reported. For the Upper Freeport, nine tests were not reported, and for the Illinois No. 6, three tests were not reported. The average losses for the coals were as follows: 5.59 #/Hour - Pittsburgh No. 8; 30.14 #/Hour - Upper Freeport; and 18.47 #/ton - Illinois No. 6. These numbers, when based on 40 tph feed rate to the circuit, work out to be 0.14 #/ton - Pittsburgh No. 8; 0.75 #/ton - Upper Freeport; and 0.46 #/ton - Illinois No. 6. Based on the calculated losses, a value of 1.2 #/ton of feed, which is a more realistic value, will be applied for magnetite losses in the semi-works plant design.

The following tables, 14.8 - 14.10, indicate the consumption of frother - MIBC, collector - kerosene, flocculants, both anionic and cationic, and pH neutralizers used during the 24-hour demonstration tests. The values calculated will be applied to the Task 15 report. The data indicate a considerable reduction in frother, collector, anionic flocculant, and cationic flocculant for all of the coals from Task 8 to Task 15, except for collector for Upper Freeport and cationic flocculant for Illinois No. 6. There is an additional expense for sodium hydroxide for Upper Freeport for pH regulation.

OPERATIONAL HISTORY

The operational history of the precleaning circuit and the POC circuit was very enlightening. During the operation of circuits on the Pittsburgh No. 8 coal, a number of operating problems developed that were corrected to permit the operation of the facility. There were changes in several unit operations and instruments. These changes are shown on tables 14.11 and 14.12, respectively. Five of the six unit operation changes and four of the five instrument changes occurred in the POC circuit.

Table 14.8

REAGENT CONSUMPTIONS - PITTSBURGH NO. 8

APPLICATION	FROTHER MIBC		COLLECTOR KEROSENE		FLOCCULANT ANIONIC		FLOCCULANT CATIONIC		pH REGULATOR SODIUM HYDROXIDE	
	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON
COARSE FLOTATION	2.00	0.00	2.50	0.00	-	-	-	-	-	-
FINE FLOTATION	2.00	0.00	2.50	0.00	-	-	-	-	-	-
ADVANCED FLOTATION	1.00	1.43	2.00	1.19	-	-	-	-	-	-
CLEAN COAL THICKENER	-	-	-	-	0.27	0.07	0.06	0.00	0.00	0.00
REFUSE THICKENER	-	-	-	-	0.15	0.32	0.06	0.00	0.00	0.00
REFUSE FILTER	-	-	-	-	0.84	0.00	0.00	0.00	0.00	0.00
TOTAL - POUNDS/TON	5.00	1.43	7.00	1.19	1.26	0.39	0.12	0.00	0.00	0.00

Table 14.9

Reagent Consumptions - Upper Freeport

APPLICATION	FROTHER MIBC		COLLECTOR KEROSENE		FLOCCULANT ANIONIC		FLOCCULANT CATIONIC		pH REGULATOR SODIUM HYDROXIDE	
	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON
COARSE FLOTATION	0.07	0.00	0.00	0.00	-	-	-	-	-	-
FINE FLOTATION	0.10	0.00	0.00	0.00	-	-	-	-	-	-
ADVANCED FLOTATION	0.34	0.51	0.34	1.04	-	-	-	-	-	-
CLEAN COAL THICKENER	-	-	-	-	0.15	0.16	0.03	0.00	0.00	0.00
REFUSE THICKENER	-	-	-	-	0.33	0.18	0.11	0.00	0.00	10.08
REFUSE FILTER	-	-	-	-	0.50	0.00	0.00	0.00	0.00	0.00
TOTAL - POUNDS/TON	0.51	0.51	0.34	1.04	0.98	0.34	0.14	0.00	0.00	10.08

Table 14.10

REAGENT CONSUMPTIONS - Illinois No. 6

APPLICATION	FROTHER MIBC		COLLECTOR KEROSENE		FLOCCULANT ANIONIC		FLOCCULANT CATIONIC		pH REGULATOR SODIUM HYDROXIDE	
	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON	TASK 8 #/TON	TASK 14 #/TON
COARSE FLOTATION	1.23	0.00	2.46	0.00	-	-	-	-	-	-
FINE FLOTATION	2.80	0.00	5.40	0.00	-	-	-	-	-	-
ADVANCED FLOTATION	2.28	0.93	4.55	1.21	-	-	-	-	-	-
CLEAN COAL THICKENER	-	-	-	-	0.22	0.17	0.00	0.00	0.00	0.00
REFUSE THICKENER	-	-	-	-	0.14	0.21	0.06	0.88	0.00	0.00
REFUSE FILTER	-	-	-	-	0.86	0.00	0.00	0.00	0.00	0.00
TOTAL - POUNDS/TON	6.31	0.93	12.41	1.21	1.22	0.38	0.06	0.88	0.00	0.00

TABLE 14.11
UNIT OPERATIONS CHANGES

1. **Clean-Coal Thickener** - Added spray water systems to eliminate froth.
2. **Refuse Belt Press** - The addition of flocculant contaminated the recirculated water. As a result, this unit was shut down.
3. **Conventional Flotation** - Testing of the conventional flotation resulted in overdosing the cells to ensure maximum Btu recovery. The overdosing caused a buildup of frother in the recirculated water that poisoned the system. These units were shut down.
4. **Clean-Coal Filter** - Operational difficulties were encountered with the hyperbaric filter because of the discharge system. When operational, the filter produced a product in the 22-25% surface moisture, but could not be continuously operated. The unit was shut down.
5. **Grinding System** - Numerous changes made to the classifying cyclones configurations resulted in an acceptable classification point. However, the ball mill was undersized for the feed rate required to operate, resulting in a coarser grind.
6. **Varisieve Addition** - An additional sizing device was added to the classification circuit for the ball mill to eliminate recycling of minus -200 mesh pyrite.

TABLE 14.12
INSTRUMENT CHANGES

1. **Automatic Floc Control** - Numerous attempts were made to make operational an automated floc control system. They were never completely successful. The turbidity meter worked, but the settling rate device did not.
2. **Ash Analyzer** - Despite our efforts, the ash analyzer never operated properly. Efforts to obtain results for the pyrite meter were unsuccessful. The samples to the analyzer were too dilute to register.
3. **Particle Size Analyzer** - We were unable to make the particle size analyzer operate properly. Over time, the unit would lose calibration.
4. **Thermal Air Flow Meter** - For whatever reason, the air lines on which the meters were mounted contained water, even though there was an air dryer in the compressed air system. These units were removed.
5. **Orifice Plate Air Flow Meter** - These instruments were installed to replace the above and were operated successfully.

The plant availability during the 24-hour demonstration test points out the reliability of the POC installation. The availability was calculated as the number of minutes of downtime divided by the total number of minutes of operation. Table 14.13, shows the total downtime, operating time and plant availability percentage.

TABLE 14.13

Plant Availability

Coal Seam	DownTime - Min	Operating Time - Min	Availability %
Pittsburgh No. 8	230	11302	98.0
Upper Freeport	377	14280	97.4
Illinois No. 6	1455	14141	89.8
TOTAL	2052	39723	95.0

The downtime was all in the precleaning circuit unit operations. The handling system accounted for 9.6% of the downtime. Start-up of the plant after shutdown accounted for 11.5% of downtime. The cagepactor accounted for 24.7% of the downtime. Pumping problems accounted for 46.1% of the downtime primarily because of oversize material generated by frozen coal when processing Illinois No. 6. The total downtime attributed to the advanced circuit unit operations was zero. This availability compares very closely to industry standards, and it could have been improved in a commercial-size plant.

RECOMMENDATIONS FOR FUTURE WORK

Based on the above, future work should examine means of reconstituting this product into either pellets and/or briquettes and reducing the final surface moisture to less than 10%. This will result in a product that would be compatible with existing material handling systems and have an as-received Btu of 12,000-12,500 Btu, which is much more marketable.

A second problem requiring future work was the size reduction of the precleaning circuit product. Several alternative grinding systems should be investigated to improve the economics of final grinding. The most viable alternative would be the application of a tower mill for producing the final grind. A tower mill has demonstrated the ability to require lower horsepower than tumbling ball mills. This would improve the economics of the operation of the commercial plant.

These are the main areas of future work, (1) improved handleability and as-received Btu characteristics of the final product, and (2) improved economical grinding. Both of these could be accomplished at bench-scale and then mathematically scaled up to commercial sizes. There are several manufacturers of tower mills and reconstitution equipment capable of performing laboratory-scale testing, then, based upon this data, scale up to commercial-size equipment.

At the beginning of this quarter, a Draft Task 14 was prepared and released for review and comments. The review and comments were returned to ICF Kaiser, and a rewrite was started at the end of this quarter incorporating the comments into a final document for publication.

15.0 TASK 15 FINAL SEMI-WORKS CONCEPTUAL DESIGN

15.1 Overview and Scope

At the completion of this task, a conceptual design for a 20 TPH semi-works facility will be available. The design will based on all knowledge gained previously in Tasks 5, 6, and 13. The work in this task will be primarily concerned with updating the conceptual design that was available in Task 8 with results of the POC scale-up operations from Task 13. Further, the team will project the design to a 200 TPH commercial facility and provide a conceptual estimate of the capital and operating costs for that facility.

The task will include several deliverables - the final report, design drawings for the semi-works plant, a detailed capital cost estimate of the semi-works plant and a preliminary conceptual estimate for the commercial plant.

15.2 Review of Work Completed This Quarter

During this quarter, the engineering design drawings of the 20 TPH Semi-Works plant were completed. Based on those drawings, a material take-off was completed. The material quantities, along with capital equipment pricing were utilized to develop a capital cost estimate. The capital cost estimate was completed for the 20 TPH Semi-Works preparation plant. This estimate is shown in Appendix A. The final capital cost was determined to be $10,915,352.00.

The quarter was devoted to writing the Task 15 Report, and the draft report should be released during the next quarter for review.

16.0 TASK 16 POC MODULE REMOVAL

16.1 Overview and Scope

This task involves removing the POC module from the host facility, restoring the site, and protecting and shipping all Contractor-procured government property to PETC.

In decommissioning the process equipment, strict adherence to removing process reagents and contaminants and to capping and blanking all openings on the POC module and OCDO host facility interfaces. All government property will be protected from environmental damage prior to and during shipment to PETC. All DOE and OCDO host facility property will be restored to its condition prior to the start of Task 11.

16.2 Review of Work Completed This Quarter

During this quarter the DOE equipment was properly stored. All nuclear material was properly returned to the original suppliers, and all reagents were properly removed and disposed of as required by Federal, State and local regulations. The OCDO facility was restored and OCDO testing continued.

The DOE/PETC and OCDO reached a Personal Property Loan Agreement concerning the DOE equipment. This equipment will be used by OCDO in conducting future additional coal preparation research at the test site.

APPENDIX A

EQUIPMENT LIST FOR SEMI-WORKS PLANT

UNITED STATES DEPARTMENT OF ENGERY

REVISION 0

UNIT LIST

20 TPH CLEAN COAL SEMI–WORKS CONCEPTUAL DESIGN
ICF KAISER ENGINEERS PROJECT NUMBER 88107–250–00

1994cost.wk3

TASK 15 EQUIPMENT LIST FOR 20 TONS PER HOUR, SEMI–WORKS FLOWSHEET

EQUIP. NO.	DESCRIPTION	# OF UNITS	WEIGHT	PRICE	UNIT HP	TOTAL HP	ENCL	VOLTS	RPM	MOTOR SUPPLIED	COMMENTS
100	PLANT FEED CONVEYOR	–	–	–	–	–	–	–	–	–	BY OTHERS
105	BELT MAGNET	1	1,615	7,070	–	–	–	–	–	–	ERIEZ MODEL SE7235MCI
105.1	BELT MAGNET RECTIFIER	1	210	INCLUDED	–	–	–	–	–	–	ERIEZ MODEL 36C 1800 WATTS
110	RAW COAL CRUSHER	1	12,000	87,739	50.00	50.00	TEFC	480	1800	YES	GUNDLACH 45 DA
111	RAW COAL CRUSHER	1	12,000	87,739	50.00	50.00	TEFC	480	1800	YES	GUNDLACH 45 DA
112	RAW COAL SCREEN	1	5,000	13,498	7.50	7.50	TEFC	480	1800	YES	TABOR 4X12 VIBRAT. INCLINED
113	OVERSIZE BUCKET ELEVATOR	1	15,000	13,498	10.00	10.00	TEFC	480	1800	YES	GOODMAN
115	RAW COAL FEED SUMP	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
120	RAW COAL FEED PUMP	1	5,000	13,498	15.00	15.00	TEFC	480	1800	YES	GOYNE PUMP
125	DELETED	–	–	–	–	–	–	–	–	–	–
130	DELETED	–	–	–	–	–	–	–	–	–	–
135	REFUSE CENTRIFUGE DRIVE	1	5,000	35,996	10.00	10.00	TEFC	480	1800	YES	CMI HVC–20
135.1	REFUSE CENTIFUGE VIBRATOR	1	–	INCLUDED	7.50	7.50	TEFC	480	1800	YES	CMI HVC–20
135.2	REFUSE CENTIFUGE OIL PUMP	1	–	INCLUDED	0.50	0.50	TEFC	480	1800	YES	CMI HVC–20
140	DESLIME SIEVE BEND	2	3,360	9,899	–	–	–	–	–	–	3'W,80"R,60,.35 MM,3/32 ISO
145	DESLIME SCREEN	1	9,000	22,497	10.00	10.00	TEFC	480	1800	YES	TABOR 4X12 SD VIB. HORIZONTAL
150	MIDDLINGS CRUSHER DRIVE 1	1	12,000	105,737	100.00	100.00	TEFC	480	1800	YES	GUNDLACH CAGEPACTOR
150.1	MIDDLINGS CRUSHER DRIVE 2	1	–	INCLUDED	75.00	75.00	TEFC	480	1800	YES	SAME
151	OVERSIZE PROTECTION SUMP	1	–	–	–	0.00	–	–	–	–	SEE PLATEWORK
152	OVERSIZE PROTECTION PUMP	1	5,000	13,498	40.00	40.00	TEFC	480	1800	YES	GOYNE PUMP
153	OVERSIZE PROTECTION SIEVE BEND	2	5,600	16,493	–	–	–	–	–	–	5'W,40"R,60,.35 MM,3/32 ISO
155	FINE HYDRO FEED SUMP	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
160	FINE HYDRO FEED PUMP	1	5,000	13,498	60.00	60.00	TEFC	480	1800	YES	GOYNE PUMP
165	FINE HYDROCYCLONES	5	15,600	41,125	–	–	–	–	–	–	KREBS 10" DIAMETER W/STAND
170	DELETED	–	–	–	–	–	–	–	–	–	–
175	DELETED	–	–	–	–	–	–	–	–	–	–
180	DELETED	–	–	–	–	–	–	–	–	–	–
190	DELETED	–	–	–	–	–	–	–	–	–	–
190.1	DELETED	–	–	–	–	–	–	–	–	–	–
200	DELETED	–	–	–	–	–	–	–	–	–	–
200.1	DELETED	–	–	–	–	–	–	–	–	–	–
202	CLASSIFYING CYCLONE SUMP	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
205	CLASSIFYING CYCLONE PUMP	1	5,000	13,498	200.00	200.00	TEFC	480	1800	YES	GOYNE PUMP
207	CLASSIFYING CYCLONES	8	17,640	42,992	–	–	–	–	–	–	KREBS 10" DIAMETER W/STAND
208	VARI–SIEVE	2	7500		–	–	–	–	–	–	KREBS 5'W VARI–SIEVE
210	BALL MILL	1	186,000	787,405	750.00	750.00	TEFC	4160	900	YES	10' DIA. X 6' CONICAL BALL MILL

UNIT LIST

20 TPH CLEAN COAL SEMI-WORKS CONCEPTUAL DESIGN
ICF KAISER ENGINEERS PROJECT NUMBER 88107-250-00

1994cost.wk3

TASK 15 EQUIPMENT LIST FOR 20 TONS PER HOUR, SEMI-WORKS FLOWSHEET

EQUIP. NO.	DESCRIPTION	# OF UNITS	WEIGHT	PRICE	UNIT HP	TOTAL HP	ENCL	VOLTS	RPM	MOTOR SUPPLIED	COMMENTS
215	ADVANCED FLOTATION FEED SUMP	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
220	ADVANCED FLOTATION FEED PUMP	1	5,000	13,498	100.00	100.00	TEFC	480	1800	YES	GOYNE PUMP
225	FLOTATION FEED DISTRIBUTOR	1	2500	–	–	–	–	–	–	–	SEE PLATEWORK
230	ADVANCED FLOTATION CELL	4	46,000	224,973	–	–	–	–	–	–	ICF KE MICROCEL™ MODEL 12025
230.1	ADVANCED FLOTATION PUMP	4	5,000	INCLUDED	75.00	300.00	TEFC	480	1800	YES	GOYNE PUMP
240	COAL STATIC THICKENER DRIVE	1	17,000	78,740	3.00	3.00	TEFC	480	1800	YES	EIMCO 50' DIAMETER HIRATE
240.1	COAL STATIC THICKENER LIFTING DEVICE	1	–	INCLUDED	1.00	1.00	TEFC	480	900	YES	SAME
245	COAL THICK. CLARIFIED WATER SUMP	1		0	–	–	–	–	–	–	SEE PLATEWORK
247	COAL THICK. CLARIFIED WATER PUMP	1	5,000	13,498	200.00	200.00	TEFC	480	1800	YES	GOYNE PUMP
249	COAL STATIC THICKENER U'FLOW PUMP	1	5,000	13,498	25.00	25.00	TEFC	480	1800	YES	GOYNE PUMP
250	DELETED	–	–	–	–	–	–	–	–	–	–
255	DELETED	–	–	–	–	–	–	–	–	–	–
255.1	DELETED	–	–	–	–	–	–	–	–	–	–
260	CLEAN COAL FILTER DRIVE	1	122,000	708,664	10.00	10.00	TEFC	480	1800	YES	ANDRITZ RUTHNER, INC.
260.1	AGITATOR	3	–	INCLUDED	1.50	4.50	TEFC	480	1800	YES	SAME
260.2	DISCHARGE GATES	1	–	INCLUDED	30.00	30.00	TEFC	480	1800	YES	SAME
260.3	AIR COMPRESSOR	1	8,000	13,498	200.00	200.00	TEFC	480	1800	YES	AIRTEC
260.4	FILTRATE PUMP	1	5,000	13,498	5.00	5.00	TEFC	480	1800	YES	GOYNE PUMP
260.5	LUBRICATOR	1	–	–	1.00	1.00	TEFC	480	1800	YES	ANDRITZ RUTHNER, INC.
260.6	AUXILLARY AIR COMPRESSOR	1	5,000	13,498	7.50	7.50	TEFC	480	1800	YES	SAME
260.7	INTERNAL CONVEYOR	1	–		10.00	10.00	TEFC	480	1800	YES	SAME
265	CLEAN COAL BELT	–	–	–	–	–	–	–	–	–	BY OTHERS
275	REFUSE STATIC THICKENER DRIVE	1	17,000	78,740	3.00	3.00	TEFC	480	1800	YES	EIMCO 60' DIAMETER HIRATE
275.1	REF. STATIC THICKENER LIFTING DEVICE	1	–	INCLUDED	1.00	1.00	TEFC	480	900	YES	SAME
280	DELETED	–	–	–	–	–	–	–	–	–	–
285	DELETED	–	–	–	–	–	–	–	–	–	–
290	REF. STATIC THICKENER U'FLOW PUMP	1	5,000	13,498	30.00	30.00	TEFC	480	1800	YES	GOYNE PUMP
310	DELETED	–	–	–	–	–	–	–	–	–	–
310.1	DELETED	–	–	–	–	–	–	–	–	–	–
310.2	DELETED	–	–	–	–	–	–	–	–	–	–
310.3	DELETED	–	–	–	–	–	–	–	–	–	–
315	REFUSE CONVEYOR	–	–	–	–	–	–	–	–	–	BY OTHERS
320	HEAVY MEDIA CYCLONE SUMP	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
325	HEAVY MEDIA CYCLONE PUMP	1	5,000	13,498	75.00	75.00	TEFC	480	1800	YES	GOYNE PUMP
330	HEAVY MEDIA CYCLONE	1	1,350	10,911	–	–	–	–	–	–	KREBS 20" DIAMETER CERAMIC
335	MIDS SIEVE BEND	1	2,200	4,837	–	–	–	–	–	–	3'W,80"R,60,.5 MM,3/32 ISO
340	MIDS DRAIN & RINSE SCREEN	1	18,000	44,995	20.00	20.00	TEFC	480	1800	YES	TABOR 4X16 SD VIB. HORIZONTAL
345	REFUSE SIEVE BEND	1	2,800	8,324	–	–	–	–	–	–	3'W,40"R,60,.5 MM,3/32 ISO

UNITED STATES DEPARTMENT OF ENGERY

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UNIT LIST

20 TPH CLEAN COAL SEMI–WORKS CONCEPTUAL DESIGN
ICF KAISER ENGINEERS PROJECT NUMBER 88107–250–00

1994cost.wk3

TASK 15 EQUIPMENT LIST FOR 20 TONS PER HOUR, SEMI–WORKS FLOWSHEET

EQUIP. NO.	DESCRIPTION	# OF UNITS	WEIGHT	PRICE	UNIT HP	TOTAL HP	ENCL	VOLTS	RPM	MOTOR SUPPLIED	COMMENTS
350	REFUSE DRAIN & RINSE SCREEN	1	12,000	28,122	15.00	15.00	TEFC	480	1800	YES	TABOR 4X16 SD VIB. HORIZONTAL
355	DELETED	1	–	–	–	–	–	–	–	–	–
355.1	DELETED	1	–	–	–	–	–	–	–	–	–
360	HEAVY MEDIA CONTROL BOX	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
365	HEAVY MEDIA SENSOR BOX	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
370	DILUTE MEDIA SUMP	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
375	DILUTE MEDIA PUMP	1	5,000	13,498	10.00	10.00	TEFC	480	1800	YES	GOYNE PUMP
380	MAGNETIC SEPARATOR	1	4,700	18,673	5.00	5.00	TEFC	480	1800	YES	ERIEZ 36" DIAMETER X 9'W
385	MAGNITITE BIN	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
385.1	MAGNETITE BIN DUST COLLECTOR	1	1,000	3,937	2.00	2.00	TEFC	480	1800	YES	AAF
390	MAGNETITE ROTARY VALVE	1	1,000	5,624	5.00	5.00	TEFC	480	1800	YES	ANDRITZ SPROUT–BAUER
395	INSTRUMENT AIR COMPRESSOR	1	2,000	5,624	25.00	25.00	TEFC	480	1800	YES	AIRTEC
395.1	INSTRUMENT AIR DRYER	1	500	1,687	–	–	–	–	–	–	SAME
395.2	PREFILTERS	1	500	1,687	–	–	–	–	–	–	SAME
395.3	AFTER FILTERS	2	750	2,812	–	–	–	–	–	–	SAME
398	PLANT & COLUMN AIR COMPRESSOR	1	8000	2,812	200.00	200.00	TEFC	480	1800	YES	AIRTEC
398.1	PREFILTERS	1	500	2,812	–	–	–	–	–	–	SAME
398.2	AFTER FILTERS	2	750	2,812	–	–	–	–	–	–	SAME
400	FLOCCULANT SYSTEM	1	–	–	–	–	–	–	–	–	MINETEC
400.1	ANIONIC FEEDER	1	500	16,873	0.13	0.13	TEFC	110	1800	YES	SAME
400.2	ANIONIC MIXER	1	500	INCLUDED	1.00	1.00	TEFC	480	1800	YES	SAME
400.3	ANIONIC MIX TANK	1	1,000	INCLUDED	–	–	–	–	–	–	SAME
400.4	ANIONIC HOLDING TANK	1	1,000	INCLUDED	–	–	–	–	–	–	SAME
400.5	ANIONIC METERING PUMP	2	3,000	7,424	0.50	1.50	TEFC	110	1800	YES	SAME
400.6	CATIONIC HOLDING TANK	1	1,000	INCLUDED	–	–	–	–	–	–	SAME
400.7	CATIONIC METERING PUMP	2	1,800	6,749	0.25	0.50	TEFC	110	1800	YES	SAME
400.8	SETTLING RATE DETECTOR	2	2,000	22,497	–	–	–	110	–	–	SAME
400.9	WATER CLARITY MEASURMENT	2	1,800	8,999	–	–	–	110	–	–	SAME
400.10	pH REAGENT PUMP	1	3000	7,424	0.50	0.50	TEFC	110	1800	YES	SAME
405	REAGENT SYSTEM	1	–	–	–	–	–	–	–	–	SAME
405.1	FROTHER BULK STORAGE	1	5,000	5,624	–	–	–	–	–	–	SAME
405.2	FROTHER TRANSFER PUMP	1	500	6,749	10.00	10.00	TEFC	480	1800	YES	SAME
405.3	FROTHER DAY TANK	1	–	–	–	–	–	–	–	–	SAME
405.4	FROTHER REAGENT PUMPS	4	1,500	10,124	0.25	1.00	TEFC	110	1800	YES	SAME
405.5	COLLECTOR BULK STORAGE	1	5,000	5,624	–	–	–	–	–	–	SAME
405.6	COLLECTOR TRANSFER PUMP	1	500	6,749	10.00	10.00	TEFC	480	1800	YES	SAME

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UNIT LIST

20 TPH CLEAN COAL SEMI-WORKS CONCEPTUAL DESIGN
ICF KAISER ENGINEERS PROJECT NUMBER 88107-250-00

1994cost.wk3

TASK 15 EQUIPMENT LIST FOR 20 TONS PER HOUR, SEMI-WORKS FLOWSHEET

EQUIP. NO.	DESCRIPTION	# OF UNITS	WEIGHT	PRICE	UNIT HP	TOTAL HP	ENCL	VOLTS	RPM	MOTOR SUPPLIED	COMMENTS
405.7	COLLECTOR DAY TANK	1	–	–	–	–	–	–	–	–	SAME
405.8	COLLECTOR REAGENT FEEDERS	4	1,500	10,124	0.25	1.00	TEFC	110	1800	YES	SAME
405.9	DELETED	–	–	–	–	–	–	–	–	–	–
410	OVERDENSE MEDIA SUMP	1	–	–	–	0.00	–	–	–	–	SEE PLATEWORK
415	OVERDENSE MEDIA PUMP	1	5,000	13,498	10.00	10.00	TEFC	480	1800	YES	GOYNE PUMP
420	OVERDENSE MEDIA CONTROL BOX	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
425	OVERDENSE MEDIA SENSOR BOX	1	–	–	–	–	–	–	–	–	SEE PLATEWORK
430	BALL MILL OVERHEAD CRANE HOIST	1	5,000	28,122	25.00	25.00	TEFC	480	1800	YES	THERN
430.1	BALL MILL OVERHEAD CRANE TRAM	1	–	INCLUDED	10.00	10.00	TEFC	480	1800	YES	THERN
435	DELETED	–	–	–	–	–	–	–	–	–	–
435.1	DELETED	–	–	–	–	–	–	–	–	–	–
440	DELETED	–	–	–	–	–	–	–	–	–	–
440.1	DELETED	–	–	–	–	–	–	–	–	–	–
445	DOORS	–	–	–	–	–	–	–	–	–	–
445.1	MAN DOORS		–	5,624	–	–	–	–	–	–	SEE TAKE OFFS
445.2	MACHINERY DOORS		–	6,749	–	–	–	–	–	–	SEE TAKE OFFS
450	PIPING	–		281,216	–	–	–	–	–	–	SEE TAKE OFFS
455	CONCRETE	–	–	0	–	–					SEE TAKE OFFS
455.1	FOUNDATIONS AND GROUND FLOOR	–	CU YD	0	–	–	–	–	–	–	LABOR-350/YD MAT'L-150/YD
455.2	ELEVATED FLOORS	–	CU YD	0	–	–	–	–	–	–	SAME
455.3	STATIC THICKENER TANK	–	CU YD	0	–	–	–	–	–	–	SAME
455.4	COAL STATIC THICKENER TANK	–	CU YD	0	–	–	–	–	–	–	SAME
460	STRUCTURAL STEEL	–		0	–	–	–	–	–	–	
465	MILD STEEL PLATEWORK	–		0	–	–	–	–	–	–	
470	A. R. STEEL PLATEWORK	–		0	–	–	–	–	–	–	
475	OTHER LINERS	–		0	–	–	–	–	–	–	
480	ROOFING AND SIDING	–	–	0	–	–	–	–	–	–	
480.1	INSULATED SIDING	–	SQS	0	–	–	–	–	–	–	
480.2	INSULATED ROOFING	–	SQS	0	–	–	–	–	–	–	
485	CLEAN-UP PUMP	1	5,000	13,498	7.50	7.50	TEFC	480	1800	YES	GOYNE PUMP
495	GLAND WATER PUMP	1	2,500	2,500	5.00	5.00	TEFC	480	1800	YES	GOYNE PUMP
500	INSTRUMENTS	–	–	–	–	–	–	–	–	–	
500.1	SLURRY SAMPLERS	3	7,000	94,489	5.00	15.00	TEFC	480	1800	YES	ESTIMATED
500.2	DRY SAMPLERS	2	5,250	20,248	5.00	10.00	TEFC	480	1800	YES	ESTIMATED
500.3	PRESSURE TRANSMITTERS	3	–	–	–	–	–	–	–	–	ROSEMOUNT
500.4	VARIBLE FREQUENCY DRIVE	1	–	–	–	–	–	–	–	–	WOODS
500.5	WEIGH TRANSMITTER	1	–	–	–	–	–	–	–	–	MILLTRONICS

UNITED STATES DEPARTMENT OF ENGERY

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UNIT LIST

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ICF KAISER ENGINEERS PROJECT NUMBER 88107-250-00

1994cost.wk3

TASK 15 EQUIPMENT LIST FOR 20 TONS PER HOUR, SEMI-WORKS FLOWSHEET

EQUIP. NO.	DESCRIPTION	# OF UNITS	WEIGHT	PRICE	UNIT HP	TOTAL HP	ENCL	VOLTS	RPM	MOTOR SUPPLIED	COMMENTS
500.6	NUCLEAR DENSITY GAUGES	3	2,500	36,558	–	–	–	–	–	–	ROSEMOUNT
500.7	MAGNETIC FLOWMETERS	1	300	33,746	–	–	–	–	–	–	ROSEMOUNT
500.8	AMP TRANSMITTERS	22	1,500	40,495	–	–	–	–	–	–	KATY
500.9	I/P CONVERTERS	9	–	–	–	–	–	–	–	–	FOXBORO
500.10	Dp CELLS	9	300	20,248	–	–	–	–	–	–	FOXBORO
500.11	CONTROL VALVES	9	1,000	13,498	–	–	–	–	–	–	FOXBORO
500.12	DELETED	–	–	–	–	–	–	–	–	–	–
500.13	AUTOMATIC FLOC MIXING SYSTEM	1	2,000	22,497	1.50	1.50	TEFC	480	1800	YES	ESTIMATED
500.14	pH METERS	2	150	10,124	–	–	–	–	–	–	ESTIMATED
500.15	SUMP LEVEL CONTROLS	10	1,500	28,122	–	–	–	–	–	–	ESTIMATED
500.16	HEAVY MEDIA LEVEL CONTROLS	2	500	14,623	–	–	–	–	–	–	ESTIMATED
EF-1	EXHAUST FANS	1			0.5	0.50	TEFC	120	1800	YES	GREENHECK MODEL BCF-108
EF-2	EXHAUST FANS	1			3	3.00	TEFC	480	1800	YES	GREENHECK MODEL SPNE - 36
EF-3	EXHAUST FANS	1			5	5.00	TEFC	480	1800	YES	GREENHECK MODEL SPNE - 42
EF-4	EXHAUST FANS	1			1	1.00	TEFC	480	1800	YES	GREENHECK MODEL SPNE - 36
EF-5	EXHAUST FANS	1			3	3.00	TEFC	480	1800	YES	GREENHECK MODEL SPNE - 36
EF-6	EXHAUST FANS	1			0.75	0.75	TEFC	480	1800	YES	GREENHECK MODEL SPNE - 30
AC-1	AIR CONDITIONER FAN	1			0.33	0.33	TEFC	480	1800	YES	CORRECT AIR CORP. MODEL SC24
AC-1.1	AIR CONDITIONER COMPRESSOR	1			5	5.00	TEFC	480	1800	YES	CORRECT AIR CORP. MODEL SC24
AC-1.2	AIR CONDITIONER STRIP HEATER	1			3 KW	0.00	TEFC	480	1800	YES	CORRECT AIR CORP. MODEL SC24
AC-2	AIR CONDITIONER FAN	1			0.33	0.33	TEFC	480	1800	YES	ADDISON MODEL PC044
AC-2.1	AIR CONDITIONER COMPRESSOR	1			5	5.00	TEFC	480	1800	YES	ADDISON MODEL PC044
AC-2.2	AIR CONDITIONER STRIP HEATER	1			9 KW	0.00	TEFC	480	1800	YES	ADDISON MODEL PC044
AC-3	AIR CONDITIONER FAN	1			0.33	0.33	TEFC	480	1800	YES	ADDISON MODEL PC044
AC-3.1	AIR CONDITIONER COMPRESSOR	1			7.5	7.50	TEFC	480	1800	YES	ADDISON MODEL PC044
AC-3.2	AIR CONDITIONER STRIP HEATER	1			18 KW	0.00	TEFC	480	1800	YES	ADDISON MODEL PC044
HV-1	HEATING & VENTILATING UNIT FAN	1			5	5.00	TEFC	480	1800	YES	BROD & McCLUNG MODEL CRP-22
HV-1.1	HEATING & VENTILATING UNIT HEATER	1			16 KW	0.00	TEFC	480	1800	YES	BROD & McCLUNG MODEL CRP-22
HV-2	HEATING & VENTILATING UNIT FAN	1			2	2.00	TEFC	480	1800	YES	BROD & McCLUNG MODEL CRP-12
HV-2.1	HEATING & VENTILATING UNIT HEATER	1			34 KW	0.00	TEFC	480	1800	YES	BROD & McCLUNG MODEL CRP-12
UH-1	UNIT HEATER A - G	7			10 KW	0.00	TEFC	480	1800	YES	Q-MARK MODEL MUH-10-4
UH-2	UNIT HEATER A - U	21			15 KW	0.00	TEFC	480	1800	YES	Q-MARK MODEL MUH-15-4
UH-3	UNIT HEATER A - N	14			20 KW	0.00	TEFC	480	1800	YES	Q-MARK MODEL MUH-20-4
LV-1	LOUVERS A - X	24			–	–	–	–	–	–	AM WARM & VENT MOD. LF-31A-A
PRD-1	PRESSURE RELIEF DAMPER	1			–	–	–	–	–	–	AM WARM & VENT MOD. PR-10
	TOTAL VALUES		710,175	3,484,772		2,822					HEATING LOAD 715 KW

DETAILED CAPITAL COST ESTIMATE

ICF KE JOB NO: 88107-250-00
DATE: JULY 15, 1994

ESTIMATE CRITERIA
FOR
ENGINEERING DEVELOPMENT OF
ADVANCE PHYSICAL FINE COAL
CLEANING TECHNOLOGIES - FROTH FLOTATION
PREPARED FOR
U.S. DEPARTMENT OF ENERGY
PITTSBURGH ENERGY TECHNOLOGY CENTER
PITTSBURGH, PA.

TYPE 3 PRELIMINARY COST ESTIMATE
PREPARED BY
ICF KAISER ENGINEERS, INTERNATIONAL
PITTSBURGH, PA

SCOPE OF WORK

The Department of Energy has commissioned ICF Kaiser Engineers International to develop generic facility for the cleaning of fine coal using the advance froth floatation technology. The facility is based on processing 41.5 tons of raw coal per hour.

PURPOSE

Provide a preliminary cost estimate for a generic advance froth flotation coal cleaning facility based on the plant being located in the Greater Pittsburgh Area. This plant could be built anywhere within the United States.

DRAWINGS AND SPECIFICATIONS

The specifications and drawings were prepared by ICF KE. The specifications and drawings are based on the test results from the labaratory and proof-of concept plant.

ESTIMATE FORMAT

The estimate utilizes ICF KE's interactive estimating system(IEST) and is formatted to show quantities, manhours, labor cost, construction equipment usage, material and equipment, subcontracts, indirect costs, contractor's overhead and profit, and total dollars for each cost element.

The estimate is an ICF KE Type 3, Preliminary Estimate as defined by the attached estimate type sheets.

QUANTITIES

Quantities for the estimate were developed from the drawings provided and estimators judgement.

SALE TAX

Sales tax has been excluded.

COST EXCLUSIONS

Permits and Licenses
Finance Charges
Owner's Cost
Land and Right of Way
Soil Investigation
Environmental Reports
Legal Services
Utilities

CONTINGENCY

The estimate contains contingency at 5% to provide for unforeseen events which statistically are bound to occur during the life of the project.

ESCALATION

Escalation has been excluded.

ESTIMATE DISCUSSION

The project was commissioned by the Department Of Energy to determine the feasibility of cleaning coal by the advance froth flotation process. A preliminary cost estimates was prepared with no specify site selected. Estimate cost were based on the plant being constructed in the Greater Pittsburgh Area.

ICF KAISER ENGINEERS INTERACTIVE ESTIMATING
20 TPH CLEAN COAL SEMI-WORKS CONCEPTUAL DESIGN
GENERAL ESTIMATE FOR REFERANCE
REPORT S1 - ESTIMATE SUMMARY BY FACILITY

WORK BREAKDWN FACIL.STANDRD	DESCRIPTION	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
200	CONCRETE AND FOUNDATIONS	6512	239827	24678	141066	0	0	16578	422149
300	STRUCTURAL SIEEL	5236	204788	29719	489556	0	0	51928	775991
400	ARCHITECTURAL WORK	3148	113985	3126	187882	0	0	19103	324096
500	EQUIPMENT INSTALLATION	12080	469655	98705	187620	0	3887376	28632	4671988
600	PIPING	4835	188767	25478	157284	0	0	18286	389815
675	MECHANICAL	1465	57149	5449	14325	0	100759	1981	179663
700	ELECTRICAL AND INSTRUMENTATION	14003	624051	38033	234657	72	687426	27274	1611513
900	INDIRECTS AND DISTRIBUTABLES	960	35860	4205	57452	10000	0	6166	113683
901	ENGINEERING	0	0	0	0	600000	0	0	600000
902	PROJECT/CONSTRUCTION MANAGEMENT	0	0	0	0	600000	0	0	600000
903	FIELD OFFICE EXPENSES	80	2940	372	33496	1000	0	0	37808
904	INSURANCE/TAXES/PERMITS/	0	0	0	173840	0	0	0	173840
REPORT TOTAL		48,319	1,937,022	229,765	1,677,178	1,211,072	4,675,561	169,948	9,900,546
ICFKE PROFIT/FEE @ 5%									495,027
SUBTOTAL									10,395,573
PROJECT CONTINGENCY @ 5%									519,779
GRAND TOTAL									10,915,352

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
200	CONCRETE AND FOUNDATIONS									
200 .131102 .	EXCAVATION MASS-1.5CY BACKHOE BUILDING FOUNDATION	880 CY	29	1060	339	0	0	0	34	1433
200 .1311021.	EXCAVATION MASS-1.5CY BACKHOE EQUIPMENT FOUNDATIONS	65 CY	2	73	25	0	0	0	3	101
200 .134910 .	DISPOSAL- 10 MI ROUND TRIP 10-12 CY TRUCK BUILDING FOUNDATION	880 CY	80	3106	1741	0	0	0	174	5021
200 .1349101.	DISPOSAL- 10 MI ROUND TRIP 10-12 CY TRUCK EQUIPMENT FOUNDATION	65 CY	6	233	129	0	0	0	13	375
200 .1349102.	DISPOSAL- 10 MI ROUND TRIP 10-12 CY TRUCK 50' CLEAN COAL THICKENER	57 CY	5	194	113	0	0	0	11	318
200 .141100 .	EXCAVATION STRUCT. FOR MAT 50' CLEAN COAL THICKENER	95 CY	4	143	139	0	0	0	14	296
200 .1411001.	EXCAVATION STRUCT. FOR MAT 55' REFUSE THICKENER	114 CY	5	179	167	0	0	0	17	363
200 .142210 .	BACKFILL STRUCTURAL AGGREGATE 50' CLEAN COAL THICKENER	38 CY	8	290	40	367	0	0	41	738
200 .1422101.	BACKFILL STRUCTURAL AGGREGATE EQUIPMENT FOUNDATIONS	13 CY	3	109	14	125	0	0	14	262
200 .1422102.	BACKFILL STRUCTURAL AGGREGATE OFFICE AREA	35 CY	7	253	37	338	0	0	38	666
200 .1422103.	BACKFILL STRUCTURAL AGGREGATE 55' REFUSE THICKENER	46 CY	9	326	48	444	0	0	49	867
200 .142212 .	BACKFILL STRUCTURAL AGGREGATE BUILDING FOUNDATION	228 CY	46	1665	238	2199	0	0	244	4346
200 .211000 .	FORMS - BUILDING FOUNDATION	2500 SF	500	17043	308	1961	0	0	227	19539
200 .212300 .	REBAR-CONTINUOUS FOOTINGS BUILDING FOUNDATION	87500 LB	875	34322	5203	20405	0	0	2561	62491
200 .213000 .	EMBEDDED METALS-BLDG FDNS	1400 LB	85	3025	0	2226	0	0	223	5474
200 .214100 .	CONCRETE-FOOTINGS & PEDESTALS 3000 PSI BUILDING FOUNDATION	700 CY	862	31322	5240	37842	0	0	4308	78712
200 .220000 .	COLUMN CONCRETE OFFICE AREA	22 CY	220	8084	1023	2665	0	0	369	12141
200 .221000 .	FORMS-EQUIP FOUNDATIONS	340 SF	89	3034	55	551	0	0	61	3701
200 .221400 .	FORMS-RING FOUNDATIONS 50' CLEAN COAL THICKENER	4200 SF	788	30250	486	6455	0	0	694	37885
200 .221405 .	FORMS-RING FOUNDATIONS 55' REFUSE THICKENER	4600 SF	863	33129	532	7070	0	0	760	41491
200 .221500 .	FORMS-SMALL PIERS	805 SF	193	6579	119	1152	0	0	127	7977
200 .222000 .	REBAR-EQUIP FOUNDATIONS	6500 LB	55	2229	325	1516	0	0	184	4254

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
200 .222400 .	REBAR-RING FOUNDATIONS 50' CLEAN COAL THICKENER	7400 LB	71	2785	422	1726	0	0	215	5148
200 .222405 .	REBAR-RING FOUNDATIONS 55' REFUSE THICKENER	7800 LB	75	2942	445	1819	0	0	226	5432
200 .222500 .	REBAR-SMALL PIERS	3125 LB	31	1256	184	729	0	0	91	2260
200 .223000 .	EMBEDDED METALS-EQUIP FDNS	260 LB	13	463	0	413	0	0	41	917
200 .223400 .	EMB METALS-RING FOUNDATIONS 50' CLEAN COAL THICKENER	400 LB	20	786	0	636	0	0	64	1486
200 .223405 .	EMB METALS-RING FOUNDATIONS 55' REFUSE THICKENER	400 LB	20	786	0	636	0	0	64	1486
200 .223500 .	EMBEDDED METALS-SM PIERS	100 LB	5	178	0	159	0	0	16	353
200 .224000 .	CONCRETE-EQUIP FOUNDATIONS 3000 PSI	52 CY	90	2759	550	2811	0	0	336	6456
200 .224403 .	CONCRETE-RING FDNS-PUMPED 3000 PSI 50' CLEAN COAL THICKENER	75 CY	125	4528	692	4055	0	0	475	9750
200 .224404 .	CONCRETE-RING FDNS-PUMPED 3000 PSI 55' REFUSE THICKENER	80 CY	133	4818	738	4325	0	0	506	10387
200 .224500 .	CONCRETE - SMALL PIERS, 3000 PSI	25 CY	45	1380	276	1352	0	0	163	3171
200 .231100 .	FORMS - MAT FOUNDATIONS 50' CLEAN COAL THICKENER	120 SF	20	768	12	93	0	0	11	884
200 .2311001.	FORMS - MAT FOUNDATIONS 55' REFUSE THICKENER	132 SF	22	845	14	102	0	0	12	973
200 .232100 .	REBAR - MAT FOUNDATIONS 50' CLEAN COAL THICKENER	12875 LB	129	5060	766	3002	0	0	377	9205
200 .2321001.	REBAR - MAT FOUNDATIONS 55' REFUSE THICKENER	15000 LB	150	5884	892	3498	0	0	439	10713
200 .233150 .	ANCHOR BOLTS-MAT FOUNDATIONS 50' CLEAN COAL THICKENER	120 LB	5	197	0	191	0	0	19	407
200 .2331501.	ANCHOR BOLTS-MAT FOUNDATIONS 55' REFUSE THICKENER	120 LB	5	197	0	191	0	0	19	407
200 .234103 .	CONCRETE - MAT FDNS PUMPED 3000 PSI 50' CLEAN COAL THICKENER	105 CY	49	1775	269	5676	0	0	595	8315
200 .2341031.	CONCRETE - MAT FDNS PUMPED 3000 PSI 55' REFUSE THICKENER	120 CY	55	1992	307	6487	0	0	679	9465
200 .241300 .	FORMS - SUSPENDED SLAB	1420 SF	241	8262	195	1641	0	0	184	10282
200 .242300 .	REBAR - SUSPENDED SLAB	11400 LB	114	4617	673	2658	0	0	333	8281
200 .244303 .	CONCRETE - SUSPENDED SLAB PUMPED, 3000 PSI	230 CY	347	10455	1922	12434	0	0	1436	26247
200 .431306 .	VAPOR BARRIER-6 MIL POLY OFFICE AREA	1200 SF	3	103	0	22	0	0	2	127

--WORK BREAKDOWN--- FACIL.	STANDRD.	WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
200	.432212	.	F.G.INSULATION RIGID - WALL 2" THICK - R8.3 OFFICE AREA	1200 SF	10	343	0	1094	0	0	109	1546
	TOTAL		CONCRETE AND FOUNDATIONS		6,512	239,827	24,678	141,066	0	0	16,578	422,149
300			STRUCTURAL STEEL									
300	.310110	.	STRUCTURAL STEEL - LIGHT UP TO 25LB/LF	49 TON	980	38269	5669	110113	0	0	11578	165629
300	.3101101	.	STRUCTURAL STEEL - LIGHT EQUIPMENT FOUNDATIONS	560 LB	8	312	45	712	0	0	76	1145
300	.310120	.	STRUCTURAL STEEL - MEDIUM 25 LB/LF TO 49LB/LF	190 TON	2850	111293	16486	314184	0	0	33067	475030
300	.310130	.	STRUCTURAL STEEL - HEAVY OVER 50 LB/LF	15 TON	180	7029	1041	20352	0	0	2139	30561
300	.321110	.	GRATING -PLATFORMS, GALV.STL	661 SF	99	4072	398	7882	0	0	828	13180
300	.322105	.	1/4" PLATEWORK @ SUMPS	690 LB	8	314	33	775	0	0	81	1203
300	.324000	.	STAIR INCLUDING SUPPORT STEEL & HANDRAIL	101 LF	162	6372	1385	8672	0	0	1006	17435
300	.325100	.	LADDERS WITH CAGE	10 LF	7	277	48	578	0	0	63	966
300	.331200	.	PLATEWORK	6 TON	240	9367	1364	15264	0	0	1663	27658
300	.399110	.		260 TON	702	27483	3250	11024	0	0	1427	43184
	TOTAL		STRUCTURAL STEEL		5,236	204,788	29,719	489,556	0	0	51,928	775,991
400			ARCHITECTURAL WORK									
400	.284109	.	10" THICK PRECAST DOOR LINTELS	93 LF	16	622	200	1949	0	0	215	2986
400	.353186	.	METAL STUDS AND JOISTS, GALV. 18 GA., 6"	572 LF	13	510	53	609	0	0	66	1238
400	.415210	.	CMU BLOCK WALLS, 10" EVERY OTHER CELL GROUTED 1 LB REBAR/SF	3871 SF	503	17921	394	12023	0	0	1242	31580
400	.4152101	.	CMU BLOCK WALLS, 10" LINTEL BLOCK	437 LF	78	2779	61	5605	0	0	567	9012
400	.415406	.	CMU BLOCK WALLS, 6" LINTEL BLOCK AT TOP OF WALL	126 LF	22	784	17	821	0	0	84	1706
400	.432111	.	INSULATION, 3-1/2" BATT-R11 FOIL FACED	4187 SF	21	819	0	1021	0	0	102	1942
400	.434618	.	SIDING GALV RIBBED STL 18GA	16632 SF	685	23526	615	53189	0	0	5380	82710
400	.434622	.	SIDING GALV RIBBED STL 22GA	7863 SF	331	12191	298	20979	0	0	2128	35596
400	.434624	.	SIDING GALV RIBBED STL 24GA	20924 SF	871	32082	795	52565	0	0	5336	90778
400	.437100	.	FLASHING METAL, AVG.	1025 SF	62	2420	0	2499	0	0	250	5169

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
400 .441012 .	DOOR HM SINGLE, 20 GA.W/FRAME AND HEAVY HARDWARE AVG.	15 EA	67	2368	0	11852	0	0	1185	15405
400 .441062 .	DOOR,HM,DOUBLE, 18GA.W.FRAME & HEAVY HARDWARE AVG. FIRERATED	1 EA	4	141	0	1311	0	0	131	1583
400 .441065 .	DOUBLE HM DOOR W/HEAVY HARDWARE 4' X 10'	1 EA	8	313	0	1908	0	0	191	2412
400 .441214 .	DOUBLE HM DOOR W/HEAVY HARDWARE 4' X 7'	3 EA	15	586	0	4770	0	0	477	5833
400 .441603 .	TRANSOM REMOVABLE	34 SF	9	352	0	541	0	0	54	947
400 .443200 .	DOOR ROLL-UP (NO OPERATOR)	200 SF	32	1323	0	2258	0	0	226	3807
400 .443280 .	MOTOR OPERATOR AND SAFETY BAR FOR ROLL-UP DOOR	2 EA	8	331	0	2406	0	0	241	2978
400 .445220 .	WINDOW-STL INSULATED GLASS	32 SF	3	118	0	397	0	0	40	555
400 .446113 .	TEMPERED GLASS	13 SF	3	117	0	103	0	0	10	230
400 .454311 .	TERRAZZO CAST-IN-PLACE 1-3/4", GRAY CEMENT	1400 SF	98	3632	182	2834	0	0	302	6950
400 .454326 .	TERRAZZO BASE CAST-IN-PLACE 6"	247 SF	17	630	31	270	0	0	30	961
400 .455100 .	CEILING MINERAL FIBER SUSPEND	1470 SF	34	1329	0	1901	0	0	190	3420
400 .456186 .	FLR BASE VINYL/RUBBER 6"	62 LF	2	78	0	39	0	0	4	121
400 .459111 .	PAINTING - MASONRY BLOCK WALL 2 COATS BRUSHED	15000 SF	150	5265	480	1113	0	0	159	7017
400 .461505 .	WASTE RECEPTACLES W/SWING TOP 13 GAL. CAP. #2250	5 EA	20	782	0	806	0	0	81	1669
400 .461510 .	PAPER TOWEL DISPENSER W/MIRROR AND SOAP DISPENSER SURFACE MOUNTED #B3309	4 EA	16	625	0	1153	0	0	115	1893
400 .461515 .	PAPER TOWEL DISPENSER SURFACE MOUNTED #262	2 EA	4	156	0	87	0	0	9	252
400 .461520 .	SOAP DISPENSER (LIQUID) SURFACE MOUNTED #B150	2 EA	4	156	0	22	0	0	2	180
400 .461525 .	MIRROR (24 X 30) AND SHELF #B292	1 EA	4	156	0	131	0	0	13	300
400 .461530 .	TOILET TISSUE DISPENSER DOUBLE ROLL W/SHELF #B28407	2 EA	4	156	0	242	0	0	24	422
400 .461535 .	SANITARY NAPKIN DISPENSER /SURFACE MOUNTED #B282	1 EA	4	156	0	297	0	0	30	483
400 .461540 .	SANITARY NAPKIN DISPOSAL W/UTILITY SELF-SERVICE MOUNTED #B271	1 EA	4	156	0	38	0	0	4	198

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
400 .461545 .	COAT HOOK STRIP (3 HOOK) B232X24	3 EA	6	234	0	116	0	0	12	362
400 .461550 .	MOP AND BROOM HOLDER W/SHELF B239X34	1 EA	2	78	0	155	0	0	16	249
400 .461555 .	STAINLESS STEEL SHELF B296X24	1 EA	2	78	0	33	0	0	3	114
400 .461560 .	SHOWER STALL CURTAIN ROD W/VINYL SHOWER CURTAIN AND HOOKS #204-2	3 EA	6	234	0	143	0	0	14	391
400 .461565 .	HEAVY DUTY ROBE HOOK B2116	3 EA	6	234	0	38	0	0	4	276
400 .465100 .	LOCKERS METAL - 60"-72" SINGLE TIER	16 EA	13	508	0	1526	0	0	153	2187
400 .465200 .	LOCKER BENCH WOOD W/ PIPE PEDESTALS	8 LF	1	39	0	132	0	0	13	184
TOTAL	ARCHITECTURAL WORK		3,148	113,985	3,126	187,882	0	0	19,103	324,096
500	EQUIPMENT INSTALLATION									
500 .100000 .	PLANT FEED CONVEYOR BY OTHERS-NOT PART OF THIS PROJECT	1 EA	0	0	0	0	0	0	0	0
500 .100100 .	PLANT FEED CONVEYOR HEAD END DISCHARGE HOPPER WT. 1300#	1 EA	32	1243	274	2120	0	0	239	3876
500 .100200 .	PLANT FEED CONVEYOR DISCHARGE CHUTE FROM HOPPER TO CRUSHER WT. 1100#	1 EA	32	1243	274	1855	0	0	213	3585
500 .105000 .	BELT MAGNET ERIEZ MODEL SE7235MC1	1 EA	24	933	206	0	0	4934	21	6094
500 .105100 .	BELT MAGNET RECTIFIER ERIEZ MODEL 36C-1800WATTS	1 EA	24	940	86	0	0	1771	9	2806
500 .110000 .	RAW COAL CRUSHER #1 GUNDLACH MODEL 45DA	1 EA	160	6217	1371	0	0	37100	137	44825
500 .110100 .	#1 RAW COAL CRUSHER DISCHARGE CHUTE TO RAW COAL CRUSHER #2 WT. 1100#	1 EA	32	1243	274	1855	0	0	213	3585
500 .111000 .	RAW COAL CRUSHER #2 GUNDLACH MODEL 45DA	1 EA	160	6217	1371	0	0	79500	137	87225
500 .111100 .	RAW COAL CRUSHER #2 DISCHARGE CHUTE TO RAW COAL SCREEN WT. 1500#	1 EA	32	1243	274	2385	0	0	266	4168
500 .112000 .	RAW COAL SCREEN TABOR 4' X 12' VIBRATING SCREEN INCLINED	1 EA	400	15543	3429	0	0	16960	343	36275

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
500 .112100 .	RAW COAL SCREEN UNDER FLOW PAN TO COLLECT FINES WT. 2000#	1 EA	64	2487	549	3180	0	0	373	6589
500 .112200 .	RAW COAL SCREEN OVER FLOW HOPPER AND CHUTE WT. 1400#	1 EA	32	1243	274	2226	0	0	250	3993
500 .113000 .	OVERSIZE BUCKET ELEVATOR GOODMAN	1 EA	400	15543	3429	0	0	25355	343	44670
500 .113200 .	OVERSIZE BUCKET ELEVATOR TOP DISCHARGE CHUTE WT. 600#	1 EA	24	933	206	1060	0	0	127	2326
500 .115000 .	RAW COAL FEED SUMP WT. 3000#	1 EA	120	4663	1029	5300	0	0	633	11625
500 .120000 .	RAW COAL FEED PUMP GOYNE PUMP	1 EA	32	1243	274	0	0	13627	27	15171
500 .135000 .	REFUSE CENTRIFUGE DRIVE MODEL CMI HVC-20	1 EA	32	1243	274	0	0	86920	27	88464
500 .135100 .	REFUSE CENTRIFUGE VIBRATOR MODEL CMI HVC-20	1 EA	24	933	206	0	0	0	21	1160
500 .135200 .	REFUSE CENTRIFUGE OIL PUMP MODEL CMI HVC-20	1 EA	24	933	206	0	0	0	21	1160
500 .135300 .	REFUSE CENTRIFUGE DRIVE DISCHARGECHUTE WT. 2000#	1 EA	48	1865	411	3392	0	0	380	6048
500 .140000 .	DESLIME SIEVE BEND 3'WIDE,80"RAD,60, .35MM, 3/32 ISO	2 EA	96	3730	823	0	0	9752	82	14387
500 .140100 .	DESLIME SIEVE BEND DISCHARGE CHUTE WT. 700#	2 EA	64	2487	549	2332	0	0	288	5656
500 .145000 .	DESLIME SCREEN TABOR 4' X 12'STD. VIBRATING HORIZONTAL	1 EA	160	6217	1371	0	0	20670	137	28395
500 .145100 .	DESLIME SCREEN DISCHARGE CHUTE #1 WT. 600#	1 EA	32	1243	274	954	0	0	123	2594
500 .145200 .	DESLIME SCREEN DISCHARGE CHUTE #2 WT. 1000#	1 EA	32	1243	274	1590	0	0	186	3293
500 .145300 .	DESLIME SCREEN UNDERFLOW PAN WT. 1400#	1 EA	32	1243	274	2226	0	0	250	3993
500 .145400 .	DESLIME AND MIDLS DISCHARGE CHUTE WT. 1500#	1 EA	32	1243	274	2650	0	0	292	4459
500 .150000 .	MIDDLINGS CRUSHER DRIVE #1 GUNDLACH CAGEPACTOR	1 EA	240	9326	2057	0	0	125811	206	137400
500 .150100 .	MIDDLINGS CRUSHER DISCHARGE CHUTE WT. 500#	1 EA	24	933	206	954	0	0	116	2209
500 .150200 .	MIDDLINGS CRUSHER DRIVE #2 GUNDLACH CAGEPACTOR W/500.150000	1 EA	240	9326	2057	0	0	0	206	11589

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
500 .150300 .	CRUSHER DISCHARGE CHUTE PLATEWORK WT. 1600#	1 EA	32	1243	274	2650	0	0	292	4459
500 .151000 .	OVERSIZE PROTECTION SUMP PLATEWORK WT. 2700#	1 EA	32	1243	274	5300	0	0	557	7374
500 .152000 .	OVERSIZE PROTECTION PUMP GOYNE PUMP	1 EA	32	1249	168	0	0	12912	17	14346
500 .153000 .	OVERSIZE PROTECTION SIEVE BEND 5'WIDE,40"R,60, .35MM, 3/32 ISO	2 EA	96	3730	823	0	0	10600	82	15235
500 .153100 .	OVERSIZE PROTECTION SIEVE BEND DISCHARGE HOPPER WT. 500#	1 EA	32	1243	274	954	0	0	123	2594
500 .153200 .	OVERSIZE PROTECTION SIEVE BEND DISCHARGE CHUTE WT.1100#	1 EA	32	1243	274	1908	0	0	218	3643
500 .155000 .	FINE HYDRO FEED SUMP PLATEWORK WT. 2700#	1 EA	48	1865	411	5300	0	0	571	8147
500 .160000 .	FINE HYDRO FEED PUMP GOYNE PUMP	1 EA	32	1249	168	0	0	14578	17	16012
500 .165000 .	FINE HYDROCLONES KREBS 10" DIAMETER WITH/STAND	5 EA	160	6217	1371	0	0	83475	137	91200
500 .165100 .	FINE CYCLONE HOPPER WT. 1800#	5 EA	120	4663	1029	15900	0	0	1693	23285
500 .202000 .	CLASSIFYING CYCLONE SUMP PLATEWORK WT. 2700#	1 EA	48	1865	411	5300	0	0	571	8147
500 .205000 .	CLASSIFYING CYCLONE PUMP GOYNE PUMP	1 EA	32	1249	168	0	0	30493	17	31927
500 .207000 .	CLASSIFYING CYCLONES KREBS 10" DIAMETER WITH/STAND	8 EA	256	9947	2194	0	0	127624	219	139984
500 .207100 .	CLASSIFYING CYCLONES HOPPER WT. 1800	8 EA	192	7460	1646	25440	0	0	2709	37255
500 .208000 .	VARI-SIEVE KREBS 5'WIDE VARI-SIEVE	2 EA	96	3730	823	0	0	103414	82	108049
500 .208100 .	VARI-SIEVE DISCHARGE CHUTE WT. 1000#	2 EA	48	1865	411	3180	0	0	359	5815
500 .210100 .	10' DIA. X 6' CONICAL BALL MILL	1 EA	800	31085	6857	0	0	606320	686	644948
500 .210200 .	BALL MILL DISCHARGE CHUTE WT. 3000#	1 EA	160	6217	1371	4770	0	0	614	12972
500 .215000 .	ADVANCED FLOTATION FEED SUMP PLATEWORK WT. 2700#	1 EA	32	1243	274	5300	0	0	557	7374
500 .220100 .	ADVANCED FLOTATION FEED PUMP GOYNE PUMP	1 EA	32	1249	168	0	0	25803	17	27237
500 .225000 .	FLOTATION FEED DISTRIBUTER PLATEWORK WT. 2500#	1 EA	32	1243	274	5300	0	0	557	7374
500 .230100 .	ADVANCED FLOTATION CELL ICFKE MICROCEL MODEL 12025	4 EA	1600	62171	13715	0	0	466400	1372	543658

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
500 .230200 .	ADVANCED FLOTATION PUMP GOYNE PUMP	4 EA	128	4998	674	0	0	0	67	5739
500 .240000 .	COAL STATIC THICKENER DRIVE EIMCO 50' DIAMETER HIRATE	1 EA	400	15543	3429	0	0	68900	343	88215
500 .240100 .	COAL STATIC THICKENER LIFTING DEVICEC, EMICO 50' DIAMETER HIRATE	1 EA	128	4974	1097	0	0	0	110	6181
500 .245000 .	COAL THICKENER CLARIFIED WATER SUMP, PLATEWORK WT. 11000#	1 EA	64	2487	549	18550	0	0	1910	23496
500 .247000 .	COAL THICKENER CLARIFIED WATER PUMP, GOYNE PUMP	1 EA	64	2499	337	0	0	30152	34	33022
500 .249000 .	COAL STATIC THICKENER UNDER FLOW PUMP, GOYNE PUMP	1 EA	32	1249	168	0	0	12207	17	13641
500 .260000 .	CLEAN COAL FILTER DRIVE, ANDRITZ RUTHNER,INC.	1 EA	400	15543	3429	0	0	1228710	343	1248025
500 .260100 .	AGITATORS ANDRITZ RUTHNER, INC. W/500.260000	3 EA	120	4663	1029	0	0	0	103	5795
500 .260200 .	DISCHARGE GATES, ANDRITZ RUTHNER, INC. W/500.260000	1 EA	64	2487	549	0	0	0	55	3091
500 .260300 .	AIR COMPRESSOR, AIRTEC	1 EA	200	7809	1053	0	0	52391	105	61358
500 .260400 .	FILTRATE PUMP GOYNE PUMP	1 EA	64	2499	337	0	0	8509	34	11379
500 .260500 .	LUBRICATOR, ANDRITZ RUTHNER,INC. W/500.260000	1 EA	32	1243	274	0	0	0	27	1544
500 .260600 .	AUXILLARY AIR COMPRESSOR ANDRITZ RUTHNER, INC. W/500.260000	1 EA	64	2499	337	0	0	0	34	2870
500 .260700 .	INTERNAL CONVEYOR, ANDRITZ RUTHNER,INC. W/500.260000	1 EA	64	2487	549	0	0	0	55	3091
500 .260800 .	CLEAN COAL FILTER DISCHARGE CHUTE, PLATEWORK WT.900#	1 EA	32	1243	274	1590	0	0	186	3293
500 .265000 .	CLEAN COAL BELT CONVEYOR BY OTHERS NOT INCLUDED IN THIS CONTRACT	1 EA	0	0	0	0	0	0	0	0
500 .275000 .	REFUSE STATIC THICKENER DRIVE EMICO 60' DIAMETER HIRATE	1 EA	400	15543	3429	0	0	74200	343	93515
500 .275100 .	REFUSE STATIC THICKENER LIFTING DEVICE, EMICO 60' DIAMETER HIRATE	1 EA	128	4974	1097	0	0	0	110	6181

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
500 .290000 .	REFUSE STATIC THICKENER UNDERFLOW PUMP GOYNE PUMP	1 EA	64	2499	337	0	0	13928	34	16798
500 .315100 .	REFUSE CONVEYOR BY OTHERS NOT PART OF THIS CONTRACT	1 EA	0	0	0	0	0	0	0	0
500 .320100 .	HEAVY MEDIA CYCLONE SUMP PLATEWORK WT. 2500#	1 EA	32	1243	274	4240	0	0	451	6208
500 .325000 .	HEAVY MEDIA CYCLONE PUMP[GOYNE PUMP	1 EA	32	1249	168	0	0	16797	17	18231
500 .330000 .	HEAVY MEDIA CYCLONE KREBS 20" DIAMETER CERAMIC	1 EA	40	1554	343	0	0	39697	34	41628
500 .330100 .	HEAVY MEDIA CYCLONE OVERFLOW BOX PLATEWORK WT. 2000#	1 EA	32	1243	274	3180	0	39697	345	44739
500 .335000 .	MIDS SIEVE BEND 3'WIDE,80"R,60, .5MM,3/32 ISO	1 EA	48	1865	411	0	0	4876	41	7193
500 .335100 .	MIDS SIEVE BEND DISCHARGE CHUTE P[LATEWORK WT. 1000#	1 EA	24	933	206	1590	0	0	180	2909
500 .340000 .	MIDS DRAIN AND RINSE SCREEN TABOR 4'X16' SD VIBRATING, HORIZONTAL	1 EA	160	6217	1371	0	0	23320	137	31045
500 .340100 .	MIDS DRAIN AND RINSE SCREEN UNDERFLOW PAN PLATEWORK WT. 3500#	1 EA	160	6217	1371	6360	0	0	773	14721
500 .340200 .	MIDS DRAIN AND RINSE SCREEN DISCHARGE CHUTE PLATEWORK WT. 2000#	1 EA	32	1243	274	3180	0	0	345	5042
500 .340300 .	MIDLS DESLIME DISCHARGE CHUTE PLATEWORK WT. 1600#	1 EA	32	1243	274	2650	0	0	292	4459
500 .345000 .	REFUSE SIEVE BEND 3'WIDE,40"R,60, .5MM,3/32 ISO	1 EA	64	2487	549	0	0	2332	55	5423
500 .345100 .	REFUSE SIEVE BEND DISCHARGE CHUTE PLATEWORK WT. 1000#	1 EA	24	933	206	0	0	0	21	1160
500 .350000 .	REFUSE DRAIN AND RINSE SCREEN TABOR 4'X16' SD VIBRATING NORIZONTAL	1 EA	160	6217	1371	0	0	23320	137	31045
500 .350100 .	REFUSE DRAIN AND RINSE SCREEN UNDERFLOW PAN PLATEWORK WT. 2200#	1 EA	160	6217	1371	3710	0	0	508	11806
500 .350200 .	REFUSE DRAIN AND RINSE SCREEN DISCHARGE CHUTE PLATEWORK WT. 1200#	1 EA	24	933	206	2120	0	0	233	3492
500 .350300 .	REFUSE DRAIN AND RINSE SCREEN DISCHARGE CHUTE TO REFUSE CENTRIFUGE DRIVE WT. 300#	1 EA	24	933	206	636	0	0	84	1859

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
500 .350400 .	REFUSE DRAIN AND RINSE SCREEN DISCHARGE CHUTE TO REFUSE CONVEYOR WT. 1000#	1 EA	24	933	206	1590	0	0	180	2909
500 .360000 .	HEAVY MEDIA CONTROL BOX PLATEWORK WT. 1000#	1 EA	32	1243	274	1855	0	0	213	3585
500 .365000 .	HEAVY MEDIA SENSOR BOX PLATEWORK WT. 400#	1 EA	16	622	137	795	0	0	93	1647
500 .370000 .	DILUTE MEDIA SUMP PLATEWORK WT. 2200#	1 EA	32	1243	274	4240	0	0	451	6208
500 .375100 .	DILUTE MEDIA PUMP GOYNE PUMP	1 EA	64	2499	337	0	0	11546	34	14416
500 .380000 .	MAGNETIC SEPARATOR ERIEZ 36" DIAMETER X 9'WIDE	1 EA	64	2487	549	0	0	16960	55	20051
500 .380100 .	MAGNETIC SEOARATOR TAILINGS CHUTE AND CONCENTRATE CHUTE PLATEWORK WT. 2600#	1 EA	48	1865	411	4240	0	0	465	6981
500 .385000 .	MAGNITITE BIN PLATEWORK WT. 3000#	1 EA	32	1243	274	5300	0	0	557	7374
500 .385100 .	MAGNITITE BIN DUST COLLECTOR AMERICAN AIR FILTER	1 EA	32	1243	274	0	0	7579	27	9123
500 .390000 .	MAGNITITE ROTARY VALVE ANDRITZ SPROUT-BAUER	1 EA	24	933	206	0	0	2899	21	4059
500 .390100 .	MAGNETIC ROTARY VALVE DISCHARGE CHUTE PLATEWORK WT. 60#	1 EA	16	622	137	318	0	0	46	1123
500 .395000 .	INSTRUMENT AIR COMPRESSOR AIRTEC	1 EA	64	2499	337	0	0	12036	34	14906
500 .395100 .	INSTRUMENT AIR COMPRESSOR DRYER AIRTEC EQUIPMENT IN 395000	1 EA	24	937	126	0	0	0	13	1076
500 .395200 .	INSTRUMENT AIR COMPRESSOR PREFILTERS AIRTEC EQUIPMENT IN 395000	1 EA	24	937	126	0	0	0	13	1076
500 .395300 .	INSTRUMENT AIR COMPRESSOR AFTERFILTERS AIRTEC EQUIPMENT IN 395000	2 EA	48	1874	253	0	0	0	25	2152
500 .398000 .	PLANT AND COLUMN AIR COMPRESSOR AIRTEC	1 EA	64	2499	337	0	0	52391	34	55261
500 .398100 .	PLANT AND COLUMN AIR COMPRESSOR-PREFILTERS AIRTEC EQUIPMENT IN 398000	1 EA	24	937	126	0	0	0	13	1076
500 .398200 .	PLANT AND COLUMN AIR COMPRESSOR AFTERFILTERS EQUIPMENT IN 398000	2 EA	48	1874	253	0	0	0	25	2152
500 .400000 .	FLOCCULATION SYSTEM CONSIST OF ITEMS 400100 THRU 401000	1 EA	0	0	0	0	0	0	0	0

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
500 .400100 .	FLOCCULANT SYSTEM ANIONIC FEEDER MINETEC	1 EA	32	1243	274	0	0	1272	27	2816
500 .400200 .	FLOCCULANT SYSTEM ANIONIC MIXER MINETEC	1 EA	24	933	206	0	0	1590	21	2750
500 .400300 .	FLOCCULANT SYSTEM ANIONIC MIX TANK MINETEC	1 EA	24	933	206	0	0	4240	21	5400
500 .400400 .	FLOCCULANT SYSTEM ANIONIC HOLDING TANK MINETEC	1 EA	32	1243	274	0	0	5300	27	6844
500 .400500 .	FLOCCULANT SYSTEM ANIONIC METERING PUMP MINETEC	2 EA	64	2499	337	0	0	3721	34	6591
500 .400600 .	FLOCCULANT SYSTEM CATIONIC HOLDING TANK MINETEC	1 EA	32	1243	274	0	0	6360	27	7904
500 .400700 .	FLOCCULANT SYSTEM CATIONIC METERING PUMP MINETEC	2 EA	48	1874	253	0	0	3721	25	5873
500 .400800 .	FLOCCULANT SYSTEM SETTLING RATE DETECTOR MINETEC	2 EA	32	1243	274	0	0	38775	27	40319
500 .400900 .	FLOCCULANT SYSTEM WATER CLARITY MEASUREMENT MINETEC	2 EA	32	1243	274	0	0	8946	27	10490
500 .401000 .	FLOCCULANT SYSTEM PH REAGENT PUMP MINETEC	1 EA	24	937	126	0	0	1860	13	2936
500 .405000 .	REAGENT SYSTEM COMPLETE INCLUDING ITEMS 405100 THRU 405800 MINETEC	1 LOT	0	0	0	0	0	0	0	0
500 .405100 .	REAGENT SYSTEM FROTHER BULK STORAGE MINETEC	1 EA	32	1243	274	0	0	2385	27	3929
500 .405200 .	REAGENT SYSTEM FROTHER TRANSFER PUMP MINETEC	1 EA	0	0	0	0	0	3721	0	3721
500 .405300 .	REAGENT SYSTEM FROTHER DAY TANK MINETEC	1 EA	32	1243	274	0	0	3180	27	4724
500 .405400 .	REAGENT SYSTEM FROTHER REAGENT PUMPS MINETEC	4 EA	96	3748	505	0	0	7441	51	11745
500 .405500 .	REAGENT SYSTEM COLLECTOR BULK STORAGE MINETEC	1 EA	32	1243	274	0	0	2385	27	3929
500 .405600 .	REAGENT SYSTEM COLLECTOR TRANSFER PUMPS MINETEC	1 EA	24	937	126	0	0	3721	13	4797
500 .405700 .	REAGENT SYSTEM COLLECTOR DAY TANK MINETEC	1 EA	32	1243	274	0	0	3180	27	4724
500 .405800 .	REAGENT SYSTEM COLLECTION REAGENT FEEDERS MINETEC	4 EA	96	3730	823	0	0	7441	82	12076
500 .410000 .	OVERDENSE MEDIA SUMP PLATEWORK WT. 2000#	1 EA	32	1243	274	3710	0	0	398	5625
500 .415000 .	OVERDENSE MEDIA PUMP GOYNE PUMP	1 EA	32	1249	168	0	0	8678	17	10112
500 .420000 .	OVERDENSE MEDIA CONTROL BOX PLATEWORK WT. 1000#	1 EA	32	1243	274	1590	0	0	186	3293

--WORK BREAKDOWN--- FACIL.	STANDRD.	WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
500	.425000	.	OVERDENSE MEDIA SENSOR BOX PLATEWORK WT. 400#	1 EA	16	622	137	795	0	0	93	1647
500	.430000	.	BALL MILL OVERHEAD CRANE HOIST THERN	1 EA	24	933	206	0	0	44520	21	45680
500	.430100	.	BALL MILL OVERHEAD CRANE TRAM RUNWAY THERN	1 LOT	128	4974	1097	0	0	8480	110	14661
500	.481105	.	LAB EQUIPMENT - OVEN (91-2150-1) PREISER SCIENTIFIC	1 EA	0	0	0	0	0	7632	0	7632
500	.481110	.	LAB EQUIPMENT - OVEN (91-2290-83) PREISER SCIENTIFIC	1 EA	0	0	0	0	0	2862	0	2862
500	.481115	.	LAB EQUIPMENT - TABLE (80-1345-01) PREISER SCIENTIFIC	1 EA	0	0	0	0	0	403	0	403
500	.481120	.	LAB EQUIPMENT - DESK (80-1345-01) PREISER SCIENTIFIC	1 EA	0	0	0	0	0	785	0	785
500	.481125	.	LAB EQUIPMENT - EXHAUST HOOD (80-2200-03) PREISER SCIENTIFIC	1 EA	0	0	0	0	0	2424	0	2424
500	.481130	.	LAB EQUIPMENT - CABINETS PREISER SCIENTIFIC	1 LOT	0	0	0	0	0	1985	0	1985
500	.485000	.	CLEAN UP PUMP 7.5HP/TEFC/480V/1800RPM	1 EA	64	2487	549	0	0	5599	55	8690
500	.495000	.	GLAND WATER PUMP 5HP/TEFC/480V/1800RPM	1 EA	64	2487	549	0	0	3407	55	6498
500	.500100	.	SLURRY SAMPLERS - 5 HP/TEFC/ 480V/1800 RPM	3 EA	120	4663	1029	0	0	14930	103	20725
500	.500200	.	DRY SAMPLERS - 5 HP/TEFC/ 480V/1800 RPM	2 EA	80	3109	686	0	0	13483	69	17347
500	.501300	.	AUTOMATIC FLOC MIXING SYSTEM 1.50HP/TEFC/480V/1800RPM	1 EA	32	1243	274	0	0	16483	27	18027
	TOTAL		EQUIPMENT INSTALLATION		12,080	469,655	98,705	187,620	0	3,887,376	28,632	4,671,988
600			PIPING									
600	.601056	.	PIPE BLK PE EW 53 S40 1-1/2"	100 LF	7	273	37	136	0	0	17	463
600	.601060	.	PIPE BLK TC EW 53 S40 1/2"	143 LF	3	117	15	84	0	0	10	226
600	.601062	.	PIPE BLK TC EW 53 S40 3/4"	281 LF	11	429	59	197	0	0	26	711
600	.601064	.	PIPE BLK TC EW 53 S40 1"	440 LF	22	859	116	430	0	0	55	1460
600	.601065	.	PIPE BLK TC EW 53 S80 1"	14 LF	1	39	4	24	0	0	3	70
600	.601069	.	PIPE BLK TC EW 53 S80 1-1/2	7 LF	1	39	3	19	0	0	2	63
600	.601070	.	PIPE BLK TC EW 53 S40 2"	823 LF	82	3202	433	1685	0	0	212	5532

--WORK BREAKDOWN--- FACIL.	STANDRD.	WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
600	.601071	.	PIPE BLK TC EW 53 S80 2"	98 LF	12	469	62	375	0	0	44	950
600	.601375	.	90 EL FS SCRD 3000 1/2"	24 EA	3	117	18	102	0	0	12	249
600	.601376	.	90 EL FS SCRD 3000 3/4"	26 EA	5	195	25	142	0	0	17	379
600	.601377	.	90 EL FS SCRD 3000 1"	28 EA	6	234	29	221	0	0	25	509
600	.601379	.	90 EL FS SCRD 3000 1-1/2"	5 EA	2	78	8	100	0	0	11	197
600	.601380	.	90 EL FS SCRD 3000 2"	70 EA	23	898	122	1694	0	0	182	2896
600	.601386	.	45 EL FS SCRD 3000 2"	4 EA	1	39	7	105	0	0	11	162
600	.601388	.	TEE FS SCRD 3000 3/4"	4 EA	1	39	4	34	0	0	4	81
600	.601392	.	TEE FS SCRD 3000 2"	65 EA	26	1015	137	2134	0	0	227	3513
600	.601444	.	UNION FS SCRD 3000 1/2"	20 EA	2	78	13	132	0	0	15	238
600	.601445	.	UNION FS SCRD 3000 3/4"	20 EA	3	117	16	159	0	0	18	310
600	.601446	.	UNION FS SCRD 3000 1"	30 EA	5	195	28	311	0	0	34	568
600	.601449	.	UNION FS SCRD 3000 2"	20 EA	6	234	34	466	0	0	50	784
600	.601551	.	CAP FS SW 3000 1/2"	8 EA	1	39	5	22	0	0	3	69
600	.601554	.	CAP FS SW 6000 3/4"	4 EA	1	39	4	30	0	0	3	76
600	.601561	.	CAP FS SW 3000 2"	4 EA	1	39	6	48	0	0	5	98
600	.601587	.	COUPLING FS SW 3000 1/2"	11 EA	1	39	7	23	0	0	3	72
600	.601589	.	COUPLING FS SW 3000 3/4"	17 EA	2	78	13	48	0	0	6	145
600	.601591	.	COUPLING FS SW 3000 1"	4 EA	1	39	3	12	0	0	2	56
600	.601597	.	COUPLING FS SW 3000 2"	2 EA	1	39	3	21	0	0	2	65
600	.601672	.	THREADOLET FS 3000 1/2"	4 EA	0	0	0	21	0	0	2	23
600	.601673	.	THREADOLET FS 3000 3/4"	5 EA	0	0	0	31	0	0	3	34
600	.601674	.	THREADOLET FS 3000 1"	34 EA	0	0	0	235	0	0	24	259
600	.601677	.	THREADOLET FS 3000 2"	8 EA	0	0	0	98	0	0	10	108
600	.602044	.	PIPE BLK PE EW 53 S40 2-1/2"	16 LF	0	0	0	51	0	0	5	56
600	.602046	.	PIPE BLK PE EW 53 S40 3"	143 LF	0	0	0	586	0	0	59	645
600	.6020461	.	PIPE BLK PE EW 53 XS 3"	191 LF	44	1718	231	1324	0	0	156	3429
600	.602048	.	PIPE BLK PE EW 53 S40 4"	305 LF	0	0	0	1557	0	0	156	1713
600	.6020481	.	PIPE BLK PE EW 53 XS 4"	465 LF	135	5271	710	4057	0	0	477	10515
600	.602052	.	PIPE BLK PE EW 53 S40 6"	80 LF	0	0	0	693	0	0	69	762
600	.6020521	.	PIPE BLK PE EW 53 XS 6"	390 LF	179	6989	944	6528	0	0	747	15208
600	.602056	.	PIPE BLK PE EW 53 S40 8"	110 LF	0	0	0	1430	0	0	143	1573
600	.6020561	.	PIPE BLK PE EW 53 XS 8"	644 LF	399	15578	2102	16220	0	0	1832	35732
600	.602058	.	PIPE BLK PE EW 53 XS 10"	378 LF	0	0	0	17551	0	0	1755	19306
600	.602061	.	PIPE BLK PE EW 53 S40 10"	15 LF	0	0	0	275	0	0	28	303
600	.602062	.	PIPE BLK PE EW 53 S80 10"	28 LF	0	0	0	1778	0	0	178	1956
600	.602064	.	PIPE BLK PE EW 53 XS 12"	40 LF	0	0	0	2192	0	0	219	2411
600	.602067	.	PIPE BLK PE EW 53 S40 12"	25 LF	0	0	0	1121	0	0	112	1233
600	.602068	.	PIPE BLK PE EW 53 S80 12"	4 LF	0	0	0	343	0	0	34	377
600	.602070	.	PIPE BLK PE EW 53 XS 14"	45 LF	0	0	0	2849	0	0	285	3134
600	.602074	.	PIPE BLK PE EW 53 S40 14"	30 LF	0	0	0	1759	0	0	176	1935
600	.602075	.	PIPE BLK PE EW 53 S80 14"	4 LF	0	0	0	465	0	0	47	512
600	.602077	.	PIPE BLK PE EW 53 XS 16"	82 LF	0	0	0	5824	0	0	582	6406
600	.602251	.	LOOSE PIPE CS S40 2-1/2"	16 LF	2	78	10	0	0	0	1	89
600	.602254	.	LOOSE PIPE CS S40 3"	143 LF	21	820	113	0	0	0	11	944
600	.602255	.	LOOSE PIPE CS S80 3"	191 LF	34	1327	181	0	0	0	18	1526

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
600 .602257 .	LOOSE PIPE CS S40 4"	305 LF	61	2382	321	0	0	0	32	2735
600 .602258 .	LOOSE PIPE CS S80 4"	465 LF	112	4373	587	0	0	0	59	5019
600 .602263 .	LOOSE PIPE CS S40 6"	80 LF	23	898	122	0	0	0	12	1032
600 .602264 .	LOOSE PIPE CS S80 6"	390 LF	144	5622	760	0	0	0	76	6458
600 .602268 .	LOOSE PIPE CS S40 8"	110 LF	43	1679	226	0	0	0	23	1928
600 .602270 .	LOOSE PIPE CS S80 8"	672 LF	329	12845	1733	0	0	0	173	14751
600 .602272 .	LOOSE PIPE CS XS 10"	378 LF	231	9019	1213	0	0	0	121	10353
600 .602275 .	LOOSE PIPE CS S40 10"	15 LF	7	273	39	0	0	0	4	316
600 .602280 .	LOOSE PIPE CS XS 12"	40 LF	29	1132	154	0	0	0	15	1301
600 .602283 .	LOOSE PIPE CS S40 12"	25 LF	16	625	83	0	0	0	8	716
600 .602285 .	LOOSE PIPE CS S80 12"	4 LF	4	156	21	0	0	0	2	179
600 .602288 .	LOOSE PIPE CS XS 14"	45 LF	38	1484	201	0	0	0	20	1705
600 .602292 .	LOOSE PIPE CS S40 14"	30 LF	23	898	123	0	0	0	12	1033
600 .602294 .	LOOSE PIPE CS S80 14"	4 LF	5	195	27	0	0	0	3	225
600 .602296 .	LOOSE PIPE CS XS 16"	82 LF	80	3123	423	0	0	0	42	3588
600 .602408 .	90 LR BUTTW. CS S40 2-1/2"	8 EA	0	0	0	62	0	0	6	68
600 .602411 .	90 LR BUTTW. CS S40 3"	15 EA	0	0	0	115	0	0	12	127
600 .602412 .	90 LR BUTTW. CS S80 3"	12 EA	0	0	0	136	0	0	14	150
600 .602414 .	90 LR BUTTW. CS S40 4"	19 EA	0	0	0	242	0	0	24	266
600 .602415 .	90 LR BUTTW. CS S80 4"	32 EA	0	0	0	598	0	0	60	658
600 .602420 .	90 LR BUTTW. CS S40 6"	12 EA	0	0	0	374	0	0	37	411
600 .602421 .	90 LR BUTTW. CS S80 6"	19 EA	0	0	0	883	0	0	88	971
600 .602424 .	90 LR BUTTW. CS S40 8"	1 EA	0	0	0	58	0	0	6	64
600 .602425 .	90 LR BUTTW. CS S80 8"	52 EA	0	0	0	4508	0	0	451	4959
600 .602427 .	90 LR BUTTW. CS XS 10"	30 EA	0	0	0	4648	0	0	465	5113
600 .602432 .	90 LR BUTTW. CS STD 12"	3 EA	0	0	0	446	0	0	45	491
600 .602433 .	90 LR BUTTW. CS XS 12"	3 EA	0	0	0	655	0	0	66	721
600 .602437 .	90 LR BUTTW. CS STD 14"	1 EA	0	0	0	201	0	0	20	221
600 .602438 .	90 LR BUTTW. CS XS 14"	1 EA	0	0	0	271	0	0	27	298
600 .602442 .	90 LR BUTTW. CS XS 16"	2 EA	0	0	0	725	0	0	73	798
600 .602488 .	45 EL BUTTW. CS S40 3"	5 EA	0	0	0	33	0	0	3	36
600 .602501 .	45 EL BUTTW. CS S40 8"	25 EA	0	0	0	1017	0	0	102	1119
600 .602506 .	45 EL BUTTW. CS S40 10"	5 EA	0	0	0	367	0	0	37	404
600 .602508 .	45 EL BUTTW. CS STD 12"	1 EA	0	0	0	104	0	0	10	114
600 .602512 .	45 EL BUTTW. CS STD 14"	4 EA	0	0	0	563	0	0	56	619
600 .602537 .	TEE BUTTW. CS S40 3"	4 EA	0	0	0	68	0	0	7	75
600 .602538 .	TEE BUTTW. CS S80 3"	1 EA	0	0	0	23	0	0	2	25
600 .602540 .	TEE BUTTW. CS S40 4"	11 EA	0	0	0	259	0	0	26	285
600 .602546 .	TEE BUTTW. CS S40 6"	2 EA	0	0	0	85	0	0	9	94
600 .602547 .	TEE BUTTW. CS S80 6"	3 EA	0	0	0	181	0	0	18	199
600 .602550 .	TEE BUTTW. CS S40 8"	1 EA	0	0	0	79	0	0	8	87
600 .602551 .	TEE BUTTW. CS S80 8"	2 EA	0	0	0	244	0	0	24	268
600 .602553 .	TEE BUTTW. CS XS 10"	1 EA	0	0	0	198	0	0	20	218
600 .602635 .	CON RED BUTTW CS S40 3"	3 EA	0	0	0	21	0	0	2	23
600 .602638 .	CON RED BUTTW CS S40 4"	5 EA	0	0	0	47	0	0	5	52
600 .602644 .	CON RED BUTTW CS S40 6"	1 EA	0	0	0	19	0	0	2	21

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
600 .602645 .	CON RED BUTTW CS S80 6"	6 EA	0	0	0	144	0	0	14	158
600 .602648 .	CON RED BUTTW CS S40 8"	2 EA	0	0	0	52	0	0	5	57
600 .602649 .	CON RED BUTTW CS S80 8"	10 EA	0	0	0	343	0	0	34	377
600 .602651 .	CON RED BUTTW CS XS 10"	6 EA	0	0	0	286	0	0	29	315
600 .602653 .	CON RED BUTTW CS S40 10"	1 EA	0	0	0	39	0	0	4	43
600 .602656 .	CON RED BUTTW CS STD 12"	1 EA	0	0	0	61	0	0	6	67
600 .602657 .	CON RED BUTTW CS XS 12"	1 EA	0	0	0	71	0	0	7	78
600 .602662 .	CON RED BUTTW CS XS 14"	2 EA	0	0	0	256	0	0	26	282
600 .602743 .	CAP BUTTWELD CS S40 3"	3 EA	0	0	0	12	0	0	1	13
600 .602746 .	CAP BUTTWELD CS S40 4"	5 EA	0	0	0	26	0	0	3	29
600 .602752 .	CAP BUTTWELD CS S40 6"	1 EA	0	0	0	10	0	0	1	11
600 .602761 .	CAP BUTTWELD CS S40 10"	1 EA	0	0	0	23	0	0	2	25
600 .602897 .	WELDOLET CS STD 3"	8 EA	0	0	0	288	0	0	29	317
600 .602992 .	SO FLANGE CS A181 150 2-1/2"	8 EA	0	0	0	84	0	0	8	92
600 .602995 .	SO FLANGE CS A181 150 3"	37 EA	0	0	0	396	0	0	40	436
600 .602998 .	SO FLANGE CS A181 150 4"	37 EA	0	0	0	506	0	0	51	557
600 .603004 .	SO FLANGE CS A181 150 6"	33 EA	0	0	0	737	0	0	74	811
600 .603007 .	SO FLANGE CS A181 150 8"	37 EA	0	0	0	1256	0	0	126	1382
600 .603010 .	SO FLANGE CS A181 150 10"	25 EA	0	0	0	1534	0	0	153	1687
600 .603012 .	SO FLANGE CS A181 150 12"	4 EA	0	0	0	362	0	0	36	398
600 .603014 .	SO FLANGE CS A181 150 14"	11 EA	0	0	0	1374	0	0	137	1511
600 .603016 .	SO FLANGE CS A181 150 16"	1 EA	0	0	0	166	0	0	17	183
600 .603026 .	THRD. FLG CS A181 150 2-1/2"	8 EA	2	78	10	118	0	0	13	219
600 .603027 .	THRD. FLG CS A181 150 3"	8 EA	2	78	12	136	0	0	15	241
600 .603059 .	BLIND FLG CS A181 150 3"	8 EA	2	78	12	99	0	0	11	200
600 .603062 .	BLIND FLG CS A181 150 4"	8 EA	3	117	16	133	0	0	15	281
600 .603068 .	BLIND FLG CS A181 150 6"	1 EA	1	39	3	26	0	0	3	71
600 .603080 .	BLIND FLG CS A181 150 16"	1 EA	1	39	8	217	0	0	23	287
600 .603607 .	FIELD JT BW CS S40 2-1/2"	24 EA	22	859	116	26	0	0	14	1015
600 .603610 .	FIELD JT BW CS S40 3"	117 EA	129	5037	678	156	0	0	83	5954
600 .603611 .	FIELD JT BW CS S80 3"	27 EA	37	1445	196	49	0	0	25	1715
600 .603613 .	FIELD JT BW CS S40 4"	136 EA	199	7770	1045	225	0	0	127	9167
600 .603619 .	FIELD JT BW CS S40 6"	67 EA	147	5739	776	229	0	0	101	6845
600 .603620 .	FIELD JT BW CS S80 6"	59 EA	162	6325	852	337	0	0	119	7633
600 .603624 .	FIELD JT BW CS S40 8"	96 EA	281	10971	1481	569	0	0	205	13226
600 .603626 .	FIELD JT BW CS S80 8"	130 EA	476	18585	2508	1333	0	0	384	22810
600 .603628 .	FIELD JT BW CS XS 10"	75 EA	344	13431	1808	962	0	0	277	16478
600 .603631 .	FIELD JT BW CS S40 10"	38 EA	139	5427	733	282	0	0	102	6544
600 .603634 .	FIELD JT BW CS STD 12"	14 EA	61	2382	323	137	0	0	46	2888
600 .603635 .	FIELD JT BW CS XS 12"	8 EA	44	1718	230	121	0	0	35	2104
600 .603642 .	FIELD JT BW CS STD 14"	21 EA	115	4490	605	227	0	0	83	5405
600 .603643 .	FIELD JT BW CS XS 14"	6 EA	42	1640	220	100	0	0	32	1992
600 .603648 .	FIELD JT BW CS XS 16"	6 EA	51	1991	269	114	0	0	38	2412
600 .605551 .	TUBING COPPER K 3/8"	680 LF	7	273	36	575	0	0	61	945
600 .605555 .	TUBING COPPER K 1/2"	217 LF	4	156	23	209	0	0	23	411
600 .607776 .	CPLG VICT + BOLTUP STD 4"	1 EA	1	39	4	12	0	0	2	57

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
600 .607778 .	CPLG VICT + BOLTUP STD 6"	1 EA	1	39	5	21	0	0	3	68
600 .607779 .	CPLG VICT + BOLTUP STD 8"	4 EA	4	156	22	139	0	0	16	333
600 .607780 .	CPLG VICT+BOLTUP STD 10"	1 EA	1	39	6	49	0	0	6	100
600 .607781 .	CPLG VICT+BOLTUP STD 12"	2 EA	3	117	14	112	0	0	13	256
600 .651342 .	GATE VALVE, CAST STL 2-1/2" CRANE 47, CLASS 150, FLGD	8 EA	8	312	41	3821	0	0	386	4560
600 .651343 .	GATE VALVE, CAST STL 3" CRANE 47, CLASS 150, FLGD	21 EA	31	1210	161	10030	0	0	1019	12420
600 .651344 .	GATE VALVE, CAST STL 4" CRANE 47, CLASS 150, FLGD	13 EA	27	1054	142	7970	0	0	811	9977
600 .651347 .	GATE VALVE, CAST STL 8" CRANE 47, CLASS 150, FLGD	1 EA	3	117	18	1527	0	0	155	1817
600 .652103 .	GATE V VOGT FS 600 1" SW-12111	3 EA	1	39	8	137	0	0	15	199
600 .652106 .	GATE V VOGT FS 600 2" SW-12111	22 EA	22	859	113	2463	0	0	258	3693
600 .652283 .	BALL VALVE, CS 1/2" JAMESBURY A2236TT SCREWED ENDS, 2000 PSI	68 EA	28	1093	147	3822	0	0	397	5459
600 .652284 .	BALL VALVE, CS 3/4" JAMESBURY A2236TT SCREWED ENDS, 2000 PSI	15 EA	7	273	36	1132	0	0	117	1558
600 .652285 .	BALL VALVE, CS 1" JAMESBURY A2236TT SCREWED ENDS, 2000 PSI	50 EA	24	937	129	4889	0	0	502	6457
600 .653020 .	GATE VALVE, BRONZE 1-1/2" CRANE 1324, CLASS 150,SJ	2 EA	1	39	6	66	0	0	7	118
600 .653378 .	CHECK VALVE, BRONZE 2" CRANE 36, CLASS 200#, THD	1 EA	1	39	4	97	0	0	10	150
600 .653497 .	GATE VALVE, BRONZE 3" CRANE 431, CLASS 150, THD	4 EA	6	234	31	715	0	0	75	1055
600 .653716 .	CHECK VALVE, BRONZE 3" CRANE 36, CLASS 200, THD	1 EA	1	39	8	295	0	0	30	372
600 .655680 .	KNIFE GATE SS 150 4" DEZURIK 824 W/ HANDWHEEL OPER 304 SS WETTED PARTS, WAFER	3 EA	5	195	26	1084	0	0	111	1416
600 .655681 .	KNIFE GATE SS 150 6" DEZURIK 824 W/ HANDWHEEL OPER 304 SS WETTED PARTS, WAFER	4 EA	9	351	48	1772	0	0	182	2353
600 .655682 .	KNIFE GATE CI 150 8" DEZURIK 824 W/ HANDWHEEL OPER 304 SS WETTED PARTS, WAFER	2 EA	5	195	29	1208	0	0	124	1556
600 .655684 .	KNIFE GATE CI 150 12" DEZURIK 824 W/ HANDWHEEL OPER 304 SS WETTED PARTS, WAFER	4 EA	13	508	68	4181	0	0	425	5182

--WORK BREAKDOWN--- FACIL.	STANDRD.	WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
600	.655685	.	KNIFE GATE CI 150 14" DEZURIK 824 W/ BEVEL GEAR OPR 304 SS WETTED PARTS, WAFER	2 EA	7	273	37	3634	0	0	367	4311
600	.686001	.	TEST & CLEAN 1/2"	143 LF	4	156	23	23	0	0	5	207
600	.686002	.	TEST & CLEAN 3/4"	281 LF	8	312	44	45	0	0	9	410
600	.686003	.	TEST & CLEAN 1"	440 LF	13	508	70	70	0	0	14	662
600	.686004	.	TEST & CLEAN 1-1/4"	823 LF	25	976	130	174	0	0	30	1310
600	.686007	.	TEST & CLEAN 2-1/2"	16 LF	1	39	5	4	0	0	1	49
600	.686008	.	TEST & CLEAN 3"	143 LF	9	351	45	38	0	0	8	442
600	.686009	.	TEST & CLEAN 4"	305 LF	21	820	112	97	0	0	21	1050
600	.686011	.	TEST & CLEAN 6"	80 LF	6	234	34	25	0	0	6	299
600	.686012	.	TEST & CLEAN 8"	110 LF	9	351	46	35	0	0	8	440
600	.686013	.	TEST & CLEAN 10"	421 LF	42	1640	221	134	0	0	36	2031
600	.686014	.	TEST & CLEAN 12"	69 LF	8	312	40	26	0	0	7	385
600	.686015	.	TEST & CLEAN 14"	79 LF	9	351	50	29	0	0	8	438
600	.686016	.	TEST & CLEAN 16"	82 LF	11	429	60	30	0	0	9	528
	TOTAL		PIPING		4,835	188,767	25,478	157,284	0	0	18,286	389,815
675			MECHANICAL									
675	.605555	.	TUBING COPPER K 1/2"	80 LF	2	78	8	77	0	0	9	172
675	.605563	.	TUBING COPPER K 3/4"	120 LF	2	78	13	211	0	0	22	324
675	.605568	.	TUBING COPPER K 1"	200 LF	4	156	21	469	0	0	49	695
675	.605572	.	TUBING COPPER K 1-1/4"	80 LF	3	117	17	240	0	0	26	400
675	.605577	.	TUBING COPPER K 1-1/2"	10 LF	0	0	2	38	0	0	4	44
675	.605582	.	TUBING COPPER K 2"	20 LF	1	39	5	120	0	0	13	177
675	.605603	.	90 EL COPPER SOLDER 1/2"	60 EA	2	78	13	35	0	0	5	131
675	.605604	.	90 EL COPPER SOLDER 3/4"	25 EA	1	39	7	33	0	0	4	83
675	.605605	.	90 EL COPPER SOLDER 1"	40 EEE	2	78	13	127	0	0	14	232
675	.605606	.	90 EL COPPER SOLDER 1-1/4"	4 EA	0	0	2	20	0	0	2	24
675	.605607	.	90 EL COPPER SOLDER 1-1/2"	4 EA	0	0	2	31	0	0	3	36
675	.605608	.	90 EL COPPER SOLDER 2"	1 EA	0	0	1	14	0	0	2	17
675	.605617	.	TEE COPPER SOLDER 1/2"	6 EA	0	0	2	6	0	0	1	9
675	.605618	.	TEE COPPER SOLDER 3/4"	4 EA	0	0	2	10	0	0	1	13
675	.605619	.	TEE COPPER SOLDER 1"	6 EA	1	39	4	43	0	0	5	91
675	.605620	.	TEE COPPER SOLDER 1-1/4"	5 EA	1	39	4	57	0	0	6	106
675	.605621	.	TEE COPPER SOLDER 1-1/2"	1 EA	0	0	1	16	0	0	2	19
675	.605622	.	TEE COPPER SOLDER 2"	1 EA	0	0	1	25	0	0	3	29
675	.605659	.	CPLG COPPER SOLDER 1/2"	6 EA	0	0	1	3	0	0	0	4
675	.605660	.	CPLG COPPER SOLDER 3/4"	3 EA	0	0	1	3	0	0	0	4
675	.605661	.	CPLG COPPER SOLDER 1"	8 EA	0	0	3	15	0	0	2	20
675	.605662	.	CPLG COPPER SOLDER 1-1/4"	6 EA	1	39	3	19	0	0	2	63
675	.606020	.	PIPE NO HUB 10 FT 1-1/4"	40 LF	3	117	15	64	0	0	8	204
675	.606021	.	PIPE NO HUB 10 FT 1-1/2"	40 LF	3	117	15	67	0	0	8	207
675	.606022	.	PIPE NO HUB 10 FT 2"	30 LF	3	117	14	55	0	0	7	193

--WORK BREAKDOWN--- FACIL.	STANDRD.	WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
675	.606045	.	1/4 BEND CI NO HUB 1-1/2"	6 EA	1	39	5	15	0	0	2	61
675	.6060451	.	1/4 BEND CI NO HUB 1-1/4"	2 EA	0	0	1	5	0	0	1	7
675	.606046	.	1/4 BEND CI NO HUB 2"	14 EA	2	78	13	37	0	0	5	133
675	.606047	.	1/8 BEND CI NO HUB 1-1/2"	1 EA	0	0	0	2	0	0	0	2
675	.606048	.	1/8 BEND CI NO HUB 2"	6 EA	1	39	3	15	0	0	2	59
675	.606053	.	SAN TEE CI NO HUB 1-1/2"	8 EA	1	39	4	26	0	0	3	72
675	.6060531	.	SAN TEE CI NO HUB 1-1/4"	1 EA	1	39	6	10	0	0	2	57
675	.606054	.	SAN TEE CI NO HUB 2"	3 EA	0	0	1	11	0	0	1	13
675	.606063	.	P-TRAP CI NO HUB 1-1/2"	4 EA	1	39	4	15	0	0	2	60
675	.6060631	.	P-TRAP CI NO HUB 1-1/4"	1 EA	0	0	1	4	0	0	1	6
675	.606064	.	P-TRAP CI NO HUB 2"	3 EA	1	39	3	11	0	0	1	54
675	.606633	.	PIPE NO HUB 10 FT 3"	20 LF	3	117	18	51	0	0	7	193
675	.606634	.	PIPE NO HUB 10 FT 4"	320 LF	54	2108	286	1060	0	0	135	3589
675	.606806	.	1/4 BEND CI NO HUB 3"	8 EA	2	78	11	28	0	0	4	121
675	.606807	.	1/4 BEND CI NO HUB 4"	20 EA	7	273	36	104	0	0	14	427
675	.606812	.	1/8 BEND CI NO HUB 4"	4 EA	1	39	4	19	0	0	2	64
675	.606831	.	SAN TEE CI NO HUB 4"	14 EA	4	156	19	97	0	0	12	284
675	.606842	.	WYE CI NO HUB 4"	10 EA	3	117	18	78	0	0	10	223
675	.606867	.	P-TRAP CI NO HUB 3"	5 EA	1	39	7	42	0	0	5	93
675	.606868	.	P-TRAP CI NO HUB 4"	1 EA	1	39	3	14	0	0	2	58
675	.608007	.	PIPE PVC D1785 PE S40 1-1/4"	20 LF	1	39	4	10	0	0	1	54
675	.608009	.	PIPE PVC D1785 PE S40 1-1/2"	100 LF	4	156	21	58	0	0	8	243
675	.608011	.	PIPE PVC D1785 PE S40 2"	60 LF	3	117	16	47	0	0	6	186
675	.608027	.	90 EL PVC SOCKET S40 1-1/4"	4 EA	0	0	1	3	0	0	0	4
675	.608029	.	90 EL PVC SOCKET S40 1-1/2"	6 EA	1	39	3	5	0	0	1	48
675	.608031	.	90 EL PVC SOCKET S40 2"	10 EA	1	39	6	13	0	0	2	60
675	.608053	.	TEE PVC SOCKET S40 1-1/2"	4 EA	0	0	2	4	0	0	1	7
675	.608055	.	TEE PVC SOCKET S40 2"	2 EA	0	0	2	3	0	0	1	6
675	.608129	.	CPLG PVC SOCKET S40 1-1/4"	1 EA	0	0	0	0	0	0	0	0
675	.608131	.	CPLG PVC SOCKET S40 1-1/2"	4 EA	0	0	2	2	0	0	0	4
675	.608133	.	CPLG PVC SOCKET S40 2"	2 EA	0	0	1	2	0	0	0	3
675	.608270	.	PIPE PVC D1785 PE S40 2-1/2"	100 LF	6	234	32	123	0	0	16	405
675	.608321	.	90 EL PVC SOCKET S40 2-1/2"	4 EA	1	39	3	16	0	0	2	60
675	.608341	.	TEE PVC SOCKET S40 2-1/2"	4 EA	1	39	4	21	0	0	3	67
675	.608391	.	CPLG PVC SOCKET S40 2-1/2"	4 EA	1	39	3	7	0	0	1	50
675	.608970	.	FLOOR DRAINS 3"	5 EA	15	586	79	368	0	0	45	1078
675	.608975	.	FLOOR DRAINS 4"	9 EA	27	1054	142	944	0	0	109	2249
675	.653019	.	GATE VALVE, BRONZE 1-1/4" CRANE 1324, CLASS 150, SJ	3 EA	1	39	7	88	0	0	10	144
675	.653020	.	GATE VALVE, BRONZE 1-1/2" CRANE 1324, CLASS 150,SJ	2 EA	1	39	6	66	0	0	7	118
675	.653021	.	GATE VALVE, BRONZE 2" CRANE 1324, CLASS 150, SJ	1 EA	1	39	4	47	0	0	5	95
675	.653436	.	BALL VALVE, BRASS 1/2" JAMESBURY A11MT SCREWED ENDS, 600 PSI	4 EA	2	78	9	209	0	0	22	318

--WORK BREAKDOWN--- FACIL.	STANDRD.	WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
675	.653437	.	BALL VALVE, BRASS 3/4" JAMESBURY A11MT SCREWED ENDS, 600 PSI	6 EA	3	117	14	449	0	0	46	626
675	.653438	.	BALL VALVE, BRASS 1" JAMESBURY A11MT SCREWED ENDS, 600 PSI	7 EA	3	117	18	634	0	0	65	834
675	.675100	.	EF-1 EXHAUST FAN .50 HP/TEFC/120V/1800RPM/ GREENHECK MODEL BCF-108	1 EA	8	312	30	0	0	1471	3	1816
675	.675102	.	EF-2 EXHAUST FAN 3HP/TEFC/480V/1800RPM/ GREENHECK MODEL SPNE-36	1 EA	8	312	30	0	0	742	3	1087
675	.675104	.	EF-3 EXHAUST FAN 5HP/TEFC/480V/1800RPM/ GREENHECK MODEL SPNE-42	1 EA	8	312	30	0	0	918	3	1263
675	.675106	.	EF-4 EXHAUST FAN 1HP/TEFC/480V/1800RPM/ GREENHECK MODEL SPNE-36	1 EA	8	312	30	0	0	584	3	929
675	.675108	.	EF-5 EXHAUST FAN 3HP/TEFC/480V/1800RPM/ GREENHECK MODEL SPNE-36	1 EA	8	312	30	0	0	742	3	1087
675	.675110	.	EF-6 EXHAUST FAN .75HP/TEFC/480V/1800RPM/ GREENHECK MODEL SPNE-30	1 EA	8	312	30	0	0	508	3	853
675	.675120	.	AC-1 AIR CONDITIONER FAN W/COMPRESSOR/HEATER UNIT CORRECT AIR CORP MODEL SC24	1 EA	48	1872	181	0	0	5724	18	7795
675	.675125	.	AC-2 AIR CONDITIONER FAN W/COMPRESSOR/HEATER UNIT ADDISON MODEL PC044	1 EA	48	1872	181	0	0	5724	18	7795
675	.675130	.	AC-3 AIR CONDITIONER FAN W/COMPRESSOR/HEATER UNIT ADDISON MODEL PC044	1 EA	48	1872	181	0	0	5724	18	7795
675	.675135	.	HV-1 HEATING/VENTILATING UNIT W/UNIT HEATER 16KW BROD & MCCLUNG MODEL CRP-22	1 EA	48	1872	181	0	0	11584	18	13655
675	.675140	.	HV-2 HEATING/VENT. UNIT FAN W/UNIT HEATER 34KW BROD & MCCLUNG MODEL CRP-12	1 EA	48	1872	181	0	0	7983	18	10054
675	.675150	.	UH-1 UNIT HEATER A-G 10KW Q-MARK MODEL MUH-10-4	7 EA	112	4368	422	0	0	6307	42	11139
675	.675152	.	UH-2 UNIT HEATER A-U 15KW Q-MARK MODEL MUH-15-4	21 EA	336	13105	1265	0	0	21370	127	35867

--WORK BREAKDOWN--- FACIL.	STANDRD.	WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
675	.675154	.	UH-3 UNIT HEATER A-N 20KW Q-MARK MODEL MUH-20-4	14 EA	224	8737	843	0	0	16324	84	25988
675	.675156	.	LV-1 LOUVERS A-X AM WARM & VENT MOD LF-31A-A	24 EA	96	3744	361	0	0	14399	36	18540
675	.675158	.	PRD-1 PRESSURE RELIEF DAMPER AM WARM & VENT MOD PR-10	1 EA	16	624	60	0	0	655	6	1345
675	.675200	.	DUCTWORK - FOR HEATING/VENTILATING AND AIR CONDITIONING UNITS	2165 LB	128	4997	0	1033	0	0	103	6133
675	.695550	.	ALLOWANCE FOR HANGERS AND SUPPORTS	1 LOT	80	3123	421	6731	0	0	715	10990
		TOTAL	MECHANICAL		1,465	57,149	5,449	14,325	0	100,759	1,981	179,663
700			ELECTRICAL AND INSTRUMENTATION									
700	.700000	.	5 KVA POWER CONDITIONER FOR UPS SYSTEM	1 EA	16	627	57	3180	0	0	324	4188
700	.700001	.	1.5 KW RECTIFIER PANEL	1 EA	16	627	57	0	0	0	6	690
700	.700002	.	10 KW ELECTRIC UNIT HEATER	27 EA	432	16928	1545	0	0	0	155	18628
700	.700003	.	20 KW ELECTRIC UNIT HEATERS	14 EA	224	8777	801	0	0	0	80	9658
700	.700004	.	PLC I/O PANELS	4 EA	192	7523	687	0	0	0	69	8279
700	.700005	.	PLC WORKSTATIONS COMPLETE	2 EA	128	5016	458	0	0	0	46	5520
700	.700006	.	CRT WORKSTATION PRINTERS	2 EA	8	313	29	0	0	0	3	345
700	.700007	.	LOCAL THERMOSTAT, NEMA #4	6 EA	48	1881	172	954	0	0	113	3120
700	.700008	.	EMERGENCY LIGHTING FIXTURE	10 EA	80	3135	286	3180	0	0	347	6948
700	.700009	.	ELECTRIC PHOTOCELL	1 EA	8	313	29	212	0	0	24	578
700	.700010	.	3/4" CONDUIT "T" FITTING	200 EA	200	7837	715	5300	0	0	602	14454
700	.700011	.	1" CONDUIT "T" FITTING	10 EA	10	392	36	371	0	0	41	840
700	.700012	.	1 1/4" CONDUIT "T" FITTING	25 EA	0	0	0	1855	0	0	186	2041
700	.700013	.	1 1/2" CONDUIT "T" FITTING	40 EA	40	1567	143	3604	0	0	375	5689
700	.700014	.	2" CONDUIT "T" FITTING	35 EA	35	1371	125	3154	0	0	328	4978
700	.700015	.	START-UP AND CHECK-OUT	1 LOT	800	31347	2861	1060	0	0	392	35660
700	.700016	.	TEMPORARY POWER AND LIGHT	1 LOT	800	31347	2861	31800	0	0	3466	69474
700	.713052	.	15KV LIGHTNING ARRESTER & MOUNTING HARDWARE TYPE LV88	1 EA	2	78	7	65	0	0	7	157
700	.722121	.	3/4" GRS EXPOSED CONDUIT W/FITTINGS & SUPPORTS	14400 LF	1901	74489	6797	24941	0	0	3174	109401
700	.722122	.	1" GRS EXPOSED CONDUIT W/FITTINGS & SUPPORTS	2160 LF	324	12696	1158	4962	0	0	612	19428
700	.722123	.	1-1/4" GRS EXPOSED CONDUIT W/FITTINGS & SUPPORTS	2715 LF	440	17241	1572	9106	0	0	1068	28987
700	.722124	.	1-1/2" GRS EXPOSED CONDUIT W/FITTINGS & SUPPORTS	620 LF	125	4898	446	2571	0	0	302	8217

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
700 .722125 .	2" GRS EXPOSED CONDUIT W/FITTINGS & SUPPORTS	1950 LF	478	18730	1708	10796	0	0	1250	32484
700 .722126 .	2-1/2" GRS EXPOSED CONDUIT W/FITTINGS & SUPPORTS	500 LF	162	6348	580	4812	0	0	539	12279
700 .722127 .	3" GRS EXPOSED CONDUIT W/FITTINGS & SUPPORTS	900 LF	363	14224	1297	10953	0	0	1225	27699
700 .731121 .	3/C #4 EPR 15KV SHIELDED COPPER CABLE	40 LF	3	118	9	354	0	0	36	517
700 .731124 .	3/C #1/0 EPR 15KV SHIELDED COPPER CABLE	70 LF	6	235	21	890	0	0	91	1237
700 .731125 .	3/C #2/0 EPR 15KV SHIELDED COPPER CABLE	100 LF	9	353	32	1431	0	0	146	1962
700 .732126 .	3/C #2/0 EPR 5KV SHIELDED COPPER CABLE	250 LF	20	784	72	2319	0	0	239	3414
700 .733042 .	#10 THHN, 1/C, CU, 600V WIRE	9500 LF	76	2978	276	1208	0	0	148	4610
700 .733201 .	3/C #12 600V PWR CBL TYPE TC	8000 LF	80	3135	288	4927	0	0	522	8872
700 .733202 .	3/C #10 600V PWR CBL TYPE TC	2200 LF	31	1215	110	1912	0	0	202	3439
700 .733203 .	3/C #8 600V PWR CBL TYPE TC	1000 LF	25	980	89	1408	0	0	150	2627
700 .733204 .	3/C #6 600V PWR CBL TYPE TC	700 LF	25	980	90	1288	0	0	138	2496
700 .733205 .	3/C #4 600V PWR CBL TYPE TC	200 LF	9	353	33	514	0	0	55	955
700 .733206 .	3/C #2 600V PWR CBL TYPE TC	130 LF	7	274	23	509	0	0	53	859
700 .733208 .	3/C #1/0 600V PWR CBL TYPE TC	670 LF	41	1607	146	3509	0	0	366	5628
700 .733209 .	3/C #2/0 600V PWR CBL TYPE TC	230 LF	16	627	57	1437	0	0	149	2270
700 .733213 .	3/C 350 MCM 600V PWR CBL TYPE TC	1200 LF	121	4741	433	17374	0	0	1781	24329
700 .733401 .	2/C #14 600V CONTROL CABLE TYPE TC	5500 LF	50	1959	176	2419	0	0	260	4814
700 .733402 .	3/C #14 600V CONTROL CABLE TYPE TC	1200 LF	12	470	43	613	0	0	66	1192
700 .733404 .	5/C #14 600V CONTROL CABLE TYPE TC	2200 LF	26	1019	95	1782	0	0	188	3084
700 .733407 .	8/C #14 600V CONTROL CABLE TYPE TC	600 LF	9	353	32	585	0	0	62	1032
700 .734121 .	1PR #16 SHIELDED CABLE	8500 LF	85	3331	306	1352	0	0	166	5155
700 .734512 .	COAXIAL CABLE, RG A/U 59 75 OHMS, FIRE RATED	200 LF	3	118	11	350	0	0	36	515
700 .741001 .	1/C #6 TO 1/0 15KV TERM INCL HI-POTTING	18 EA	72	2821	258	1431	0	0	169	4679
700 .742006 .	1/C #2/0 TO 4/0 5KV TERM. INCL HI-POTTING	12 EA	48	1881	172	890	0	0	106	3049
700 .743001 .	1/C #16 TO #10 SOLDERLESS TERMINAL LUGS,600V	2893 EA	463	18142	1655	1135	0	0	279	21211
700 .743002 .	1/C #8 TO #4 SOLDERLESS TERMINAL LUGS,600V	78 EA	21	823	75	103	0	0	18	1019

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
700 .743003 .	1/C #2 TO #1 SOLDERLESS TERMINAL LUGS,600V	6 EA	2	78	8	18	0	0	3	107
700 .743004 .	1/C #1/0 TO #2/0 SOLDERLESS TERMINAL LUGS,600V	48 EA	24	940	86	285	0	0	37	1348
700 .743008 .	1/C 350 MCM SOLDERLESS TERMINAL LUGS,600V	114 EA	130	5094	465	1601	0	0	207	7367
700 .743009 .	1/C 500 MCM SOLDERLESS TERMINAL LUGS,600V	20 EA	27	1058	95	281	0	0	38	1472
700 .751021 .	FEEDER BREAKER DRAWOUT TYPE, 1200A, 500 MVA, 13.8KV	3 EA	180	7053	644	0	0	79500	64	87261
700 .751209 .	XFORMER, PAD MTD, OIL FILLED 13.8KV/480/277V,3PH,1000 KVA	1 EA	80	3135	286	0	0	15688	29	19138
700 .751228 .	XFORMER, PAD MTD, SILICON FLD 13.8KV/480/277V,2500 KVA	1 EA	140	5486	501	0	0	48654	50	54691
700 .752050 .	STARTER FVNR 4.16KV TO 1250 HP CLASS E-2	1 EA	40	1567	143	0	0	13886	14	15610
700 .753006 .	480V DRAWOUT AIR CIRCUIT BRKR 800A (ELECTRIC)	8 EA	192	7523	687	0	64	61056	69	69399
700 .753010 .	480V DRAWOUT AIR CIRCUIT BRKR 4000A (ELECTRIC)	1 EA	60	2351	215	0	8	45707	22	48303
700 .753150 .	COMBINATION CKT BRKR STARTER MCC MOUNTED, NEMA 1, CLASS 2 TYPE B, 480V, FVNR SIZE 1	45 EA	135	5290	483	0	0	45792	48	51613
700 .753151 .	COMBINATION CKT BRKR STARTER MCC MOUNTED, NEMA 1, CLASS 2 TYPE B, 480V, FVNR SIZE 2	7 EA	42	1646	150	0	0	8533	15	10344
700 .753152 .	COMBINATION CKT BRKR STARTER MCC MOUNTED, NEMA 1, CLASS 2 TYPE B, 480V, FVNR SIZE 3	5 EA	40	1567	143	0	0	9275	14	10999
700 .753153 .	COMBINATION CKT BRKR STARTER MCC MOUNTED, NEMA 1, CLASS 2 TYPE B, 480V, FVNR SIZE 4	9 EA	108	4232	386	0	0	30910	39	35567
700 .753154 .	COMBINATION CKT BRKR STARTER MCC MOUNTED, NEMA 1, CLASS 2 TYPE B, 480V, FVNR SIZE 5	2 EA	36	1411	129	0	0	14034	13	15587
700 .753180 .	CKT BRKR MCC MTD,480V-15-100A	75 EA	75	2939	268	0	0	29018	27	32252
700 .753182 .	CKT BRKR MCC MTD,480V,400A	2 EA	10	392	36	0	0	3328	4	3760
700 .753190 .	MCC,MAIN BRKR,480V,600A	2 EA	32	1254	114	0	0	4632	11	6011
700 .753191 .	MCC,MAIN BRKR,480V,800A	4 EA	72	2821	258	0	0	13059	26	16164
700 .753231 .	TRANSFORMER,DRY INDOOR 5 KVA,480V-120/208V,3PH	1 EA	11	431	39	0	0	413	4	887
700 .753234 .	TRANSFORMER,DRY INDOOR 30 KVA,480V-120/208V,3PH	1 EA	20	784	72	0	0	1060	7	1923
700 .753301 .	UPS 5 KVA 480V INCLUDING 30 MIN BATTERY BACKUP	1 EA	48	1881	172	0	0	21200	17	23270

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
700 .753412 .	36 CKT PANEL BOARD NEMA 1 277/480V,4W,225A/3P,MAIN LUGS INCL 20A/1P BKRS.	2 EA	45	1763	159	0	0	3286	16	5224
700 .761013 .	FLUO LTG FIXTURE, TROFFER, SURF MTD, 2'X 4', W/2-40W LAMPS (ACRYLIC LENS)	6 EA	8	313	28	382	0	0	41	764
700 .761015 .	FLUO LTG FIXTURE, TROFFER, SURF MTD, 2'X 4', W/4-40W LAMPS (ACRYLIC LENS)	18 EA	27	1058	97	1507	0	0	160	2822
700 .761063 .	HPS, SURFACE MOUNTED 2'X 2', 400W LAMP	2 EA	7	274	24	704	0	0	73	1075
700 .761066 .	HPS, LOW BAY, RECESSED MTD 150W LAMP	121 EA	303	11873	1082	41556	0	0	4264	58775
700 .762007 .	RECEPT CORROSION RESISTANT 15A,125V INCL BOX & COVER	30 EA	26	1019	91	655	0	0	75	1840
700 .762022 .	WELDING RECEPT 100A 3PH 600V	5 EA	15	588	54	1174	0	0	123	1939
700 .762031 .	TOGGLE SWITCH SINGLE POLE 15A 120V INCL BOX & COVER	10 EA	7	274	25	74	0	0	10	383
700 .762303 .	PUSHBUTTON START/STOP,NEMA 4 CHANNEL MOUNTED	49 EA	196	7680	701	6441	0	0	714	15536
700 .762313 .	SELECTOR SW, HANDS-OFF-AUTO NEMA 4, CHANNEL MOUNTED	6 EA	24	940	86	731	0	0	82	1839
700 .763017 .	#4/0 STRANDED, BCW, 600V	500 LF	10	392	36	956	0	0	99	1483
700 .763021 .	500 MCM STRANDED, BCW, 600V	1200 LF	29	1136	103	4910	0	0	501	6650
700 .763081 .	GROUND ROD 5/8"X 10'	6 EA	6	235	21	82	0	0	10	348
700 .763212 .	500 MCM AWG CADWELD	60 EA	120	4702	429	684	0	0	111	5926
700 .772005 .	11-LINE PHONE	2 EA	9	353	33	0	0	721	3	1110
700 .772107 .	PAGING MICROPHONE	9 EA	9	353	32	0	0	2385	3	2773
700 .772111 .	WP HORN TYPE SPEAKER	9 EA	18	705	64	0	0	1431	6	2206
700 .794100 .	PROCESS CONTROLS - EQUIPMENT/ DESIGN/FIELD SERVICES	1 LOT	3380	207802	0	0	0	164258	0	372060
700 .800100 .	PRESSURE TRANSMITTERS - ELECTRICAL ROSEMOUNT 1151GP	3 EA	12	470	43	0	0	3180	4	3697
700 .800102 .	FLOW TRANSMITTERS - MAGNETIC/ ELECTRICAL	1 EA	4	157	14	0	0	6042	1	6214
700 .800104 .	LEVEL SWITCHES - FLOATS	2 EA	8	313	29	0	0	1272	3	1617
700 .800106 .	LEVEL TRANSMITTERS D/P FLANGE ROSEMOUNT 1151LT-4-E-GO-M-12-D	9 EA	36	1411	129	0	0	14215	13	15768
700 .800110 .	BUTTERFLY CONTROL VALVES 2"	6 EA	12	469	63	0	0	6360	6	6898
700 .800112 .	BUTTERFLY CONTROL VALVES 3"	1 EA	2	78	11	0	0	1166	1	1256
700 .800114 .	BUTTERFLY CONTROL VALVES 6"	2 EA	8	312	42	0	0	2756	4	3114

--WORK BREAKDOWN--- FACIL.	STANDRD.	WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
700	.800116	.	BUTTERFLY CONTROL VALVES 14"	1 EA	8	312	42	0	0	2332	4	2690
700	.800120	.	ANALYZER - PH ROSEMOUNT 2000 1054PH	1 EA	8	313	29	0	0	2226	3	2571
700	.800122	.	ANALYZER - DENSITY-NUCLEAR	3 EA	24	940	86	0	0	18603	9	19638
700	.800124	.	ANALYZER - TURBIDITY	2 EA	16	627	57	0	0	7844	6	8534
700	.800126	.	POWER POSITIONER - PNEUMATIC	2 EA	32	1254	114	0	0	3604	11	4983
		TOTAL	ELECTRICAL AND INSTRUMENTATION		14,003	624,051	38,033	234,657	72	687,426	27,274	1,611,513
900			INDIRECTS AND DISTRIBUTABLES									
900	.901005	.	SURVEY SERVICES	1 LOT	0	0	0	0	10000	0	0	10000
900	.901010	.	TEMPORARY FIELD FAB SHOP	1 LOT	240	8819	1116	5300	0	0	642	15877
900	.901015	.	TEMPORARY POWER	1 LOT	240	9404	858	10600	0	0	1146	22008
900	.901035	.	FIELD CONSTRUCTION TRAILERS (2 EA)	12 MO	0	0	0	6360	0	0	636	6996
900	.901040	.	TOOL TRAILERS (2 EA)	12 MO	0	0	0	5088	0	0	509	5597
900	.901045	.	PORT A JOHNS (3 EA)	12 MO	0	0	0	2862	0	0	286	3148
900	.901050	.	POTABLE DRINKING WATER	1 LOT	0	0	0	1060	0	0	106	1166
900	.901055	.	ALLOWANCE FOR BARRICADES AND LIGHTS	1 LOT	160	5879	744	1590	0	0	233	8446
900	.901060	.	PICK UP TRUCKS (2 EA) RENTAL	12 MO	0	0	0	7632	0	0	763	8395
900	.901065	.	ALLOWANCE FOR FUEL, OIL AND GREASE FOR PICK UP TRUCKS	1 LOT	0	0	0	4240	0	0	424	4664
900	.901070	.	FIELD WAREHOUSE	1 LOT	320	11758	1487	12720	0	0	1421	27386
		TOTAL	INDIRECTS AND DISTRIBUTABLES		960	35,860	4,205	57,452	10,000	0	6,166	113,683
901			ENGINEERING									
901	.901015	.	DESIGN ENGINEERING SERVICES W/BURDEN AND EXPENSES FOR SITE SPECIFIC DESIGN	1 LOT	0	0	0	0	600000	0	0	600000
		TOTAL	ENGINEERING		0	0	0	0	600,000	0	0	600,000
902			PROJECT/CONSTRUCTION MANAGEMENT									
902	.902005	.	CONSTRUCTION MANAGEMENT PERSONNEL W/BURDEN AND EXPENSES	1 LOT	0	0	0	0	250000	0	0	250000
902	.902020	.	PROJECT MANAGEMENT SERVICES W/BURDEN AND EXPENSES	1 LOT	0	0	0	0	350000	0	0	350000

--WORK BREAKDOWN--- FACIL.STANDRD.WKPKG	DESCRIPTION	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	S/C OH&P	TOTAL DOLLARS
TOTAL	PROJECT/CONSTRUCTION MANAGEMENT		0	0	0	0	600,000	0	0	600,000
903	FIELD OFFICE EXPENSES									
903 .903005 .	ICFKE FIELD OFFICE TRAILER	12 MO	0	0	0	6360	0	0	0	6360
903 .903012 .	TRAILER HOOK UP AND REMOVAL	1 EA	80	2940	372	0	1000	0	0	4312
903 .903015 .	FIELD VEHICLE FOR CONSTR. MANAGEMENT	12 MO	0	0	0	5088	0	0	0	5088
903 .903020 .	OFFICE SUPPLIES	12 MO	0	0	0	2544	0	0	0	2544
903 .903022 .	COPY MACHINE	12 MO	0	0	0	1908	0	0	0	1908
903 .903025 .	COMPUTERS	2 EA	0	0	0	10600	0	0	0	10600
903 .903030 .	TELEPHONE/FAX SERVICE	12 MO	0	0	0	3816	0	0	0	3816
903 .903060 .	UTILITY SERVICE	12 MO	0	0	0	3180	0	0	0	3180
TOTAL	FIELD OFFICE EXPENSES		80	2,940	372	33,496	1,000	0	0	37,808
904	INSURANCE/TAXES/PERMITS/									
904 .904105 .	ALL RISK INSURANCE	1 LOT	0	0	0	74200	0	0	0	74200
904 .904110 .	1% BOND	1 LOT	0	0	0	99640	0	0	0	99640
TOTAL	INSURANCE/TAXES/PERMITS/		0	0	0	173,840	0	0	0	173,840
REPORT TOTAL			48,319	1,937,022	229,765	1,677,178	1,211,072	4,675,561	169,948	9,900,546