GW - 28

# GENERAL CORRESPONDENCE

YEAR(S):
1986

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501-2088
(505) 827-5800

September 22, 1986

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. David G. Griffin
Environmental Affairs Supt.
Navajo Refining Co.
P. O. Drawer 159
Artesia, New Mexico 88201

RE: PROPOSED WASTEWATER TREATMENT PLANT
DISCHARGE PLAN GW-28

Dear Mr. Griffin:

This office has received your letter dated August 19, 1986, containing the specifications for the above-referenced treatment plant. The design and specifications are adequate for the purpose intended, and, properly constructed, will provide fresh water protection.

Please be advised that the acceptance of the plans and specifications for inclusion in your discharge plan does not relieve you of liability should your operation result in actual pollution of surface or ground waters which may be actionable under other laws and/or regulations.

Sincerely,

Roger C. Anderson

ROGER C. ANDERSON
Environmental Engineer

RCA:dp

TELEPHONE
(505) 748-3311

Navajo REFINING COMPANY
501 EAST MAIN STREET • P. O. DRAWER 159
ARTESIA, NEW MEXICO 88210

EASYLINK
62905278



August 19, 1986

Mr. David G. Boyer
*Director of Environmental Compliance*
Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87501

Re: Waste Water Treatment Plant Specs

Dear Mr. Boyer:

Enclosed you will find Navajo Refining Company's specifications for the new waste water treatment facility to be constructed at our Artesia Refinery. In addition to the equipmment specifications, I have enclosed an overall plot plan showing the unit's location in relation to the rest of the refinery, a preliminary plant layout plan and a preliminary P&ID.

There are expected to be some changes to the information provided and when they become available I will send you updated copies. You can address any comments on the enclosed information directly to me.

Sincerely,

David G. Griffin
Superintendent of
Environmental Affairs
& Quality Control

DGG/pb

attachments

OCD

BID PACKAGE NO. (1 - 11)

## TECHNICAL REQUIREMENTS

## PART A - GENERAL

1. SCOPE: These specifications cover Plant Equipment and accessories such as pumping equipment, process equipment, and metering and control equipment required for the construction of Navajo Refining Company's wastewater treatment facility. Navajo is purchasing this equipment for installation by an installation contractor to be selected at a later date.

2. APPROVAL OF EQUIPMENT AND MATERIALS: All equipment and materials shall be new and shall be designed for the function and service specified herein. No equipment nor materials shall be used in the project except that which has been approved by the Engineer. Approval for installation, or incorporation in the project, will be made only after submittal and examination of shop and installation drawings, manufacturer's specifications, test results or other data required in the paragraph SHOP AND INSTALLATION DRAWINGS or in connection with the equipment specifications. Final approval and acceptance of equipment will be made only after such equipment is in operation and has met all specified tests.

3. DELIVERY DATE: The Supplier shall quote an equipment delivery date, assuming a three week shop drawing review period by the Engineer. All major equipment items should be delivered by April 10, 1987.

4. SHOP AND INSTALLATION DRAWINGS: Shop and Installation Drawings, Installation Instructions, Manufacturer's Specifications, and all other pertinent data, required by the Engineer to determine approval for installation of the equipment, shall be submitted to the Engineer, for all equipment items. Such drawings and other data shall be submitted to the Engineer at the earliest practicable date. Four sets of shop drawings shall be submitted. One set of drawings shall be reproducible sepias. One set will be returned with approval or corrections or supplemental information required, indicated thereon.

Shop Drawings shall be complete, showing all dimensions, anchor bolts or other mounting devices, openings in structures required for installation of the equipment, connecting piping, size and location of electrical conduits and conduit openings, name-plate data for electric motors and drive devices, and any other pertinent data necessary for determing compliance with the specifications and suitability of the equipment of the installation in the proper location and for the service intended. Since installation details may vary with the type of equipment furnished, such details may not agree with drawings provided with the specifications. Such variations shall be clearly shown in the shop and installation drawings and any structural modifications required, because of such variations, shall be clearly noted. However, only minor structural modifications will be approved unless it is clearly shown that it is impractical to adapt the equipment to the structure as detailed, or to secure equipment which would not require major modifications

5. EQUIPMENT WARRANTIES: It is specifically required that all equipment be covered by the Warranties and guarantees specified herein. The Vendor does hereby warrant that any failure of equipment, or part thereof, or any operational malfunction occurring to any equipment, caused by reason of faulty or inadequate equipment design, improper adjustment or defective materials or workmanship occurring prior to September 1, 1988, will be promptly remedied by the Vendor, at no additional cost to the Owner. It is the intent that the equipment be installed and operational on about September 1, 1987.

6. LUBRICATION EQUIPMENT AND SPECIAL TOOLS: All equipment shall be provided with proper lubrication devices. Any special lubricatin or servicing tools required by the equipment, except grease guns and standard commercial tools shall be furnished with the equipment. Lists of such required tools shall be submitted with the shop drawings.

7. OPERATION AND MAINTENANCE MANUALS: At the time of manufacturer's inspection of installation of the equipment, the Engineer shall be furnished with one copy of the complete installation, operation and maintenance manuals, for the equipment. The Vendor shall subsequently bind four (4) sets of all manuals in a large binder(s) with index tabs identifying the various pieces of equipment. Each equipment item section shall include, but not be limited to, the following: (1) Name, address and telephone number of nearest commercial service representative who can supply parts and service; (2) Descriptive literature, including illustrations, covering the operating features of the equipment and its components, specific for this installation, with all inapplicable information omitted or marked through; (3) Operating, Maintenance and Trouble Shooting Information; (4) Complete Maintenance Parts Lists; (5) Complete connection, interconnection and assembly diagrams and operational circuit diagrams, where applicable; (6) Shop Drawings; (7) Certified Test Curves, where applicable. Navajo will withhold 5% of the payment and will not issue final acceptance for the equipment until all such manuals have been received.

8. MANUFACTURER'S SUPERVISION OR INSPECTION OF INSTALLATION: It is the intent of these specifications that all equipment be installed under the supervision of a competent installation Engineer, representing the Manufacturer, or that the installation will be inspected by a competent representative of the Manufacturer. The character and extent of such supervision and/or inspection services will be governed by the complexity of the equipment and the degree of competence, in installation of such equipment, of the installation personnel. The minimum service of this type which will be required is: (1) A competent representative of the Manufacturer shall check the completed equipment installation and make such pre-operational adjustments as may be required to prepare the equipment for full operation; (2) A competent representative of the Manufacturer shall be present when the equipment is put into operation and shall perform all tests and make all adjustments necessary to insure satisfactory operation, and shall instruct plant operating personnel in the operation and maintenance of the equipment. Instruction shall consist of (1) field videotaping, by Navajo, of all new equipment and facilities with the manufacturers' representative present; (2) field "hands-on" instruction under the supervision of the manufacturers' representative.

The right is reserved by Navajo to require more than the minimum supervision and inspection service whenever, in the opinion of the Engineer, such additional service is required to insure satisfactory installation and operation. The cost of such services shall be included in the equipment price.

9. SEAL WELDING AND BOLTED CONNECTION COATING AND ANCHOR BOLTS: All submerged steel equipment shall continuously seal welded around all stiffeners, plates, and shapes to eliminate areas which cannot be coated. Stitch welding of these items is specifically prohibited. All bolted connections shall be sandblasted and coated prior to assembly. All submerged bolts are to be stainless steel.

10. SPARE PARTS: The Manufacturer shall furnish a list of recommended equipment spare parts to be stored at the refinery. The Manufacturer shall also furnish an itemized price list of all available spare parts for the specified equipment.

BID PACKAGE NO. 1

## PART B - PARSHALL FLUME

1. EQUIPMENT DESCRIPTION: There shall be supplied for installation in the flume channel, a molded fiberglass reinforced polyester Parshall flume with a throat width of 6 inches. The flume shall have a height of 24 inches and be molded in one piece with ample wall thickness and reinforcing ribs to prevent distortion during shipment, installation and operation. The flume shall be self-supporting and require no external supporting structure. Interior dimensions shall conform to those shown in the latest revision of U.S. Department of Interior Bureau of Reclamation, Water Measurement Manual. The flume shall be equipped with a staff gauge reading in feet and inches subdivided into 1/4 inch units.

2. OTHER REQUIREMENTS: The requirements of Part A apply to this section.

BID PACKAGE NO. 2

## PART B - API OIL-WATER SEPARATOR

1. GENERAL: This section covers a traveling bridge sludge collector mechanism, skimmer mechanism, effluent weir, bar screen, and spare parts, for installation in a two-bay oil-water separator. The separator has two tanks, each 8 feet wide x 54 feet long x 5 feet water depth, as shown in the attached drawing "API Separator" August 13, 1986. The requirements of Part A apply to this section.

The wastewater flowing through the separator varies in pH from 2 to 13. All items of the separator shall be designed for operation in this type of environment.

2. TRAVELING BRIDGE: The bridge shall consist of two (2) wide flanged beams with suitable cross bracing. The bridge shall travel at 3 FPM while scraping and return at 6 FPM while skimming. The bridge shall be designed to support a live load of 50 pounds per square foot in addition to the dead load with a deflection not to exceed 1/360 of the span. The bridge shall have a 3'-0" wide walkway with 3/16" checkered floor plate, toe plate and 3'-6" high double handrail of 1-1/2" outside diameter aluminum pipe.

The traveling bridge shall be completely assembled and electrically tested prior to shipment. The unit shall be shipped assembled with only the skimming and scraping blades and supports being shipped separately with bolted connections for field assembly.

All bearings requiring lubrication shall be equipped with flexlines to allow servicing from the walkway.

All parts of the mechanism shall be amply proportioned for all stresses that may occur during fabrication, erection and intermittent or continuous operation. Workmanship shall be of high grade in all respects.

All appurtenances including electrical controls other than specified and all field work including erection and final painting shall be furnished by others.

3. RACK AND PINION DRIVE: At each end of the bridge shall be a steel cut-tooth pinion gear. The pinion shall be 28 teeth, 13.37" pitch dia., 2.0" face width fabricated from C1045 with teeth hardened to 420-440 Brinell. The pinion gears shall be synchronized and engage the rack bolted on brackets attached to the top of the tank. Bolted to the pinion shall be a cut-tooth steel sprocket. A chain connection between these sprockets and line shaft sprockets provides for positive power transmission to the pinion gears. The rack shall be 48" long x 1/2" thick fabricated from C1045 steel with 32 teeth flame hardened to 371 Brinell. The Equipment Manufacturer shall furnish the rack with suitable brackets.

The required amount of 40 pound rails, rail clamps, splices and rail stops shall be furnished by the Equipment Manufacturer.

A worm gear reducer mounted on the walkway shall drive the bridge. The reducer shall be connected to a line shaft by chain reduction. The shaft, supported by anti-friction bearings, shall be connected to the driving wheels by a chain reduction. All line shaft sprockets shall be keyed and setscrewed. A motor shall be directly connected to the reducer.

The motor shall be a 3HP minimum, squirrel cage, induction type, ball bearing, two speed, of ample power for starting and continuously operating the mechanism without overloading. The motor shall conform to NEMA standards and be nameplated for operation on 230/460 volts, 3 phase, 60 Hertz. The motor shall be provided with an integral disc type brake with heater. The brake shall be rated for 3 Ft.-Lbs. per motor horsepower. The motor shall be explosion proof.

4. SCRAPER: The traveling bridge shall be furnished with a blade mounted scraper on support arms. The arms shall be pivoted at the bridge and shall be raised and lowered by means of a cable hoist. Cable drums shall be mounted on and keyed to a line shaft supported by anti-friction bearings. A worm gear reducer mounted on the walkway shall drive the shaft through a chain reduction. The motor shall be an 1800 RPM, squirrel cage, induction type, totally enclosed, ball bearing, constant speed, of ample power for starting and continously operating the mechanism without overloading. The motor shall conform to NEMA standards and be nameplated for operation on 230/460 volts, 3 phase, 60 Hertz. The motor shall be explosion proof.

5. SKIMMER BLADE: A pivoted skimmer blade shall be mounted on support arms pivoted from the bridge. A cable and sheave shall tie the skimmer and scraper together such that raising the scraper would lower the skimmer.

6. ELECTRICAL CONTROLS: The electrical feed line cable will be an eight conductor, 12 gauge, with a towing trolley type festoon support assembly. A power outlet box for conductor, 12 AWG, 600 volt festoon power cable shall be provided at the end point of bridge travel by others. The power cable shall be rated for -20°C temperature. The festoon supporting track guide will be of sufficient strength to support the conductor and trolleys and shall be galvanized steel. Cable and festoon support assemblies shall be furnished by the Equipment Manufacturer.

The traveling bridge shall be furnished with automatic controls for continuous operation (with 24 hour timer clock for intermittent operation). The controls shall include manual override, emergency and overload protection, starters, limit switches, relays, contacts, 460/115 volt transformer and other components necessary for operation. The controls shall be mounted on explosion-proof NEMA 7 enclosure. The controls shall be prewired and tested prior to shipment, requiring only a connection from the cable on the reel to the outlet box. An alarm contact shall be provided which indicates a failure of the bridge drive motor or the skimmer blade operator. This contact will be connected

through the festooned cable to the plantwide control system. The alarm shall be locally indicated.

7. SKIMMER PIPE: Two 12 inch diameter x 8 feet long rack and pinion operated oil collecting pipes will be furnished, one for each flight cleaner mechanism.

Standard black steel pipe, not less than 12" O.D. and with a nominal wall thickness of .330" will be used. A 60 degree slot will be cut symmetrical about the vertical axis of the pipe with the edges of the slot serving as a weir over which the scum flows into the pipe when the pipe is rotated. The edges of the slot will be parallel to the longitudinal axis of the pipe. At regular intervals of not more than 2'-6", 2" wide bands of the full pipe periphery will be left in the pipe to act as stiffeners.

8. SKIMMER PIPE SUPPORT: The revolving pipe will be supported at each end in such a manner that a slight vertical or horizontal misalignment will not interfere with the smooth operation of the pipe. The pipe will be supported by and revolve in a rolled steel collar which will be welded to an adjustable steel plate. The open end supports will have segments welded to the internal periphery of the collar to provide ample bearing surface for the pipe without crushing the seal.

Plywood fillers will be furnished with the open end and center supports to provide a watertight connection to the tank walls without grouting.

9. SKIMMER SEALS: A suitable watertight seal will be provided for the open end of the pipe. This seal will be so constructed that it will remain effective even with a slight misalignment of the pipe and collar. The seal will not be affected by grease, acids, or alkalies and shall be compatible with pH variations between 2 and 13. The seal will be readily renewable without removing the pipe from the supporting brackets and will not bind or impede the smooth action of the revolving pipe.

10. SKIMMER OPERATING MECHANISM: The revolving scum collecting pipe will be manually operated by means of vertical worm gear drive. The worm gear drive will consist of a cast iron cut tooth gear wheel and a steel cut tooth double thread worm rigidly mounted on a structural steel support. The worm shaft will revolve in babbitted bearings and the worm wheel will revolve on a bronze bushing. The revolving pipe will be free to float inside the worm wheel so that slight misalignment of the pipe will not affect the mesh of the worm and worm wheel. The worm shaft will turn a universal joint to provide offset operation as detailed in the plans.

Recesses in the worm wheel will engage lugs bolted to the pipe to turn the pipe as the worm is turned. The vertical pipe stem will be suitably secured to the worm shaft in such a manner that a slight misalignment will not affect the mesh of the worm and worm wheel. A 20" diameter handwheel will be provided to operate the worm gear drive. The worm reduction will provide an adequate mechanical advantage so that a slight pressure on the handwheel will turn the pipe and allow easy, accurate adjustment.

11. REACTION JET BAFFLES: Reaction jet baffles will be furnished to provide even distribution of the flow across the full width of each basin. Each baffle will be made of #10 gauge thick stainless steel formed to the proper radius and are to be mounted in front of the inlet pipes. Wall sleeves are to be furnished by others and of adequate size to allow the inlet reaction jet throat to extend through the sleeve and be properly aligned and sealed in place with "POROX" or other suitable type sealant.

12. EFFLUENT WEIR: An adjustable straight edge effluent weir will be provided for each basin. The weir will have a beveled edge and be of 1/4" thick x 6" wide steel plate bolted to a 4"x3"x3/8" angle.

13. OIL RETENTION BAFFLE (Furnished by Others): An oil retention baffle, furnished by others, is to be located behind the skimmer pipe and in front of the effluent weir. This baffle is to serve as a retention device to permit the separated oils to remain in the area of influence of the skimmer pipe and prevent excess oils from passing over the weir. The oil retention baffle shall be installed by others.

14. BAR SCREENS: The manufacturer shall furnish and deliver, ready for installation, one (1) manually cleaned bar screen as indicated on the plans and herein specified. The screen shall be installed in a channel 4'0" wide x 2'7" deep. The screen shall be capable of handling 1.2 MGD with a maximum water depth in the channel of 0'11". The water depth when handling the minimum flow of 0.7 MGD will be approximately 0'1" in the channel. The screen frame shall not be recessed in the channel walls, as shown on the plans.

The screen shall be inclined 45° from the horizontal. The bar screen shall consist of steel bars, 3/8" thick x 2-1/2" wide, held firmly and accurately in place with 1" clear openings by means of welded spacers at each end. The bar rack shall extend from the bottom of the channel to the platform as shown in the plans. The bar screen shall be designed to withstand the head loss load when 50% blinded by debris. The bar screen assembly shall be bolted in place for ease of removal.

15. SPARE PARTS: The manufacturer shall furnish a list of recommended spare parts and shall also furnish an itemized price list of all spare parts.

16. SERVICE: An installation supervisor shall be provided for a period of five (5) working days as required in part A of this specification. The Supplier shall also include with the bid the services of the Equipment Manufacturer's field service technician for a period of one (1) trip and four (4) days. This service shall be for the purposes of check-out, initial startup, certification, and instruction to plant personnel.

A written report of the technician's findings and installation approval shall be submitted to the engineer covering all inspections and outlining in detail any deficiencies noted.

BID PACKAGE NO. 3

## PART B - SLIDE GATES

1. GENERAL: Gates, operators, stems and accessories shall be of the size, type, material and construction specified herein. The gates shall be manufactured by Rodney Hunt, Waterman, Enviroquip or equal, although various manufacturers model numbers are given as an indication of the quality required.

Two 18" W x 18" D self contained stainless steel fabricated slide gates are required.

2. INSTALLATION AND DRAWINGS:

2.1 Installation: The manufacturer shall furnish necessary installation drawings and an installation, operation and maintenance manual.

2.2 Drawings: Four sets of drawings shall be submitted for approval on all gates, lifts, and accessories and assembly drawings shall also be submitted on all gates, lifts and accessories. One copy will be returned with approval or corrections or supplemental information required, indicated thereon. After approval, four complete sets of the corrected documents shall be furnished to the Engineer. Fabrication of the gates shall not commence until after the drawings have been approved.

3. SLIDE GATES:

3.1 Materials: Materials used in construction of the gates specified herein shall meet the requirements of the following specifications:

| Gate Part | Material | Specification |
|---|---|---|
| Frame, Slide Angles, Retainers, Filter and Cover bars, Slide Plates and Reinforcing | Stainless Steel | 304L |
| Fasteners | Stainless Steel | A320, Grd, B8 or B8F (bolts) |
| Stems | Stainless Steel | A276 Type 304 |

3.2 Gate Seat and Angle Frame: Gate seat and angle frame shall be an integral unit of extruded shapes and shall be assembled by welding to form the waterway opening. The gate frame shall be designed to be bolted to concrete. The frame shall be self contained and of sufficient slze to withstand 3 ft. of unseating head.

3.3 Gate Slide: Gate slide shall be fabricated from 3/8-inch min. thickness plate and reinforced with structural shapes to limit deflection under full head to 1/260 of the span. The slide shall be provided with a pocket for attaching the stem. This pocket shall be attached to the slide by welding and shall be capable of taking the full thrust developed during normal gate operation.

3.4 Stems: Stems shall be manufactured from solid stainless steel round bar stock. Stem diameter shall be sufficient to withstand the opening and closing thrusts encountered in the operation of the gate and shall be supplied with reasonable lengths to permit easy installation and removal. Stems shall be furnished with Acme type double lead threads of proper length to allow for full gate opening. The surface finish of the bearing faces of the thread shall have a maximum roughness of 32 micro inches (rms). Stop nuts with set screws shall be provided to prevent over travel of the stem.

3.5 Stem Guides: Adjustable guides shall be supplied to hold the stem in alignment, yet free enough to permit easy operation. They shall be spaced in accordance with the manufacturer's recommendations, however, the 1/r ratio shall not be greater than 200.

3.6 Lifts: Crank operated bench stands shall be furnished for the self contained gates. The housing shall be cast iron and shall be suitable for mounting on the head frame.

The bronze lift nut shall be flanged to support bale thrust bearings mounted above and below and shall take the maximum thrust developed during gate operation.

The design of the lift mechanism shall be such that the slide can be operated with no more than a 25 pound effort on the crank. The maximum radius of the crank shall be 15 inches. Grease fittings shall be provided to allow lubrication of bearings and stem. Aluminum stem covers shall be furnished. Stem cover shall be of removable type and shall have a cap at the top.

The centerline of the crank shall be 8'7" above the bottom of the gate.

BID PACKAGE NO. 4

## PART B - TELESCOPIC SLUDGE VALVES

1. GENERAL: Under this item the Equipment Manufacturer shall furnish and deliver, ready for installation, two (2) telescopic sludge draw-off valves. Valves shall be as manufactured by Envirex Inc. of Waukesha, Wisconsin or equal demonstrated quality and efficiency, and shall be as hereinafter specified.

2. VALVE: The telescopic valves shall be of the non-rising stem type of extra sturdy construction throughout and designed to provide a vertical travel of 4 feet 0 inches.

3. VALVE TUBE: The valve shall consist essentially of a fabricated steel floor stand incorporating a valve lifting stem and a travel indicating device calibrated in 1/2" increments, geared down so that the full 48" of travel registers on a two-foot scale, hand wheel with handle grip for rapid adjustment, seamless brass tube, and tube guide collar with Neoprene gasket.

4. OPERATION: The sliding valve tube shall be seamless brass tubing 5.500 inch outside diameter with a minimum wall thickness of 1/8" to prevent corrosion and to insure proper operation at all times, and arranged to slide inside of a 6 inch diameter cast iron sludge draw-off pipe. The valve tube shall have two V-notched weirs located at 180° to accurately control the rate of sludge withdrawal.

The telescopic valve shall be manually operated by means of an 18" diameter cast iron hand wheel with handle. The hand wheel shaft, designed to prevent rotation of the brass sleeve during operation, shall be manufactured of 1-1/8" diameter brass stock and shall have a triple lead Acme threads to allow for rapid adjustment of 1 foot of travel with 16 turns of the hand wheel. The valve lifting stem shall have an Acme thread at one end for engagement with the hand wheel shaft and provisions for attaching the valve tube at the other end. The hand wheel shall be mounted 4'-6" above the maximum elevation of the valve tube. The hand wheel support device shall be of fabricated steel and cantilevered from a vertical concrete wall 12" from the centerline of the tube. The valve shall be complete with tube guide collar made of steel and Neoprene gasket for sealing at the cast iron sludge draw-off pipe.

All anchor bolts shall be plated steel furnished by the Equipment Manufacturer and shall be of ample size and strength for purpose intended. All anchor bolts shall be set by the Contractor in accordance with the Manufacturer's instructions. All parts of the mechanism shall be amply proportioned for all stresses that may occur during fabrication, erection, and intermittent operation. Workmanship shall be of high grade in all respects.

BID PACKAGE NO. 5

## PART B - PROGRESSIVE CAVITY PUMPS

1. GENERAL: This section of the specifications covers the progressing cavity pumps to be used as P-875 API separator sludge pump (1 unit), P-876 API separator oil pump (1 unit), P-878 DAF float pump (1 unit), and P-879 DAF sludge pump (1 unit). All progressing cavity pumps shall be built by the same manufacturer.

All pumping equipment specified herein shall be furnished complete with motors and all accessories required for proper operation. Assembly of the pumping units, i.e., installing the motor, gear drive and pump on the base plate shall be done at the manufacturer's plant.

The requirements of Part A apply to this section.

2. DAF FLOAT AND DAF SLUDGE PUMPS, API SLUDGE PUMPS, API SLOP OIL PUMP:

2.1 Requirements: Four (4) pumping units shall be provided. The progressing cavity pumping units shall be a complete assembly consisting of a motor, a pump, and a fabricated steel mounting base with OSHA type coupling and belt guards.

The pumping units shall pump 25 GPM of process fluid at 75 psig with a pump speed not exceeding 600 RPM.

2.2 Motor: The pump motor shall operate on 3 phase, 60 cycle, 460 V alternating current. The motor shall be of NEMA design, explosion proof, class B insulation, 1.15 service factor, and a temperature rise not exceeding 90°C above an ambient of 40°C. The horsepower rating of the motor shall not be exceeded when operating the pump with a maximum differential pressure of 40 psi, but in no case shall the motor be less than 3.0 horsepower.

The following pump and motor equipment numbers shall be used when referencing this bid package:

| Item | Pump Number | Motor Number |
|---|---|---|
| API Separator Sludge Pump | P-875 | M-875 |
| API Separator Oil Pump | P-876 | M-876 |
| DAF Float Pump | P-878 | M-878 |
| DAF Sludge Pump | P-879 | M-879 |

2.3 Speed Reduction: A belt and sheave arrangement shall be used.

2.4 Pump: The pump shall be a positive displacement progressing cavity type equipped with a helical rotor of hard chrome plated tool steel and a stator

of Buna-N synthetic rubber. Pump body shall be cast iron. suction and discharge connections shall be suitable for connection to 3 inch standard flanges. The pump shall be cradle mounted to permit the suction part to be rotated to any desired angle. Pinned joints shall be used for rotor end and shaft end.

The connecting rod shall pass through the suction housing shaft seal area within the hollow drive shaft quill so that no eccentric loads are imparted on the packed seal. This connecting rod shall be ridged and not susceptible to chipping.

The drive shaft shall be of the two part design with the chrome plated, hollow quill removable for repair. The quill will be replatable. It shall be removable without removing the bearings from the bearing housing or disconnecting the driver.

The stuffing box shall be equipped with a split packing gland and split teflon latern ring. The packing shall be grease lubricated.

3. SPARE PARTS: The Manufacturer shall furnish a list of recommended spare parts to be stored at the refinery. The Manufacturer shall also furnish an itemized price list of all available spare parts for each equipment item.

BID PACKAGE NO. 6

## PART B - API WASTEWATER PUMPS

1. GENERAL: The three API waste water pumps are to be mounted above the API effluent sump. Each pumping unit shall consist of a bowl assmebly, column, shafting, discharge head, base plate, motor mount, motor, and other accessories as specified herein. The units shall be as manufactured by Worthington, Aurora, or equal.

1.1 Vertical Turbine Pumps: The pumps will pump wastewater produced by the API oil/water separator. This water will contain refinery wastes of up to 300 ppm free oil and a pH range from 2 to 13. Water temperature will normally be 110°(F) but not greater than 180°(F). An all iron construction is required.

2. PUMPS: The rated conditions of operation are shown on the table below. Pumps furnished shall meet the "Rated Conditions".

| Pump Number | Motor No. | Head, Ft. | Capacity, GPM |
|---|---|---|---|
| P-872 | M-872 | 50' | 500 |
| P-873 | M-873 | 50' | 500 |
| P-874 | M-874 | 50' | 500 |

Head at no flow shall not exceed 70 feet. The pump speed shall not be in excess of 1760 RPM.

The pump bowls shall be of close grained C.I.30 (ASTMA-48), free from blow holes, and other defects. Bowls shall be accurately machined and fitted to close dimensions. Bowls shall be porcelain enamel lined. They shall be capable of withstanding a hydrostatic presure equal to twice the head at rated capacity or 1.5 times shut-off head, whichever is greater. A cast iron bowl wear ring shall be provided. Bowl bolts shall be steel.

The impeller shaft shall be of 416 stainless steel at least 1" in diameter and shall conform to the requirements of AWWA Specification A101, latest edition.

Bearings shall be provided in each stage to keep the impellers accurately centered. The bearings shall be teflon.

The impellers shall be of the enclosed, open, or semi-open type, manufactured of C.I.30 (ASTMA-48), polished smooth and perfectly balanced both hydraulically and dynamically. Provision shall be made for minimizing wear between impeller and bowl and for field adjustment of impellers to compensate for wear. Impellers shall be securely fastened to the impeller shaft with keys, tapered split collets or lock nuts of carbon steel.

The column pipe shall be at least 6" in diameter and conform to AWWA Specification A101, latest edition.

Column pipe shall be of the length required for a base plate elevation of 63.50 and a suction bell elevation of 52.05. If more than one section of column is used, the sections shall be coupled with extra-heavy threaded sleeve type couplings, with pipe joints butted to insure perfect column alignment after assembly.

Line shaft shall be of 416 stainless steel, at least 1" in diameter, turned and polished and shall, in all aspects, meet or exceed the requirements of AWWA Specification A101, including the requirements of this specification for Graphitar or equal shaft bearings for water lubricated pump and column.

The pump shall be provided with a C.I.30 (ASTM-48) discharge head. The discharge head shall be provided with a bottom flange designed for mounting on the base plate, and top flange designed to support the motor. Shaft packing box with removable bronze bushing shall also be provided. The packing gland shall be accessible from the outside. The discharge head shall be of cast construction, adequately designed to provide a rigid support for drive and shafting and, to withstand the internal pressure specified. Discharge pipe shall be 6" and shall be provided with an ASA Class 25 flange.

A base plate shall be provided as shown on the drawing. The discharge head shall be provided with one 1/4-inch tap, for connection of a pressure gauge.

2.1 Motors: The pump motors shall be provided by the pump manufacturer. It shall be the manufacturer's responsibility to coordinate the requirements of the electric motor drives with the pumping unit requirement. Motor sizes shall not be less than that specified below but shall be capable of operating the pumping unit at any point on the pump curve without exceeding the name plate rating of the motor. All motors shall conform to the design, construction, and performance standards of NEMA, Class 1, Div. 1, Group D TEFC.

The motors shall be 10 horsepower minimum, 460 volts, 3 phase, 60 cycle, explosion proof. Insulation shall be NEMA Class B minimum and name plate rating shall be for 60°C rise in temperature above an ambient temperature of 40°C.

Motors shall have a hollow shaft and shall have thrust bearings capable of supporting the shafting.

The motors shall have NEMA Type P base.

BID PACKAGE NO. 7

## PART B - EQUALIZATION TANK BLOWER

1. GENERAL: This section describes the aeration blower equipment to be furnished for the equalization tank. Technical specification Part A is also a part of this specification.

2. DESCRIPTION: Blowers shall be Heavy Duty, Rotary Displacement type, designed for continuous service and supplying oil free air. They shall operate without internal rotor contact. Inlet and Discharge openings shall be 12" ANSI 150#, standard drilling flanges and arranged for vertical air flow. Blower capacity shall be 2050 scfm at a discharge pressure of 13.0 psig.

2.1 Blower: Two revolving rotors shall be constructed of high strength ductile iron. Each rotor and shaft shall be identical, of one piece construction with a two lobe profile. The rotors shall be dynamically balanced to assure smooth and vibration-free operation.

The rotor housing shall be constructed of a one-piece close-grained cast iron casting. The housing shall be externally ribbed for strength.

End plates shall be constructed of close-grained cast iron and dowelled to rotor housing.

Drive End Cover shall be constructed of close-grained cast iron and Free End Cover shall be cast iron.

Drive Shaft shall be forged alloy steel of heavy duty design and flange mounted to the timing gear. The Drive Shaft shall be independently supported by a heavy duty ball bearing.

Timing Gears shall be matched sets, forged, heat treated, Helical type, 9" diameter, and shall be a minimum of AGMA Quality 12 with a maximum backlash tolerance of 0.0015". They shall be located at the Drive Shaft End to eliminate need for rotor "twist clearance".

Rotor bearings shall be of the anti-friction ball type. Gear and bearings shall be double row. Rotor shafts, bearings and gears shall be locked up in the drive end head plate to maintain precise rotor end clearance.

Timing of rotors shall be of a shim and dowel arrangement that will maintain their proper relationship without the need of re-drilling or pinning after each re-assembly.

2.2 Lubrication System: Lubrication shall be an integral lube system with a shaft mounted oil pump and an associated oil cooler and filter. Oil slingers and gear dipping shall be provided as well as suitable oil level sight glasses. External source lubrication with cooling shall be included to provide clean, filtered and cooled oil.

2.3 Seals: Oil seals shall be provided to assure no contamination of the air stream by oil used in the blower lubrication. Seal arrangements shall consist of positive lip type shaft seals installed adjacent to bearings, plus labyrinth type located in End Plate before rotor housing. An air space between the two type seals shall be provided to relieve possible air pressure build-up and prevent oil carry-over into rotor housing.

2.4 Test Report: The blower shall have a mechanical running test before shipment and a certified PTC-9 Flow Test shall be performed and report provided.

2.5 Blower Motor: The motor shall be a 2 speed, 200 HP, TEXP, Class 1, Group D with a 1.10 S.F., 1800 RPM/1200 RPM, 230/460 volt, 3 phase, 60 Hz.

2.6 Unit Package: A package unit consisting of an inlet filter, inlet silencer, blower and motor, support stand, and a discharge silencer shall be supplied with the inlet filter and silencer mounted above the blower/motor which is above the discharge silencer.

2.7 Startup and Training: Manufacturer to provide one day of start up and training as well as six (6) Operation and Maintenance manuals.

3. SPARE PARTS: The Manufacturer shall furnish a list of recommended spare parts to be stored at the refinery. The Manufacturer shall also furnish an itemized price list of all available spare parts for each equipment item.

BID PACKAGE NO. 8

## PART B - AERATED WASTE HOLDING TANK - FIXED AERATION HEADERS

1. GENERAL: The complete aeration system for a 114 foot diameter x 30 foot sidewater depth covered steel tank shall be furnished. The aeration equipment manufacturer shall furnish the aeration equipment beginning with a stainless steel flanged connection at the upstream side of the drop leg and include the drop leg, loose follower flange connection to the air manifold, air manifold, slip joint connections between air manifold and air header, air headers, diffuser connectors, diffusers, stainless steel supports, gaskets, header joints, bolts, nuts and washers, all to form the complete aeration system within the tank. The requirements of Part A apply to this section.

2. FIXED AERATION HEADERS: A drop leg shall be furnished from the air main connection at the top of the tank shell. The top connection shall be a loose follower flange. The drop leg connection to the air manifold shall be a loose follower flange. Support of the drop leg shall be from its upper connection and intermediate tank shell supports. The connections between the air manifold and air headers shall be a slip joint for ease of installation.

The air distribution header shall be fabricated in sections up to thirty five (35) feet in length. The bottom elevation of the air distribution header shall be the same throughout the tank. Changes in diameter shall be accomplished by using eccentric reducers. The end of each header shall have welded end caps. The sections shall be of appropriate geometry to fit through a 3' by 4' opening in the tank wall.

Connections between sections of the air distribution header shall be special flanged joints or slip joints. These joints shall be designed so that individual header sections can be rotated independently of adjacent header sections for alignment purposes. Flanged joints shall be of the face ring-follower flange type with thru bolts or of the face ring - V-clamp type. The flanged joints shall be structurally designed to transmit the longitudinal forces caused by expansion and contraction in the air distribution header. Slip joints shall be designed to allow for expansion and contraction of the air distribution header.

All supports are to be 316 stainless steel and will be welded directly to the tank, by the installation contractor. An adjustable pipe cradle will be attached to the fixed support.

The air distribution header shall include an expansion-contraction system consisting of slip joints, fixed supports, and flanged header connections. Fixed supports shall be designed to anchor the header against longitudinal movement at the support. Intermediate supports between fixed supports and slip joints shall allow for longitudinal movement. The entire system shall be designed to allow for expansion and contraction over a temperature range of 80°F to 120°F.

Each section of the air distribution header shall have a minimum of two supports. Maximum spacing between supports shall not exceed sixteen (16) feet.

Header supports shall include hold-down, adjusting and locking mechanism, header cradle, crosstree and supporting structure.

Each support shall have an adjustable cradle with a bearing surface contoured to fit a minimum of the bottom 90 degrees of the air distribution header. The surface shall be a minimum of two (2) inches wide. All materials to be 316 stainless steel.

All supports shall include a mechanism to provide for a minimum of ±3 inches vertical and ±1/2 inch lateral adjustment for alignment of the header.

One support for each header section shall include an integral device for rotational adjustment. All adjusting devices and mechanisms shall lock to maintain the header position after the final adjustment and alignment have been made.

The diffuser connectors shall be factory welded to the bottom centerline of the air distribution header. The diffuser connectors shall be on a common horizontal plane. Air release from the diffuser into the wastewater shall be at or below this common horizontal plane. The connectors shall be of such length and so positioned that the air exiting the diffusers shall clear the air header. Diffuser connectors and headers shall be mutually stiffened to withstand a vertical load that results in a moment of 500 inch pounds at the diffuser connector without any permanent deformation.

The design and fabrication of the entire aeration system shall be such that all diffusers connected to a header can be leveled to within ±3/8 inch of a common horizontal plane.

3. MATERIALS AND FABRICATION: All welded parts and assemblies including drop legs, air distribution headers, diffusers, connectors, fabricated supports flanged joints, and expansion joints shall be fabricated from sheets and plates of 316L stainless steel with a 2D finish conforming to AISI 316L and ASTM A240-72a. Other non-welded parts and pieces such as bolts, washers and follower flanges shall be made from 316 stainless steel. The nuts shall be 316 stainless steel.

All gaskets shall withstand pH variation from 2 to 13.

All 316L material shall conform to the chemical requirements of ASTM 240-72A and AISI 316L except that the maximum carbon content shall be limited to .030%.

Header dimensions shall be as shown on the proposal drawings with dimensional tolerances conforming to ASTM A554-72 and ASTM A530-72.

All welding on this equipment shall be completed in the factory. Field welding shall not be permitted. All welding shall be by the shielded arc, inert gas, MIC ot TIG method. Filler wire shall be added to all welds to provide for a cross section of weld metal equal to, or greater than, the parent metal. Butt welds shall have full penetration to the interior surface and gas shielding shall be provided to the interior and exterior of the joint.

All welds shall have a surface finish equal to the smoothness of a 2-D sheet finish. Interior weld beads shall be smooth, evenly distributed, with an interior projection not exceeding 1/16" beyond the I.D. of the air header or fitting.

The outside weld area shall be wire brushed. Brushes shall be of stainless steel and used only on stainless steel. All discoloration and deposits left by welding shall be removed by pickling.

After fabrication, all stainless steel assemblies and parts shall be passivated by immersion in a pickling solution of 6% nitric acid and 3% hydrofluoric acid at 140°F for a minimum of 15 minutes. Parts shall be free of iron particles or other foreign material. A complete neutralizing operation shall be required by immersion in a tri-sodium phosphate rinse.

4. HEADLOSS: The maximum allowable headloss from the header through the connector and diffuser to the water shall not exceed 1.0 psi when operating at 20 scfm flow per diffuser.

5. DIFFUSERS: 200 diffusers shall be furnished and installed. Each diffuser will have a capacity of 20 scfm at 1.0 psi or less pressure drop The Supplier shall furnish a layout showing the arrangement, spacing and pipe sizes.

Diffusers shall be designed to provide wide band aeration. Air shall be released uniformly along a minimal air band of 2' beyond the side of the air distribution header. Air exiting from the diffusers shall clear the air header.

The diffusers shall be coarse bubble of proven non-clog design with no moving parts. Each diffuser shall consist of: a balancing nozzle, an inverted air reservoir, air exit ports and a deflector. Diffusers to be Sanitaire D-24 or equal.

The balancing nozzle, with a 3/4" NPT male pipe connection, shall provide the proper headloss to assure uniform distribution throughout the entire aeration system.

The body of the diffuser shall be constructed of 316L stainless steel. The end cap shall be cast 316 stainless steel and shall have a 3/4" NPT male pipe connection equivalent to Schedule 80 pipe.

6. SPARE PARTS: The Manufacturer shall furnish a list of recommended spare parts to be stored at the refinery. The Manufacturer shall also furnish an itemized price list of all available spare parts for each equipment item.

T-801



# API Standard 650
# Storage Tank Specification Data Sheet

Date AUG 12, 1986 Sheet 1 of 3
By PARKHILL SMITH & COOPER INC. File No. _____

**General Information (By Purchaser)**

1 Purchaser/Agent _____
Address SUITE 929 FIRST CITY NATIONAL BANK
City EL PASO State TX Phone (915) 533-6811
2 User NAVAJO REFINING CO., BOX 159, ARTESIA, N.M.
3 Erection Site: Name of Plant NAVAJO REFINING COMPANY
Location ARTESIA, N.M.
4 Tank No. T-801 Tank Capacity (bbl): Nominal 54,000 Net Working 54,000
5 Pumping Rates: In 2150 bbl/hr. Out 2150 bbl/hr. SEE REMARKS BELOW
6 Max. Operating Temperature 140° F
7 Product Stored WASTE WATER Design Specific Gravity 1.0 @ 60 F
Design Metal Temp. 140° F Vapor Pressure _____ in. water
8 Corrosion allowance (in.): Shell 1/16 Roof 1/16
Bottom 1/16 Structurals 1/16
9 Shell Design: Basic API 650 ✓ App. A _____ App. F _____ Design Pressure _____
10 Roof Design: Basic API 650 CONE ROOF Floating Roof App. C _____
Internal Floating Roof App. H _____
Frangible Roof Joint: Yes _____ No _____
11 Roof Loads: Uniform Live (consider snow) API 650 15#/SQ. FT. SNOW lb/sq. ft.
Special Loading (provide sketch) _____
12 Earthquake Design per App. E: Yes _____ No ✓
Seismic Zone (Fig. E-1) _____ Essential Facilities Factor _____
Zone Coefficient (Table E-1) _____
Site Amplification Factor (Table E-2) _____
Roof Tie Rods (3.10.4.5): Yes _____ No _____
13 Wind Load: Velocity (mph) 100
Provide Intermediate Windgirder (as per 3.9.7): Yes _____ No _____
14 Environmental Effects: Rainfall, max. 4" in. per hr.
Snowfall, total accumulation 6" in.
15 Diameter and/or Height Restrictions 114 Diameter, max.
30 Height, max.
16 Foundation Type: Earth _____ Concrete Ringwall ✓ BY OTHERS
Other _____

Remarks NAVAJO WILL FURNISH WATER FOR TESTING COMPLETED TANK.

ITEM 5 IN ADDITION TO THE LIQUID FILL RATE 1850 SCFM OF AIR WILL BE CONTINOUSLY ADDED TO TANK.

T-801



Sheet 2 of 3
File No. _____

**Construction Details (By Manufacturer and/or Purchaser, as Applicable)**

1 Manufacturer _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

2 Fabricator _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

3 Material Specifications: Shell A-36
Roof A-36
Bottom A-36
Structurals A-36

4 Shell Courses (no. of) _____

5 Plate Width and Thickness (including corrosion allowance
1 _____ 2 _____ 3 _____
4 _____ 5 _____ 6 _____
7 _____ 8 _____ 9 _____

6 Tank Bottom: Plate Thickness 1/4" - SKETCH PLATE 5/16"
Seams (check one) ✓ lap _____ butt
Slope 0.1 in. per ft. Check one: To _____ From ✓ Center

7 Bottom Annular Plates Min. Width and Thickness (see 3.5) _____

8 Roof to Shell Detail: Fig. F-1 DETAIL H

9 Intermediate Windgirder: Yes _____ No _____
Top Windgirder (use as walkway): Yes _____ No _____

10 Roof Type: Supported ✓ Self-Supported _____
Slope or Radius _____ Floating _____

11 Roof Plate: Thickness 3/16" Lap Joint ✓
Butt Joint _____

12 Paint-Shell: Exterior-Yes _____ No ✓ Interior-Yes _____ No ✓
Bottom Interior-Yes _____ No ✓ Underside-Yes _____ No ✓
Surface Preparation _____

13 Tank Bottom Coating: Interior-Yes _____ No ✓ Material _____
Application Specification _____

14 Paint: Structural Steel Interior-Yes _____ No ✓ Exterior-Yes _____ No _____
Specification _____

15 Inspection By: Shop _____ Field NAVAJO OR NAVAJO REPRESENTATIVE

16 Weld Examination: Radiograph STD API 650
Supplementary Liquid Penetrant or Ultrasonic _____

17 Films _____ Property Of _____

18 Leak Testing: Bottom VACUUM BOX Roof VACUUM BOX - PENETRATIVE DIESEL FUEL
Shell PENETRATIVE DIESEL FUEL

19 Mill Test Reports Required: Yes ✓ No _____
Plate ✓ Structural Shapes ✓

20 Purchaser's Reference Drawing _____

21 Tank Size: Diameter and Height in ft. 114' DIA. x 30' HIGH

22 Date of Edition or Revision of API Standard 650 _____

Remarks
NO PAINTING

T-801



Sheet 3 of 3
File No. _____

**Appurtenances (By Manufacturer and/or Purchaser, as Applicable)**

1 Stairway Style (check one): Circular ✓ Straight _____ WITH PLATFORM AT TOP
Angle, degree to horizontal 45° Ladder _____
2 Walkway: Width API 650 Length _____
3 Drawoff Sump: Standard _____ Special _____
4 Bolted Door Sheet (App. A only): _____ Raised-Type _____ Flush-Type _____
5 Scaffold Hitch _____
6 Internal Pipe: Swing Line _____ Suction Nozzle _____
Heating Coil Surface Area _____ sq. ft.
7 Roof Drain: Hose _____ Jointed _____ Siphon _____
8 Shell Manways: No. and Size 1-24" 1- 3'X4' CLEAN OUT
9 Roof Manways: No. and Size 1-24"
10 Shell Nozzles (See Fig. 3-4B, 3-5, 3-6, and Tables 3-8,3-9, and 3-10)

| Mark | Size | Flanged | | | Screwed | | | | | Orientation N = 0° | Height From Bottom | Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SGL | DBL | SPL | A | B | C | D | E | | | |
| | 8" | ✓ | | | | | | | | 90 | 2' | INLET |
| | 10" | ✓ | | | | | | | | 270 | 2' | DISCHARGE |
| | 6" | ✓ | | | | | | | | 210 | 3" | DRAIN |
| | 3" | ✓ | | | | | | | | 250 | 5" | LIT |
| | 8" | | ✓ | | | | | | | 270 | 29'-6" | AIR |
| | 24" | ✓ | | | | | | | | 45 | 3' | MANWAY |
| | 3'X4' | ✓ | | | | | | | | 220 | FLUSH | CLEAN OUT |
| | 8" | ✓ | | | | | | | | 215 | 15' | SKIMMER |
| | 8" W/WEIR BOX * | | | ✓ | | | | | | 180 | 29' | OVERFLOW |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

* SIZE WEIR BOX TO PASS 1500 GPM AT 6" OVER WEIR

11 Roof Nozzles (Including venting connection) (See Fig. 3-4 and 3-15 and Tables 3-16 and 3-17)

| Mark | Size | Flanged | Screwed | Reinf. | Orientation N = 0° | Distance From Center | Service |
|---|---|---|---|---|---|---|---|
| | 24 | ✓ | | | 270 | 20' | MANWAY |
| | 10 | ✓ | | | 270 | 10' | VENT |
| | 8 | ✓ | | | 45 | 10' | GAUGE/HATCH |
| | 8 | ✓ | | | 135 | 20' | " " |
| | 8 | ✓ | | | 225 | 30' | " " |
| | 8 | ✓ | | | 315 | 40' | " " |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

*Note:* Sketch and/or separate sheet may be attached to cover special requirements.

T-802



# API Standard 650
# Storage Tank Specification Data Sheet

Date _____ Sheet 1 of 3
By PARKHILL SMITH & COOPER, INC. File No. _____

**General Information (By Purchaser)**

1 Purchaser/Agent PARKHILL SMITH & COOPER, INC.
Address SUITE 924 FIRST CITY NATIONAL BANK
City EL PASO State TX Phone (915) 533-6811
2 User NAVAJO REFINING CO., BOX 159, ARTESIA, N.M.
3 Erection Site: Name of Plant ARTESIA REFINING COMPANY
Location ARTESIA, N. MEX.
4 Tank No. T-802 Tank Capacity (bbl): Nominal 5000 Net Working 5000
5 Pumping Rates: In 35.7 bbl/hr. Out 143 bbl/hr.
6 Max. Operating Temperature 140° F
7 Product Stored SLOP OIL Design Specific Gravity .85 @ 105° F
Design Metal Temp. 140° F Vapor Pressure _____ in. water
8 Corrosion allowance (in.): Shell 1/16" Roof 1/16"
Bottom 1/16" Structurals 1/16"
9 Shell Design: Basic API 650 ✓ App. A _____ App. F _____ Design Pressure _____
10 Roof Design: Basic API 650 CONE ROOF Floating Roof App. C _____
Internal Floating Roof App. H _____
Frangible Roof Joint: Yes _____ No _____
11 Roof Loads: Uniform Live (consider snow) API 650 15#/SQ.ft SNOW lb/sq. ft.
Special Loading (provide sketch) _____
12 Earthquake Design per App. E: Yes _____ No ✓
Seismic Zone (Fig. E-1) _____ Essential Facilities Factor _____
Zone Coefficient (Table E-1) _____
Site Amplification Factor (Table E-2) _____
Roof Tie Rods (3.10.4.5): Yes _____ No _____
13 Wind Load: Velocity (mph) 100
Provide Intermediate Windgirder (as per 3.9.7): Yes _____ No ✓
14 Environmental Effects: Rainfall, max. 4 in. per hr.
Snowfall, total accumulation 6 in.
15 Diameter and/or Height Restrictions 35 Diameter, max.
30 Height, max.
16 Foundation Type: Earth _____ Concrete Ringwall ✓ BY OTHERS
Other _____

Remarks NAVAJO WILL FURNISH WATER FOR TESTING COMPLETED TANK.

T-802



Sheet 2 of 3
File No. _____

**Construction Details (By Manufacturer and/or Purchaser, as Applicable)**

1 Manufacturer _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

2 Fabricator _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

3 Material Specifications: Shell A-36
Roof A-36
Bottom A-36
Structurals A-36

4 Shell Courses (no. of) _____

5 Plate Width and Thickness (including corrosion allowance
1 _____ 2 _____ 3 _____
4 _____ 5 _____ 6 _____
7 _____ 8 _____ 9 _____

6 Tank Bottom: Plate Thickness 1/4 - SKETCH PLATE 5/16"
Seams (check one) ✓ lap _____ butt
Slope 0.1 in. per ft. Check one: To _____ From ✓ Center

7 Bottom Annular Plates Min. Width and Thickness (see 3.5) _____

8 Roof to Shell Detail: Fig. F-1 DETAIL C

9 Intermediate Windgirder: Yes _____ No _____
Top Windgirder (use as walkway): Yes _____ No _____

10 Roof Type: Supported ✓ Self-Supported _____
Slope or Radius _____ Floating _____

11 Roof Plate: Thickness 3/16" Lap Joint ✓
Butt Joint _____

12 Paint-Shell: Exterior-Yes _____ No ✓ Interior-Yes _____ No ✓
Bottom Interior-Yes _____ No ✓ Underside-Yes _____ No ✓
Surface Preparation _____

13 Tank Bottom Coating: Interior-Yes _____ No ✓ Material _____
Application Specification _____

14 Paint: Structural Steel Interior-Yes _____ No ✓ Exterior-Yes _____ No _____
Specification _____

15 Inspection By: Shop _____ Field NAVAJO OR NAVAJO REPRESENTATIVE

16 Weld Examination: Radiograph STD API 650
Supplementary Liquid Penetrant or Ultrasonic _____

17 Films _____ Property Of _____

18 Leak Testing: Bottom VACUUM BOX Roof VACUUM BOX - PENETRATIVE DIESEL FUEL
Shell PENETRATIVE DIESEL FUEL

19 Mill Test Reports Required: Yes ✓ No _____
Plate ✓ Structural Shapes ✓

20 Purchaser's Reference Drawing _____

21 Tank Size: Diameter and Height in ft. 35' DIA. x 30' HIGH

22 Date of Edition or Revision of API Standard 650 REVISION 1 FEB 1984

Remarks
NO PAINTING

T-802



Sheet 3 of 3
File No. _____

**Appurtenances (By Manufacturer and/or Purchaser, as Applicable)**

1 Stairway Style (check one): Circular ✓ Straight _____ WITH PLATFORM AT TOP
Angle, degree to horizontal 45° Ladder _____
2 Walkway: Width API 6.50 Length _____
3 Drawoff Sump: Standard 2'X2' Special _____
4 Bolted Door Sheet (App. A only): _____ Raised-Type _____ Flush-Type _____
5 Scaffold Hitch _____
6 Internal Pipe: Swing Line _____ Suction Nozzle _____
Heating Coil Surface Area _____ sq. ft.
7 Roof Drain: Hose _____ Jointed _____ Siphon _____
8 Shell Manways: No. and Size 1-24"
9 Roof Manways: No. and Size 1-24"
10 Shell Nozzles (See Fig. 3-4B, 3-5, 3-6, and Tables 3-8,3-9, and 3-10)

| Mark | Size | Flanged | | | Screwed | | | | | Orientation N = 0° | Height From Bottom | Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SGL | DBL | SPL | A | B | C | D | E | | | |
| | 4" | | ✓ | | | | | | | | 1'-0" | OUTLET |
| | 3" | ✓ | | | | | | | | DATA | 15'-0" | FILL |
| | 4" | ✓ | | | | | | | | | 0'-3" | DRAIN |
| | 24" | ✓ | | | | | | | | LATER | 3'-0" | MANWAY |
| | 3" | ✓ | | | | | | | | | 0'-5" | LIT |
| | 1" | | | | ✓ | | | | | | 2'-0" | SAMPLE 1 |
| | 1" | | | | ✓ | | | | | | 15'-0" | SAMPLE 2 |
| | 1" | | | | ✓ | | | | | | 27'-0" | SAMPLE 3 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

11 Roof Nozzles (Including venting connection) (See Fig. 3-4 and 3-15 and Tables 3-16 and 3-17)

| Mark | Size | Flanged | Screwed | Reinf. | Orientation N = 0° | Distance From Center | Service |
|---|---|---|---|---|---|---|---|
| | 3" | ✓ | | | 0 | 0 | VENT |
| | 24" | ✓ | | | 0 | 10'-0" | MANWAY |
| | 8" | ✓ | | | 225 | 10'-0" | GAUGE HATCH |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

*Note: Sketch and/or separate sheet may be attached to cover special requirements.*

T-803



# API Standard 650
## Storage Tank Specification Data Sheet

Date _____ Sheet 1 of 3
By PARKHILL SMITH & COOPER, INC. File No. _____

**General Information (By Purchaser)**

1 Purchaser/Agent PARKHILL SMITH & COOPER, INC.
Address SUITE 924 FIRST CITY NATIONAL BANK
City EL PASO, State TX Phone (915) 533-6811
2 User NAVAJO REFINING CO., P.O. BOX 159, ARTESIA, N.M.
3 Erection Site: Name of Plant ARTESIA REFINING COMPANY
Location ARTESIA, N. MEX.
4 Tank No. T-803 Tank Capacity (bbl): Nominal 100 BBL Net Working 100 BBL
5 Pumping Rates: In _____ bbl/hr. Out _____ bbl/hr.
6 Max. Operating Temperature _____ F
7 Product Stored DAF FLOAT / DAF-API SLUDGE Design Specific Gravity _____ @ _____ F
Design Metal Temp. 140° F Vapor Pressure _____ in. water
8 Corrosion allowance (in.): Shell 1/16" Roof 1/16"
Bottom 1/16" Structurals 1/16"
9 Shell Design: Basic API 650 ✓ App. A _____ App. F _____ Design Pressure _____
10 Roof Design: Basic API 650 CONE ROOF Floating Roof App. C _____
Internal Floating Roof App. H _____
Frangible Roof Joint: Yes ✓ No _____
11 Roof Loads: Uniform Live (consider snow) API 650 15#/SQ.FT. SNOW lb/sq. ft.
Special Loading (provide sketch) _____
12 Earthquake Design per App. E: Yes _____ No ✓
Seismic Zone (Fig. E-1) _____ Essential Facilities Factor _____
Zone Coefficient (Table E-1) _____
Site Amplification Factor (Table E-2) _____
Roof Tie Rods (3.10.4.5): Yes _____ No _____
13 Wind Load: Velocity (mph) 100
Provide Intermediate Windgirder (as per 3.9.7): Yes _____ No ✓
14 Environmental Effects: Rainfall, max. 4 in. per hr.
Snowfall, total accumulation 6 in.
15 Diameter and/or Height Restrictions 10' Diameter, max.
14' Height, max.
16 Foundation Type: Earth _____ Concrete Ringwall ✓ BY OTHERS
Other _____

Remarks NAVAJO WILL FURNISH WATER FOR TESTING COMPLETED TANK

THIS IS A CONE BOTTOM SKIRT SUPPORTED TANK

TANK DIMENSIONS: DIAMETER 10'-0"
VERTICAL WALL 7'-0"
SKIRT HEIGHT 7'-0"
DEPTH OF CONE 5'-0"

T-803



Sheet 2 of 3
File No. _____

**Construction Details (By Manufacturer and/or Purchaser, as Applicable)**

1 Manufacturer _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

2 Fabricator _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

3 Material Specifications: Shell A-36
Roof A-36
Bottom A-36
Structurals A-36

4 Shell Courses (no. of) _____

5 Plate Width and Thickness (including corrosion allowance
1 _____ 2 _____ 3 _____
4 _____ 5 _____ 6 _____
7 _____ 8 _____ 9 _____

6 Tank Bottom: Plate Thickness AS REQUIRED
Seams (check one) _____ lap ✓ butt
Slope 12" in. per ft. Check one: To ✓ From _____ Center

7 Bottom Annular Plates Min. Width and Thickness (see 3.5) _____

8 Roof to Shell Detail: Fig. F-1 DETAIL C

9 Intermediate Windgirder: Yes _____ No ✓
Top Windgirder (use as walkway): Yes _____ No _____

10 Roof Type: Supported _____ Self-Supported ✓
Slope or Radius _____ Floating _____

11 Roof Plate: Thickness 3/16" Lap Joint ✓
Butt Joint _____

12 Paint-Shell: Exterior-Yes _____ No ✓ Interior-Yes _____ No ✓
Bottom Interior-Yes _____ No ✓ Underside-Yes _____ No ✓
Surface Preparation _____

13 Tank Bottom Coating: Interior-Yes _____ No ✓ Material _____
Application Specification _____

14 Paint: Structural Steel Interior-Yes _____ No ✓ Exterior-Yes _____ No _____
Specification _____

15 Inspection By: Shop _____ Field NAVAJO OR NAVAJO REPRESENTATIVE

16 Weld Examination: Radiograph STD API 650
Supplementary Liquid Penetrant or Ultrasonic _____

17 Films _____ Property Of _____

18 Leak Testing: Bottom VACUUM BOX Roof VACUUM BOX - PENETRATIVE DIESEL FUEL
Shell PENETRATIVE DIESEL FUEL

19 Mill Test Reports Required: Yes ✓ No _____
Plate ✓ Structural Shapes ✓

20 Purchaser's Reference Drawing _____

21 Tank Size: Diameter and Height in ft. _____

22 Date of Edition or Revision of API Standard 650 REVISION 1 FEB 1984

Remarks
NO PAINTING

T-803



Sheet 3 of 3
File No. _____

**Appurtenances (By Manufacturer and/or Purchaser, as Applicable)**

1 Stairway Style (check one): Circular _____ Straight ✓ WITH PLATFORM BETWEEN T-803 & T804. ONE STAIR SERVES BOTH TANKS
Angle, degree to horizontal 45° Ladder _____

2 Walkway: Width API 650 Length _____

3 Drawoff Sump: Standard _____ Special _____

4 Bolted Door Sheet (App. A only): _____ Raised-Type _____ Flush-Type _____

5 Scaffold Hitch _____

6 Internal Pipe: Swing Line _____ Suction Nozzle _____
Heating Coil Surface Area _____ sq. ft.

7 Roof Drain: Hose _____ Jointed _____ Siphon _____

8 Shell Manways: No. and Size 1-24"

9 Roof Manways: No. and Size 1-24"

10 Shell Nozzles (See Fig. 3-4B, 3-5, 3-6, and Tables 3-8,3-9, and 3-10)

| Mark | Size | Flanged | | | Screwed | | | | | Orientation N = 0° | Height From Bottom OF SKIRT | Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SGL | DBL | SPL | A | B | C | D | E | | | |
| | 3" | ✓ | | | | | | | | | 10'-0" | INLET |
| | 3" | ✓ | | | | | | | | | 2'-0" | OUTLET |
| | 3" | ✓ | | | | | | | | | 4'-0" | LIT |
| | 24" | ✓ | | | | | | | | DATA | 8'-0" | MANWAY |
| | 3" | ✓ | | | | | | | | | 13'-0" | OVERFLOW |
| | 1" | | | | ✓ | | | | | LATER | 6'-0" | SAMPLE 1 |
| | 1" | | | | ✓ | | | | | | 7'-0" | SAMPLE 2 |
| | 1" | | | | ✓ | | | | | | 8'-0" | SAMPLE 3 |
| | 1" | | | | ✓ | | | | | | 9'-0" | SAMPLE 4 |
| | 1" | | | | ✓ | | | | | | 10'-0" | SAMPLE 5 |
| | 1" | | | | ✓ | | | | | | 11'-0" | SAMPLE 6 |
| | 1" | | | | ✓ | | | | | | 12'-0" | SAMPLE 7 |

11 Roof Nozzles (Including venting connection) (See Fig. 3-4 and 3-15 and Tables 3-16 and 3-17)

| Mark | Size | Flanged | Screwed | Reinf. | Orientation N = 0° | Distance From Center | Service |
|---|---|---|---|---|---|---|---|
| | 24" | ✓ | | | 0 | 2.5' | MANWAY |
| | 3" | ✓ | | | 0 | 0 | VENT |
| | 8" | ✓ | | | 315 | 2' | GAUGE HATCH |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

*Note:* Sketch and/or separate sheet may be attached to cover special requirements.

T-804



# API Standard 650
# Storage Tank Specification Data Sheet

Date AUG. 12, 1986 Sheet 1 of 3
By PARKHILL SMITH & COOPER INC. File No.

**General Information (By Purchaser)**

1 Purchaser/Agent PARKHILL SMITH & COOPER, INC.
Address SUITE 924, FIRST CITY NATIONAL BANK
City EL PASO State TX Phone (915) 533-6811
2 User NAVAJO REFINING CO, P.O. BOX 159, ARTESIA, N.M.
3 Erection Site: Name of Plant ARTESIA REFINING COMPANY
Location ARTESIA, N. MEX.
4 Tank No. T-804 Tank Capacity (bbl): Nominal _____ Net Working _____
5 Pumping Rates: In _____ bbl/hr. Out _____ bbl/hr.
6 Max. Operating Temperature _____ F
7 Product Stored DAF FLOAT / DAF-API SLUDGE Design Specific Gravity 1.1 @ 100 F
Design Metal Temp. 140° F Vapor Pressure _____ in. water
8 Corrosion allowance (in.): Shell 1/16" Roof 1/16"
Bottom 1/16" Structurals 1/16"
9 Shell Design: Basic API 650 ✓ App. A _____ App. F _____ Design Pressure _____
10 Roof Design: Basic API 650 CONE ROOF Floating Roof App. C _____
Internal Floating Roof App. H _____
Frangible Roof Joint: Yes ✓ No _____
11 Roof Loads: Uniform Live (consider snow) API 650 15# / SQ FT SNOW lb/sq. ft.
Special Loading (provide sketch) _____
12 Earthquake Design per App. E: Yes _____ No ✓
Seismic Zone (Fig. E-1) _____ Essential Facilities Factor _____
Zone Coefficient (Table E-1) _____
Site Amplification Factor (Table E-2) _____
Roof Tie Rods (3.10.4.5): Yes _____ No _____
13 Wind Load: Velocity (mph) 100
Provide Intermediate Windgirder (as per 3.9.7): Yes _____ No ✓
14 Environmental Effects: Rainfall, max. 4 in. per hr.
Snowfall, total accumulation 6 in.
15 Diameter and/or Height Restrictions 10' Diameter, max.
14' Height, max.
16 Foundation Type: Earth _____ Concrete Ringwall ✓ BY OTHERS
Other _____

Remarks NAVAJO WILL FURNISH WATER FOR TESTING COMPLETED TANK

THIS IS A CONE BOTTOM SKIRT SUPPORTED TANK

TANK DIMENSIONS:
DIAMETER 10'-0"
VERTICAL WALL 7'-0"
SKIRT HEIGHT 7'-0"
DEPTH OF CONE 5'-0"

T-804



Sheet 2 of 3
File No. _____

**Construction Details (By Manufacturer and/or Purchaser, as Applicable)**

1 Manufacturer _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

2 Fabricator _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

3 Material Specifications: Shell A-36
Roof A-36
Bottom A-36
Structurals A-36

4 Shell Courses (no. of) _____

5 Plate Width and Thickness (including corrosion allowance
1 _____ 2 _____ 3 _____
4 _____ 5 _____ 6 _____
7 _____ 8 _____ 9 _____

6 Tank Bottom: Plate Thickness AS REQUIRED
Seams (check one) _____ lap ✓ butt
Slope 12" in. per ft. Check one: To ✓ From _____ Center

7 Bottom Annular Plates Min. Width and Thickness (see 3.5) _____

8 Roof to Shell Detail: Fig. F-1 DETAIL C

9 Intermediate Windgirder: Yes _____ No ✓
Top Windgirder (use as walkway): Yes _____ No _____

10 Roof Type: Supported _____ Self-Supported ✓
Slope or Radius _____ Floating _____

11 Roof Plate: Thickness 3/16" Lap Joint ✓
Butt Joint _____

12 Paint-Shell: Exterior-Yes _____ No ✓ Interior-Yes _____ No ✓
Bottom Interior-Yes _____ No ✓ Underside-Yes _____ No ✓
Surface Preparation _____

13 Tank Bottom Coating: Interior-Yes _____ No ✓ Material _____
Application Specification _____

14 Paint: Structural Steel Interior-Yes _____ No ✓ Exterior-Yes _____ No _____
Specification _____

15 Inspection By: Shop _____ Field NAVAJO OR NAVAJO REPRESENTATIVE

16 Weld Examination: Radiograph STD API 650
Supplementary Liquid Penetrant or Ultrasonic _____

17 Films _____ Property Of _____

18 Leak Testing: Bottom PENETRATIVE DIESEL FUEL Roof VACUUM BOX-PENETRATIVE DIESEL FUEL
Shell PENETRATIVE DIESEL FUEL

19 Mill Test Reports Required: Yes ✓ No _____
Plate ✓ Structural Shapes ✓

20 Purchaser's Reference Drawing _____

21 Tank Size: Diameter and Height in ft. _____

22 Date of Edition or Revision of API Standard 650 REVISION 1 FEB 1984

Remarks _____
NO PAINTING

T-804



Sheet 3 of 3
File No. _____

**Appurtenances (By Manufacturer and/or Purchaser, as Applicable)**

1 Stairway Style (check one): Circular _____ Straight ✓ WITH PLATFORM BETWEEN T-803 & T804 ONE STAIR SERVES BOTH TANKS
Angle, degree to horizontal 45° Ladder _____
2 Walkway: Width API 650 Length _____
3 Drawoff Sump: Standard _____ Special _____
4 Bolted Door Sheet (App. A only): _____ Raised-Type _____ Flush-Type _____
5 Scaffold Hitch _____
6 Internal Pipe: Swing Line _____ Suction Nozzle ✓
Heating Coil Surface Area _____ sq. ft.
7 Roof Drain: Hose _____ Jointed _____ Siphon _____
8 Shell Manways: No. and Size 1-24"
9 Roof Manways: No. and Size 1-24"
10 Shell Nozzles (See Fig. 3-4B, 3-5, 3-6, and Tables 3-8,3-9, and 3-10)

| Mark | Size | Flanged | | | Screwed | | | | | Orientation | Height From | Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SGL | DBL | SPL | A | B | C | D | E | N = 0° | Bottom | |
| | 3" | ✓ | | | | | | | | | 10'-0" | INLET |
| | 3" | ✓ | | | | | | | | | 2'-0" | OUTLET |
| | 2" | ✓ | | | | | | | | | 4'-0" | LIT |
| | 24" | ✓ | | | | | | | | DATA | 8'-0" | MANWAY |
| | 3" | ✓ | | | | | | | | | 13'-0" | OVERFLOW |
| | 1" | | | | ✓ | | | | | LATER | 6'-0" | SAMPLE 1 |
| | 1" | | | | ✓ | | | | | | 7'-0" | SAMPLE 2 |
| | 1" | | | | ✓ | | | | | | 8'-0" | SAMPLE 3 |
| | 1" | | | | ✓ | | | | | | 9'-0" | SAMPLE 4 |
| | 1" | | | | ✓ | | | | | | 10'-0" | SAMPLE 5 |
| | 1" | | | | ✓ | | | | | | 11'-0" | SAMPLE 6 |
| | | | | | ✓ | | | | | | 12'-0" | SAMPLE 7 |

11 Roof Nozzles (including venting connection) (See Fig. 3-4 and 3-15 and Tables 3-16 and 3-17)

| Mark | Size | Flanged | Screwed | Reinf. | Orientation N = 0° | Distance From Center | Service |
|---|---|---|---|---|---|---|---|
| | 24" | ✓ | | | 0 | 2.5' | MANWAY |
| | 3 | ✓ | | | 0 | 2.5' | VENT |
| | 8" | ✓ | | | 315 | 2'-0" | GAUGE HATCH |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Note: Sketch and/or separate sheet may be attached to cover special requirements.

T-807



# API Standard 650
## Storage Tank Specification Data Sheet

Date AUG 12, 1986 Sheet 1 of 3
By PARKHILL SMITH & COOPER, INC. File No.

**General Information (By Purchaser)**

1 Purchaser/Agent PARKHILL SMITH & COOPER INC.
Address SUITE 924 FIRST CITY NATIONAL BANK
City EL PASO State TX Phone (915) 533-6811
2 User NAVAJO REFINING CO., P.O. BOX 159, ARTESIA, N.M.
3 Erection Site: Name of Plant ARTESIA REFINING COMPANY
Location ARTESIA, N. MEX.
4 Tank No. T-807 Tank Capacity (bbl): Nominal 38 Net Working 38
5 Pumping Rates: In 300 bbl/hr. Out 0.25 bbl/hr.
6 Max. Operating Temperature 110° F
7 Product Stored CAUSTIC Design Specific Gravity 1.330 @ 60 F
Design Metal Temp. 110° F Vapor Pressure in. water
8 Corrosion allowance (in.): Shell 3/16" Roof 3/16"
Bottom 3/16" Structurals 3/16"
9 Shell Design: Basic API 650 ✓ App. A App. F Design Pressure
10 Roof Design: Basic API 650 CONE ROOF Floating Roof App. C
Internal Floating Roof App. H
Frangible Roof Joint: Yes No ✓
11 Roof Loads: Uniform Live (consider snow) API 650 15 #/SQ. FT SNOW lb/sq. ft.
Special Loading (provide sketch)
12 Earthquake Design per App. E: Yes No ✓
Seismic Zone (Fig. E-1) Essential Facilities Factor
Zone Coefficient (Table E-1)
Site Amplification Factor (Table E-2)
Roof Tie Rods (3.10.4.5): Yes No
13 Wind Load: Velocity (mph) 100
Provide Intermediate Windgirder (as per 3.9.7): Yes No ✓
14 Environmental Effects: Rainfall, max. 4 in. per hr.
Snowfall, total accumulation 6 in.
15 Diameter and/or Height Restrictions 10' Diameter, max.
10' Height, max.
16 Foundation Type: Earth Concrete Ringwall ✓ BY OTHERS
Other

Remarks NAVAJO WILL FURNISH WATER FOR TESTING COMPLETED TANK

T-807



Sheet 2 of 3
File No. _____

**Construction Details (By Manufacturer and/or Purchaser, as Applicable)**

1 Manufacturer _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

2 Fabricator _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

3 Material Specifications: Shell A-36
Roof A-36
Bottom A-36
Structurals A-36

4 Shell Courses (no. of) _____

5 Plate Width and Thickness (including corrosion allowance
1 _____ 2 _____ 3 _____
4 _____ 5 _____ 6 _____
7 _____ 8 _____ 9 _____

6 Tank Bottom: Plate Thickness 3/8" CORROSION ALLOWANCE INCLUDED
Seams (check one) ✓ lap _____ butt
Slope 0.1 in. per ft. Check one: To _____ From ✓ Center

7 Bottom Annular Plates Min. Width and Thickness (see 3.5) _____

8 Roof to Shell Detail: Fig. F-1 DETAIL C

9 Intermediate Windgirder: Yes _____ No _____
Top Windgirder (use as walkway): Yes _____ No _____

10 Roof Type: Supported _____ Self-Supported ✓
Slope or Radius _____ Floating _____

11 Roof Plate: Thickness 3/8" Lap Joint ✓
Butt Joint _____

12 Paint-Shell: Exterior-Yes _____ No ✓ Interior-Yes _____ No ✓
Bottom Interior-Yes _____ No ✓ Underside-Yes _____ No ✓
Surface Preparation _____

13 Tank Bottom Coating: Interior-Yes _____ No ✓ Material _____
Application Specification _____

14 Paint: Structural Steel Interior-Yes _____ No ✓ Exterior-Yes _____ No _____
Specification _____

15 Inspection By: Shop _____ Field NAVAJO OR NAVAJO REPRESENTATIVE

16 Weld Examination: Radiograph STD API 650
Supplementary Liquid Penetrant or Ultrasonic _____

17 Films _____ Property Of _____

18 Leak Testing: Bottom PENETRATIVE DIESEL FUEL Roof PENETRATIVE DIESEL FUEL
Shell PENETRATIVE DIESEL FUEL

19 Mill Test Reports Required: Yes ✓ No _____
Plate ✓ Structural Shapes ✓

20 Purchaser's Reference Drawing _____

21 Tank Size: Diameter and Height in ft. 10' DIA. X 10' HIGH

22 Date of Edition or Revision of API Standard 650 REVISION 1 FEB. 1984

Remarks
NO PAINTING

T-807



Sheet 3 of 3
File No. _____

**Appurtenances (By Manufacturer and/or Purchaser, as Applicable)**

1 Stairway Style (check one): Circular _____ Straight _____
Angle, degree to horizontal 90° Ladder ✓
2 Walkway: Width _____ Length _____
3 Drawoff Sump: Standard _____ Special _____
4 Bolted Door Sheet (App. A only): _____ Raised-Type _____ Flush-Type _____
5 Scaffold Hitch _____
6 Internal Pipe: Swing Line _____ Suction Nozzle _____
Heating Coil Surface Area _____ sq. ft.
7 Roof Drain: Hose _____ Jointed _____ Siphon _____
8 Shell Manways: No. and Size 1 - 24"
9 Roof Manways: No. and Size 1 - 24"
10 Shell Nozzles (See Fig. 3-4B, 3-5, 3-6, and Tables 3-8,3-9, and 3-10)

| Mark | Size | Flanged | | | Screwed | | | | | Orientation N = 0° | Height From Bottom | Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SGL | DBL | SPL | A | B | C | D | E | | | |
| | 1½" | ✓ | | | | | | | | 270 | 3" | OUTLET |
| | 2½" | | ✓ | | | | | | | 180 | 6" | INLET |
| | 24" | ✓ | | | | | | | | 135 | 3'-0" | MANWAY |
| | 2" | ✓ | | | | | | | | 225 | 3" | DRAIN |
| | 3 | ✓ | | | | | | | | 90 | 6" | LIT |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

11 Roof Nozzles (including venting connection) (See Fig. 3-4 and 3-15 and Tables 3-16 and 3-17)

| Mark | Size | Flanged | Screwed | Reinf. | Orientation N = 0° | Distance From Center | Service |
|---|---|---|---|---|---|---|---|
| | 24" | ✓ | | | 315 | 2' | MANWAY |
| | 3" | ✓ | | | 0 | 0 | VENT |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Note: Sketch and/or separate sheet may be attached to cover special requirements.

T-808



# API Standard 650
# Storage Tank Specification Data Sheet

Date AUG. 12, 1986 Sheet 1 of 3
By PARKHILL SMITH & COOPER, INC. File No.

**General Information (By Purchaser)**

1 Purchaser/Agent PARKHILL SMITH & COOPER, INC.
Address SUITE 924 FIRST CITY NATIONAL BANK
City EL PASO State TX Phone (915) 533-6811
2 User NAVAJO REFINING CO., P.O. BOX 159, ARTESIA, N.M.
3 Erection Site: Name of Plant NAVAJO REFINING COMPANY
Location ARTESIA, N. MEX.
4 Tank No. T-808 Tank Capacity (bbl): Nominal 24 Net Working 24
5 Pumping Rates: In _____ bbl/hr. Out _____ bbl/hr.
6 Max. Operating Temperature 110° F
7 Product Stored ACID Design Specific Gravity 1.83 @ 20° C F
Design Metal Temp. 110° F Vapor Pressure _____ in. water
8 Corrosion allowance (in.): Shell 1/16" Roof 1/16"
Bottom 1/16" Structurals 1/16"
9 Shell Design: Basic API 650 ✓ App. A _____ App. F _____ Design Pressure _____
10 Roof Design: Basic API 650 CONE ROOF Floating Roof App. C _____
Internal Floating Roof App. H _____
Frangible Roof Joint: Yes _____ No ✓
11 Roof Loads: Uniform Live (consider snow) API 650 15#/SQ. FT. SNOW lb/sq. ft.
Special Loading (provide sketch) _____
12 Earthquake Design per App. E: Yes _____ No ✓
Seismic Zone (Fig. E-1) _____ Essential Facilities Factor _____
Zone Coefficient (Table E-1) _____
Site Amplification Factor (Table E-2) _____
Roof Tie Rods (3.10.4.5): Yes _____ No _____
13 Wind Load: Velocity (mph) 100
Provide Intermediate Windgirder (as per 3.9.7): Yes _____ No ✓
14 Environmental Effects: Rainfall, max. 4 in. per hr.
Snowfall, total accumulation 6 in.
15 Diameter and/or Height Restrictions 5' Diameter, max.
7' Height, max.
16 Foundation Type: Earth _____ Concrete Ringwall ✓ BY OTHERS
Other _____

Remarks NAVAJO WILL FURNISH WATER FOR TESTING COMPLETED TANK

T-808



Sheet 2 of 3
File No. _____

**Construction Details (By Manufacturer and/or Purchaser, as Applicable)**

1 Manufacturer _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

2 Fabricator _____
Address _____
City _____ State _____ Phone _____
Serial No. _____

3 Material Specifications: Shell A-36
Roof A-36
Bottom A-36
Structurals A-36

4 Shell Courses (no. of) _____

5 Plate Width and Thickness (including corrosion allowance
1 _____ 2 _____ 3 _____
4 _____ 5 _____ 6 _____
7 _____ 8 _____ 9 _____

6 Tank Bottom: Plate Thickness 1/4"
Seams (check one) ✓ lap _____ butt
Slope _____ in. per ft. Check one: To _____ From _____ Center

7 Bottom Annular Plates Min. Width and Thickness (see 3.5) _____

8 Roof to Shell Detail: Fig. F-1 DETAIL C

9 Intermediate Windgirder: Yes _____ No _____
Top Windgirder (use as walkway): Yes _____ No _____

10 Roof Type: Supported _____ Self-Supported ✓
Slope or Radius _____ Floating _____

11 Roof Plate: Thickness 3/16" Lap Joint ✓
Butt Joint _____

12 Paint-Shell: Exterior-Yes _____ No ✓ Interior-Yes _____ No ✓
Bottom Interior-Yes _____ No ✓ Underside-Yes _____ No ✓
Surface Preparation _____

13 Tank Bottom Coating: Interior-Yes _____ No ✓ Material _____
Application Specification _____

14 Paint: Structural Steel Interior-Yes _____ No ✓ Exterior-Yes _____ No _____
Specification _____

15 Inspection By: Shop _____ Field NAVAJO OR NAVAJO REPRESENTATIVE

16 Weld Examination: Radiograph STD API 650
Supplementary Liquid Penetrant or Ultrasonic _____

17 Films _____ Property Of _____

18 Leak Testing: Bottom PENETRATIVE DIESEL FUEL Roof PENETRATIVE DIESEL FUEL
Shell PENETRATIVE DIESEL FUEL

19 Mill Test Reports Required: Yes ✓ No _____
Plate ✓ Structural Shapes ✓

20 Purchaser's Reference Drawing _____

21 Tank Size: Diameter and Height in ft. 5' DIA. x 10' HIGH

22 Date of Edition or Revision of API Standard 650 REVISION 1 FEB. 1984

Remarks
NO PAINTING

T-808



Sheet 3 of 3
File No. _____

**Appurtenances (By Manufacturer and/or Purchaser, as Applicable)**

1 Stairway Style (check one): Circular _____ Straight _____
Angle, degree to horizontal 90° Ladder ✓

2 Walkway: Width _____ Length _____

3 Drawoff Sump: Standard _____ Special _____

4 Bolted Door Sheet (App. A only): _____ Raised-Type _____ Flush-Type _____

5 Scaffold Hitch _____

6 Internal Pipe: Swing Line _____ Suction Nozzle _____
Heating Coil Surface Area _____ sq. ft.

7 Roof Drain: Hose _____ Jointed _____ Siphon _____

8 Shell Manways: No. and Size 1-20"

9 Roof Manways: No. and Size 1-20"

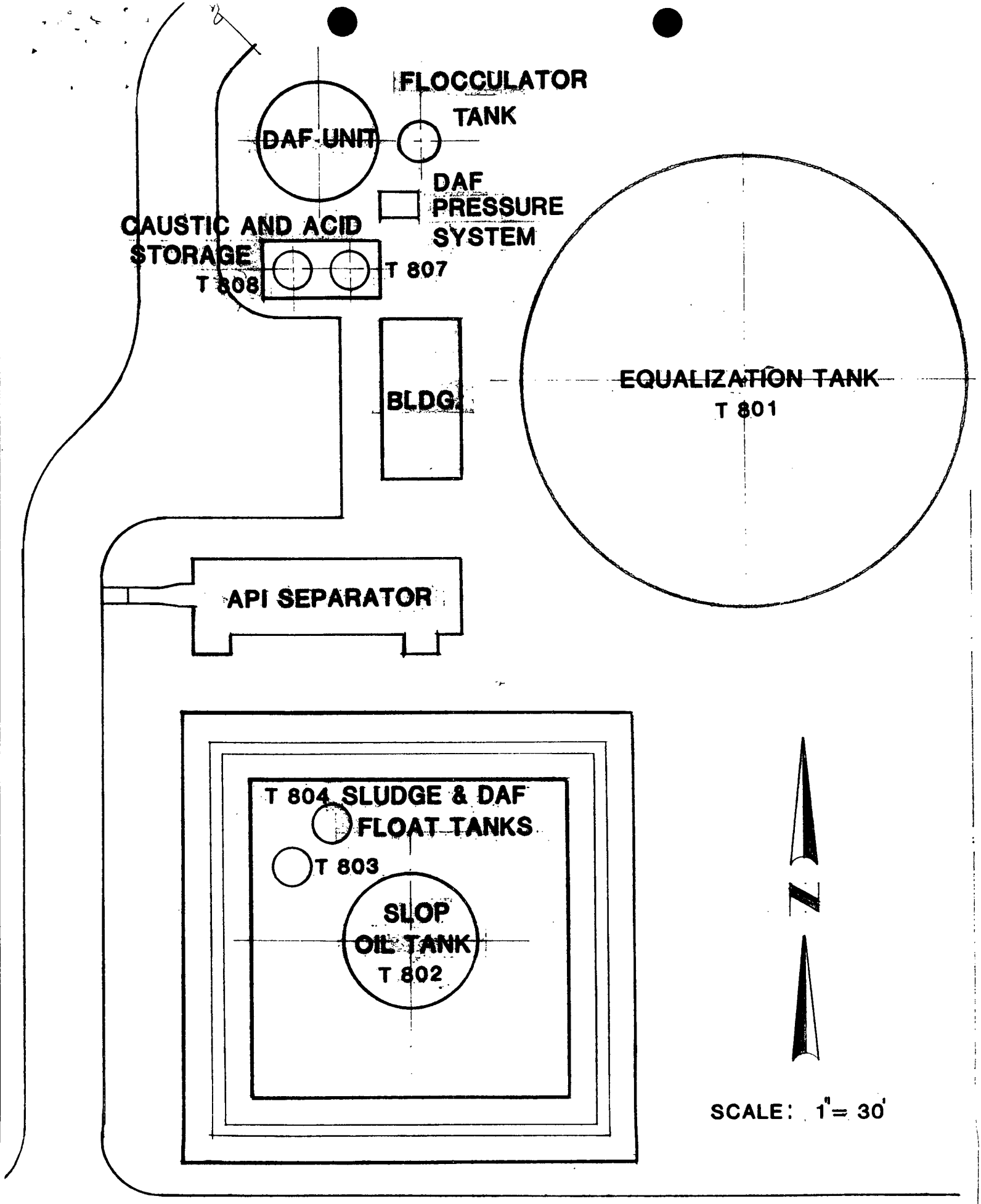
10 Shell Nozzles (See Fig. 3-4B, 3-5, 3-6, and Tables 3-8,3-9, and 3-10)

| Mark | Size | Flanged | | | Screwed | | | | | Orientation N = 0° | Height From Bottom | Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SGL | DBL | SPL | A | B | C | D | E | | | |
| | 1½" | ✓ | | | | | | | | 90 | 3" | OUTLET |
| | 2½" | ✓ | | | | | | | | 180 | 6" | INLET |
| | 20" | ✓ | | | | | | | | 270 | 3' | MANWAY |
| | 2" | ✓ | | | | | | | | 135 | 3" | DRAIN |
| | 3" | ✓ | | | | | | | | 110 | 6" | LIT |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

11 Roof Nozzles (including venting connection) (See Fig. 3-4 and 3-15 and Tables 3-16 and 3-17)

| Mark | Size | Flanged | Screwed | Reinf. | Orientation N = 0° | Distance From Center | Service |
|---|---|---|---|---|---|---|---|
| | 20" | ✓ | | | 315 | 2 | MANWAY |
| | 3" | ✓ | | | 0 | 0 | VENT |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

*Note: Sketch and/or separate sheet may be attached to cover special requirements.*




SITE LAYOUT PLAN

BID PACKAGE NO. 10

## PART B - FLOCCULATION TANK

1. GENERAL: Under this item the Equipment Manufacturer shall furnish and deliver, ready for installation, one (1) vertical paddle wheel flocculator and one (1) circular steel tank 10' x 0" in diameter by 11' x 4" average water depth. All items of Part B and Part C will be supplied by a single supplier, referred to as the DAF supplier. The requirements of Part A apply to this section.

1.1 General Description: The flocculator shall be shop fabricated and shall include:

Drive unit complete with reducer, motor and variable speed unit
Paddle wheel assembly
Shaft and coupling
Bearings and supports
Support bridge
Steel tank with floor
All associated attachment bolts and anchor bolts

1.2 Design Criteria

The Equipment Manufacturer shall select the flocculator components based upon design calculations incorporating the following criteria:

The paddle wheel shall be designed for the following maximum velocity gradient at a water temperature of 27°C: 100 fps/ft.

The speed shall be infinitely variable over a 2:1 speed range.

In no event shall the flocculator components be less than specified herein. The Manufacturer shall submit complete design calculations for the Engineer's review.

1.3 Paddle Wheel Assemblies

The paddle wheel shall be designed to provide the velocity gradient as specified under the Design Criteria in its corresponding zone of influence at the maximum shaft speed. Maximum paddle wheel tip speeds shall be less than 3.0 feet per second.

The paddle wheel assembly shall consist of paddle arms fixed in position between two (2) 1/2" thick fabricated steel hubs keyed to the shaft with keys of adequate size to transmit the maximum torque. Each paddle arm shall consist of two (2) structural steel angles and paddle blades of 6" x 2" nominal size select heart redwood.

Each angle arm shall bolt to the fabricated steel shaft hub with three (3) bolts, and each paddle shall bolt to each angle arm with two (2)

bolts. The angle arms shall be sized such that the tip deflection of the arm is less than 1/360 of the arm length under full operating load.

The paddle wheel shall have 2 arms.

1.4 Shaft

The shaft shall be solid, cold-finished steel, with key-seats to connect the paddle arms and flexible coupling.

1.5 Drive Unit

Each drive unit shall consist of a motor, variable speed unit, and a speed reducer, mounted on a common drive base. The drive motor shall be 1 HP minimum.

The motor shall be rated at 1800 RPM, squirrel cage, induction type, explosion proof, ball bearing, of ample power for starting and continuously operating the unit without overloading. The motor shall conform to NEMA standards and be nameplated for operation on 230/460 volt, 3 phase, 60 Hertz current.

1.6 Variable Speed Unit

The gear reducer shall be of the worm gear type, right angle, fully housed, running in oil and with anti-friction bearings throughout. The reducer shall be rated AGMA Class II for 24-hour continuous duty, moderate shock load.

1.7 Bearings and Supports

The paddle shaft shall be connected to the slow speed shaft of the gear reducer by a flexible coupling, and shall be supported by a heavy-duty flanged roller bearing mounted on the drive support base. The paddle shaft shall be held in by a self-aligning pillow block babbited bearing mounted on the tank floor. The submerged bearing shall be designed to be removable without disassembly of the paddle shaft. The drive unit shall be mounted on a structural steel support base, and the support base shall be mounted on the steel support bridge.

1.8 Support Bridge

An all-welded structural steel support bridge shall be provided by the Equipment Manufacturer to span the tank and support the mechanism. The bridge shall be provided with a walkway for access to the drive unit. The bridge shall be designed to support, in addition to the dead load, a live load of 150 lbs. per lineal foot with a deflection not exceeding 1/360 of the span. The bridge shall be complete with a 3 foot wide walkway with 3/16" thick steel checkered floor plate, toe plate, and a double handrail of 1-1/2" diameter steel pipe for the rails and vertical posts.

1.9 Steel Tank Shell

One (1) circular steel tank 10'0" diameter by 12'4" deep by 1/4" shall be furnished. The steel tank floor shall be a minimum of 1/4" thick and shall be supported with I Beams on 3' maximum centers. The tank shall

include an 8" flanged influent nozzle, a 2" flanged drain nozzle and an 8" flanged effluent nozzle. The following elevations will be used: tank floor - 65.00', water level - 74.86', and top of tank - 75.83'.

1.10 General Items

All anchor bolts shall be plated steel furnished by the Equipment Manufacturer and shall be of ample size and strength for the purpose intended.

All appurtenances, including chemicals, chemical feed equipment, chemical piping, baffles, electrical controls, wiring of motor or controls, control panels or supports, valves, gates, piping, tools, lubricants, and all field work, including erection and final painting, will be furnished by the Owner.

2. SPARE PARTS: The Manufacturer shall furnish a list of recommended spare parts for this equipment to be stored at the refinery. The Manufacturer shall also furnish an itemized price list of all spare parts for the bid package.

BID PACKAGE NO. 10

## PART C - DISSOLVED AIR FLOTATION CLARIFIER

1. GENERAL: This section covers the flotation clarifier mechanism, the pressurization system, and clarifier tank for a DAF clarifier. All items of Part B and Part C will be supplied by a single supplier, referred to as the DAF supplier. The requirements of Part A apply to this section.

2. FLOTATION CLARIFIER: There shall be furnished one (1) Flotation Clarifier mechanism, having a minimum flotation area of 604 square feet suitable for installation in a steel tank 30'-0" I.D. x 6'-1" SWD with a 6" freeboard, having a bottom slope of 1" in 12".

The mechanism shall be supported by a superstructure spanning the tank. The influent flow shall enter at the side of the unit and enter the flotation area through a central influent diffusion well.

Float shall be transported by rotating skimmer arms into a float box attached to a peripheral baffle. Settled sludge shall be raked inward to a central trough for discharge.

3. CLARIFIER EQUIPMENT: The equipment furnished with the flotation mechanism shall include the bridge with 36" wide walkway, handrailing and toe plates, center assembly with drive unit, overload protection device, influent pipe and diffuser, surface skimmer arms, skimmer blades, bottom scraper arms with adjustable squeegees, flotation baffle and supports, float box, center shaft, anchor bolts and assembly bolts.

Also included shall be a pressurization system to supply the required dissolved air for flotation. (See item 17.)

4. CLARIFIER DRIVE UNIT: The drive shall consist of a speed reducer rated for continuous duty, driven through a roller chain and sprockets by a 3/4 HP nominal 10:1 mechanical variable speed drive. Chains shall be enclosed in a OSHA type guard. The drive shall be protected by a mechanical overload device with electrical contacts to stop the drive motor and sound an alarm.

The drive motor shall conform to NEMA standards and be explosion proof, and shall be designed for operation on 460 volt, 3 phase, 60 hertz current.

5. CLARIFIER BRIDGE: The bridge shall span the tank and be supported by the tank walls and shall be designed to safely withstand all normal operating loads. The walkway shall be 36" wide, with 3/16" steel checkered floorplate extending out to provide easy access to all sides of the center drive unit. Handrails of 42" high, 1-1/2" outside diameter aluminum double row horizontal pipe and 4" x 3/16" steel toe plates shall be included. The bridge shall be

designed to support, in addition to the dead load, a live load of 150 lbs. per lineal foot with a deflection not exceeding 1/360 of the span.

6. CLARIFIER CENTER SHAFT: The steel center shaft shall be a schedule 80 steel pipe with the upper end connected to the drive mechanism through a flanged coupling. The shaft shall be furnished with connections for the rake arms and skimmers. At the lower end of the shaft there shall be furnished a shaft guide support.

7. CLARIFIER FLOAT REMOVAL EQUIPMENT: The float removal equipment to be furnished with the mechanism shall sweep the outer surface of the flotation compartment and consist of four (4) rotating surface skimmers and a float box for collection and removal of floating matter from the flotation compartment.

Each float skimmer shall maintain contact with the flotation baffle as it rotates. Upon approaching the flat section of the float box the float will be trapped and scraped up the ramp and into the float box.

The steel float box shall be supported from the flotation baffle and shall consist of a trough, vertical steel sides, and a sloping ramp. The sloping ramp section shall be fabricated to form a section of a helix so that the skimmer blade remains in contact with the ramp at all times. The float box shall be a minimum of 10'-0" long.

All floated solids delivered to the float box shall be conveyed by gravity through a 6" discharge pipe to the tank periphery.

8. CLARIFIER HEADER BOX: The header box shall be fabricated of 3/16" steel plate and provide a 8" flanged connection for the waste feed pipe. It shall also provide a mounting flange for the back pressure valve so that the pressurized flow can be released inside the waste feed pipe and inside the main flotation unit.

9. CLARIFIER INFLUENT PIPE AND DIFFUSER: The 14" diameter steel influent pipe shall extend from a flexible coupling at the tank wall and shall terminate at the influent diffuser. The stationary diffusion well shall be placed at the tank center, and supported by a steel tie rod extending to the tank shell. Flow shall discharge from the top of the diffusion well with a low velocity to facilitate float removal and collection.

10. CLARIFIER SLUDGE REMOVAL ARMS: The mechanism shall include two steel sludge removal arms with steel raking blades and adjustable squeegees. The blades shall be properly spaced to insure complete raking of the bottom once per revolution.

11. CLARIFIER FLOTATION COMPARTMENT BAFFLE: The flotation compartment baffle shall be 29 feet 0 inches diameter by 5 feet 0 inches deep including a six (6) inch free-board. The baffle shall be fabricated of 1/4" steel plate and shall be provided with appropriate supports for attachment to the tank wall.

12. CLARIFIER EFFLUENT WEIRS: Effluent weirs shall consist of 1/4" x 6" peripheral V-notch steel plate sections clamped to the tank wall. The design shall provide vertical adjustments of the weir sections.

13. CLARIFIER ANCHOR BOLTS: Galvanized steel anchor bolts with necessary hex nuts and washers shall be provided for all items of the mechanism to be secured to concrete.

14. CLARIFIER MATERIAL REQUIREMENTS: All fabricated structural steel shall conform to the requirements of "Standard Specifications for Steel Bridges and Buildings," A.S.T.M. Designation A-36. All shop welding shall conform to the latest standards of the American Welding Society.

Except where specifically indicated otherwise, all plates and structural members designated for submerged service shall have a minimum thickness of 1/4".

15. CLARIFIER SHOP PAINTING: All fabricated steel surfaces requiring painting shall be cleaned per commercial blast and primed with TNEMEC 37-77 Chem-Prime. Castings shall be given one (1) shop coat of Tnemec 37-77 Chem-Prime after power wire brushing. Gearmotors shall be painted with the manufacturer's standard enamel. Where practicable, blasting and painting will be done in the field by others.

16. CLARIFIER STEEL TANK SHELL: A 30'-0" diameter x 6'-7" deep x 1/4" steel tank shell shall be provided. The tank shall be designed to be welded to a 6" steel anchor channel imbedded in the tank floor. The tank shall include an effluent launder, a 16" flanged effluent nozzle, and a 8" flanged recycle nozzle. The 6" anchor channel shall be provided by the Equipment Manufacturer.

17. PRESSURIZATION SYSTEM EQUIPMENT: There shall be furnished one (1) pressurization system capable of delivery of 350 GPM of pressurized flow at 65 PSIG to be used for flotation.

The equipment furnished with the pressurization system shall include the pressurization pump, pressurization tank, air compressor, air control panel, back pressure control valve, recycle flow measurement device, and pressure gauges.

18. PRESSURIZING PUMP: The pressurizing pump shall be a single stage, end suction, open impeller pump arranged to deliver 350 GPM of liquid at a discharge pressure of 75 PSIG. The pump shall include a 25 HP minimum explosion proof motor directly connected through a flexible coupling to the pump. A coupling guard and structural mounting base shall be included. Pump connections shall be Class 125 ASA flanged, 3" inlet and 2" outlet.

19. PRESSURIZATION TANK: A vertically mounted pressurization tank shall be provided for dissolving air into the pressurized flow. The tank shall be designed to provide a high degree of air saturation without requiring internal packing or re-aeration pumps. The tank shall be designed for 350 GPM and shall

be 3'-0" diameter by 6'-0" side shell and shall be constructed on the basis of the ASME Code for unfired pressure vessels for a working pressure of 100 PSIG. The tank shall be baffled such that the exit velocity of the liquid will be no greater than 0.75 feet per second to allow for all free air to leave the liquid prior to it exiting the tank. Calculation submittals shall verify this requirement.

The pressurization tank shall be equipped with steel legs, a drain plug, access manhole for inspection, sight glass, pressure gauge, relief safety valve, and an air inlet connection. Liquid level in the pressurization tank shall be maintained by a mechanically operated float valve connected to an excess air bleed line.

20. AIR COMPRESSOR: The air compressor shall be receiver mounted, capable of a continuous output of 10 SCFM free air at 100 PSIG. The compressor shall be driven through guarded V-Velts by a 5 HP explosion proof motor. With the compressor shall be furnished standard accessories including pressure gauge, pressure regulator, and pneumatic constant speed control.

21. AIR FEED CONTROLS: Proper controls required for metering and regulating the process air shall be provided piped together in an open faced panel. Included shall be a pressure regulator, rotameter, pressure gauges, air flow control valve, required gate valves, and a normally closed solenoid valve wired to shut off the process air when the pressurizing pump is off. The rotameter shall be direct reading in SCFM and shall have a 316 stainless steel float and safety shield. Inlet and outlet connections to the panel shall be 1/2" NPT. All electrical controls shall be explosion proof.

22. BACK PRESSURE VALVE: A specially designed back pressure valve shall be provided to maintain the proper pressure in the pressurization tank. The valve shall release the pressurized flow inside the flotation unit to prevent loss of dissolved air in external piping and distribution systems.

The valve shall be fabricated from a 4" cast iron tee with a stainless steel disc and positioner to maintain back pressure control. The pressurized flow shall be released in a conical pattern to intimately mix it with the waste stream. The position of the back pressure control disc shall be controlled by a 6-1/2" diameter manual handwheel. The stainless steel disc and pipe shall be properly beveled to insure proper air bubble formation. (Submittals shall illustrate this requirement). The handwheel shall be operated with no more than 35 inch pounds of torque. (Calculation shall be submitted to verify this requirement).

23. VALVES, PIPING AND FITTINGS: Interconnecting piping between the pump discharge and retention tank inlet and between the retention tank outlet and the flotation unit (except for the back pressure valve) shall be furnished by others. Miscellaneous air piping shall also be furnished by others.

24. PRESSURIZED FLOW MEASUREMENT: There shall be included a 6" orifice plate and by-pass rotameter for the installation in the pressurized piping system.

The by-pass rotameter shall be sized and calibrated to read from 50% to 125% of the pump design flow. Orifice plate flanges shall be supplied by the equipment manufacturer.

25. ELECTRICAL CHARACTERISTICS: The pressurizing pump and air compressor motors shall be designed for operation on 460 volt, 60 Hertz, 3 phase power. The solenoid shall be designed for operation on 110 volt, single phase power.

26. SERVICE/ERECTION: The supplier shall submit two service quotations: I) the supplier shall provide an installation supervisor for a period of fifteen (15) working days to supervise assembly of the DAF system (flocculation tank, flocculation mechanism, DAF clarifier tank, DAF mechanism, pressurization system). II) the supplier shall provide the labor and equipment necessary to erect the DAF Clarifier tank on site including grouting the bottom but not including the concrete foundation, piping outside of the DAF clarifier, or electrical installation. The supervisor provided for the equipment erection shall also supervise installation of the flocculation system and the pressurization system. The quote on option II shall include a breakdown of manhours by trade for the DAF clarifier installation.

The equipment supplier shall include with the bid the services of the Equipment Manufacturer's field service technician for a period of one (1) trip and five (5) days.

This service shall cover the flocculation, DAF and pressurization systems and shall be for the purposes of check-out, initial start-up, certification, and instruction of plant personnel.

A written report covering the technician's findings and installation approval shall be submitted to the engineer covering all inspections and outlining in detail any deficiencies noted.

27. SPARE PARTS: The Manufacturer shall supply a list of recommended spare parts for the DAF system (flocculation included). The Manufacturer shall also furnish an itemized price list of all available spare parts for the DAF system.

BID PACKAGE NO. 11

## PART B - POLYMER FEED SYSTEM, CAUSTIC FEED PUMPS, AND ACID FEED PUMPS

1. GENERAL: This section of the specifications covers the cationic polymer feed system, the anionic polymer feed system, the acid feed system, and the caustic feed system for the wastewater treatment plant. The requirements of Part A apply to this section.

2. CATIONIC POLYMER FEED SYSTEM:

2.1 General: The cationic polymer feed system consists of one (1) feed pump, one (1) calibration chamber, and one (1) 1200 gallon minimum fiberglass tank. The system will be used for the addition of liquid cationic polyelectrolyte to the water treatment process. System will be located in the chemical feed building.

2.2 Feed Pump: The feed pump shall be a diaphragm metering pump. The pump shall have heavy duty gearing and shall not utilize a stuffing box. Feed rate shall be maintained to within ± 1% of rated capacity.

An O-ring seal valve assembly, removable without dismantling piping shall be provided. The pump shall have automatic hydraulic system and pressure relief valves to protect the pump during system malfunction.

A simple straight-path tubular design shall be used on the process fluid side of the pump. Pumping rate shall be proportionally adjusted from a 4 to 20 mA signal input from the control system. Pumping rate shall be adjusted with an electrical stroke adjustment and shall be adjustable during operation. Flow capacity shall vary between 1 and 10 gallons per hour.

Pump materials shall be as follows:

| | |
|---|---|
| Valve Cap and Guide | 316 SS |
| Valve | 316 SS |
| Valve Seat | 316 SS |
| Valve and Cap Gaskets | TFE |
| Primary Diaphragm | Nitrile |
| Reagent Head | 316 SS |
| Tube | Hypalon |

Pumps shall be Pulsa Feeder Model 712OH, Milton Roy Milroyal A or B, or equal.

Motor shall be 1/2 HP, 1725 RPM, TEFC, and shall operate on 120 VAC, 60 Hz, single phase power.

A steel pump stand 24" high shall be furnished for the feed pump.

2.3 Calibration Chamber: A 1000 ml calibration chamber as shown on the drawings shall be furnished. Chamber shall be graduated in ml increments and shall be made from a high strength translucent plastic material.

2.4 Polymer Tank: A 1200 gallon minimum polymer tank shall be furnished.

2.4.1 Tank Materials: The fabrication of the tank shall be achieved with automatic equipment as follows:

1. A resin-rich layer of chemically-resistant polyester or vinylester resin shall be uniformly applied in a 20 mil thickness on an inner surface mat of chemically-resistant fiberglass reinforcement.

2. A resin-rich layer of chemically-resistant polyester or vinylester shall be uniformly applied in a 80 mil thickness with a randomly oriented layer of fiberglass shopped strand reinforcements.

3. The filament wound layer, impregnated with isophthalic polyester resin shall be oriented for highest circumferential strength. This layer is composed of filament winding interspersed with chopped strand fiberglass to provide the strength required in ASTM specification D 3299.

4. The resin-rich outer surface (20 mil thickness) shall utilize chemically-resistant fiberglass reinforcement or organic veil sprayed with isophthalic polyester resin.

The first and second layers shall comprise the 100 mil corrosion liner responsible for the non-corroding, non-contaminating features of the tank.

2.4.2 Tank Design Criteria: The following design criteria shall be used:

| | |
|---|---|
| Storage temperature limit: | 200°F |
| Concentrated top load limit: | 1000# distributed over 100 square inches. |
| Gussetted Nozzle Strength: | (where required) 2000 ft lbs. torque and 1500 ft. lbs. |

2.4.3 Tank Dimensions: The tanks shall have the dimensions and accessories as follows:

| | |
|---|---|
| Nominal Capacity: | 1200 gallon |
| Diameter: | 72" |
| Height: | 100" minimum |
| Connections: | 2" bottom threaded.<br>1-1/2" flanged. |

| | |
|---|---|
| | 3" flanged.<br>20" manhole opening with cover |
| Accessories: | Flat load carrying cover with 20" manhole opening on top with cover, and 4" vent on top. Bolts to be S.S. |
| Color: | Natural. Tank shall be permanently marked with 10 gallon dimensions. |

3. ANIONIC POLYMER FEED SYSTEM:

3.1 General: The anionic polymer feed system consists of four (4) polymer pumps, one (1) calibration chamber, two (2) 100 gallon fiberglass tanks, one (1) mixer, one (1) inline static mixer, one (1) rotameter, and controls. The system will be used for the addition of liquid anionic polyelectrolyte to the water treatment process. The system will be located in the chemical feed building.

3.2 System Operation: 100 gallons per day of 1/2% anionic polymer solution shall be pumped from the polymer feed tank by the feed pump and shall enter the flocculation basin upstream of the DAF unit. When the low level operating point in the feed tank is reached, the transfer pump shall automatically transfer aged polymer from the aging tank to the feed tank. When the low level operating point in the aging tank is reached, the mixer pump and raw polymer pump shall be automatically started and the dilution water solenoid valve shall open. Refer to drawing 11-1.

When the high level operating point of the aging tank is reached, the mixing pump and the raw polymer pump shall automatically shut off and the dilution water solenoid valve shall close. When the high level operating point of the feed tank is reached, the transfer pump shall automatically shut off.

3.3 Feed Pump: The feed pump shall comply with 2.2.

3.4 Transfer Pump: The transfer pump shall be a centrifugal pump. Feed rate shall be 5 gpm. High and low level monitors in the feed tank shall be used to control the transfer pump. A low level shall start the transfer pump and a high level shall stop the transfer pump. The pump shall be 110V, single phase.

3.5 Skid Mounted Dilution System: A gear pump for raw anionic polymer, a solenoid valve, a rotameter, and in-line static mixer, a centrifugal pump, and controls shall be arranged as a skid-mounted dilution system. The gear pump shall draw from a drum of polymer. The centrifugal pump shall discharge into a 100 gallon aging tank.

3.5.1 Gear Pump: A gear pump shall be furnished that is capable of delivering between 0 and 1.0 gallons per hour of anionic polymer,

drawn from the storage barrel. The pump shall discharge to the static mixer. High and low level monitors in the aging tank shall be used to control the gear pump. A low level shall start the gear pump and a high level shall stop the gear pump. The gear pump motor shall be 110V, single phase.

3.5.2 Solenoid Valve: A solenoid valve shall control the flow of dilution water to the rotameter in response to the gear pump operation. The solenoid valve shall open when the gear pump is started and close when it stops.

3.5.3 Rotameter: A rotameter with a scale of 0 to 10 gallons per minute shall be furnished to measure the dilution water flow rate. The rotameter shall discharge to the in-line static mixer.

3.5.4 In-line Static Mixer: An in-line static mixer shall be furnished to provide thorough mixing of the polymer and the dilution water. The static mixer shall discharge to the centrifugal mixing pump.

3.5.5 Centrifugal Mixing Pump: A centrifugal pump capable of pumping 5 gallons per minute of 0.5% anionic polymer solution shall be furnished. This pump shall be identical to the transfer pump specified in 3.4, except that operation shall be dependent upon aging tank solution elevation. The pump shall discharge to the aging tank.

3.6 Calibration Chamber: A calibration chamber as specified in 2.3 shall be furnished.

3.7 Polymer Tanks: Two (2) 100 gallon polymer mix tanks shall be furnished.

3.7.1 Tank Materials: The fabrication of the tanks shall be as specified in 2.4.1.

3.7.2 Tank Design Criteria: The tank design criteria shall be as specified in 2.4.2.

3.7.3 Tank Dimensions: The tanks shall be identical and shall have the dimensions and accessories as follows:

| | |
|---|---|
| Nominal Capacity: | 100 gallons |
| Diameter: | 24" |
| Height: | 70" |
| Connections: | 2" bottom threaded.<br>1-1/2" flanged.<br>3" flanged. |

| | |
|---|---|
| Accessories: | Flat Flanged load carrying cover with hinged opening and mounting for clamp on mixer specified below. Hinges and bolts to be S.S. |
| Color: | Natural. Tank shall be permanently marked with 10 gallon dimensions. |

3.8 Mixer: A clamp mount propeller type mixer shall be installed on the chemical tank. The mixer shall have a .30 H.P. high efficiency, 1.15 service factor, Class F5 insulation, 1750 RPM, TEFC, vertical ball bearing chemical plant type motor for operation on 115 volt, 60 Hz, single phase power. The motor shall be integrally assembled to a sealed aluminum gear chamber having 5:1 single reduction, internal helical gears guaranteed against lubricant leakage. The unit shall have shielded bearings to support radial and thrust loads of the mixer shaft. The unit shall have a universally adjustable ball and socket type aluminum clamp with a vibration damping pad and wedge-type, indexed, position locking device. The mixer shall be complete with a quick-acting positive lock, electruless nickel plated steel chuck, 5/8" x 48" long, a stabilizing ring, and a type 316 stainless steel shaft carrying a single 316 stainless steel propeller rotating at 350 RPM. Mixer shall be equal to a Lightnin Model XJ30 as manufactured by Mixco, Philadelphia Gear, or equal.

4. ACID FEED SYSTEM:

4.1 General: The Acid Feed System consists of one (1) feed pump, and one (1) a calibration chamber.

The system will pump 98% Sulfuric Acid from the acid storage tank (Bid Item 9) to the process addition point. All equipment will be installed inside the chemical feed building.

4.2 Feed Pump: The feed pump shall be as specified in 2.2 except that the pumping capacity shall vary from 0.1 to 1.0 gallons per hour. Construction shall also be compatible with Sulfuric Acid and indoor operation.

4.3 Calibration Chamber: A 1000 ml calibration chamber shall be furnished to be installed upstream of the feed pump. The chamber shall be graduated in ml increments and shall be made from a high strength, acid resistant, transluscent material.

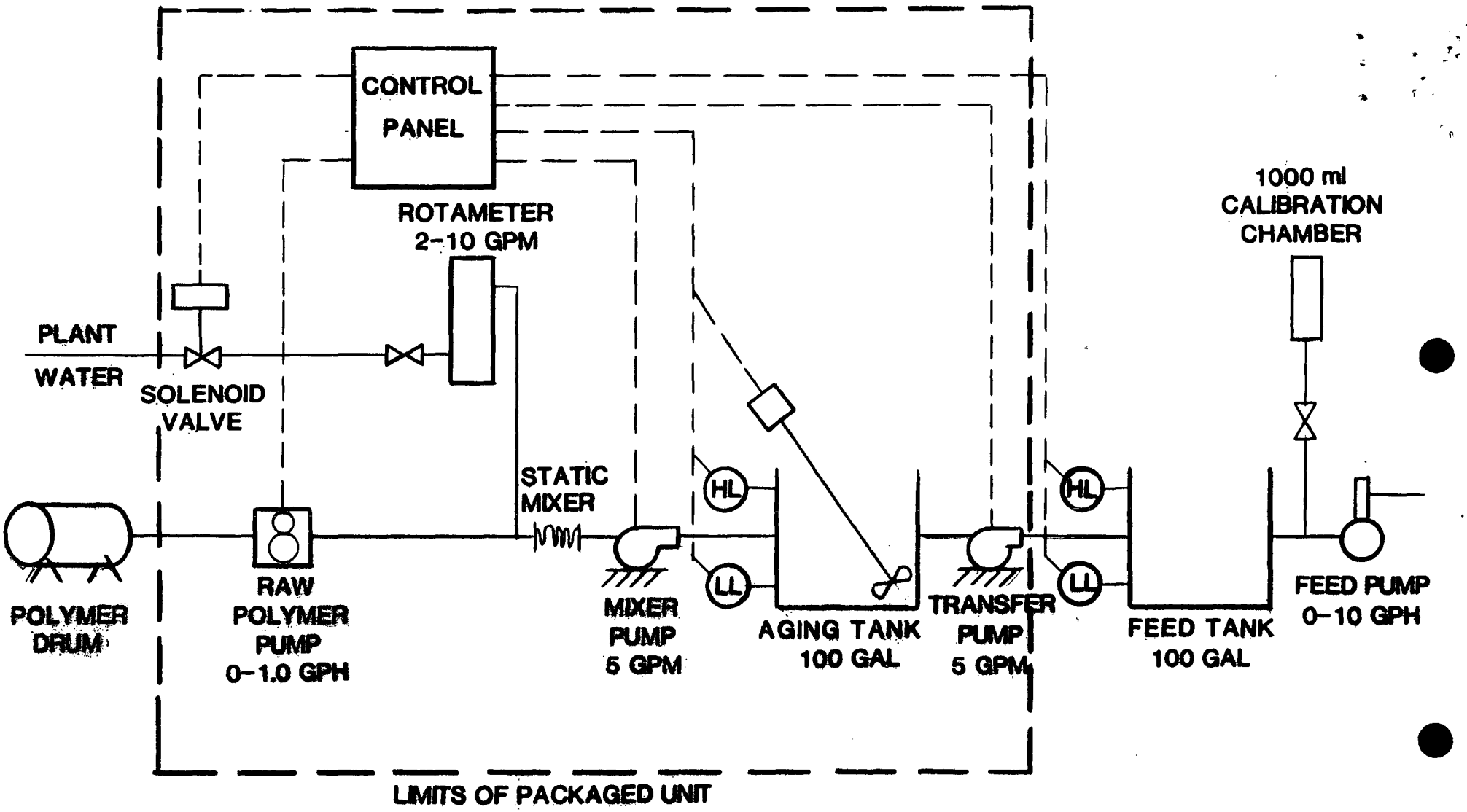
5. CAUSTIC FEED SYSTEM:

5.1 General: The Caustic Feed System consists of one (1) feed pump, and one (1) calibration chamber. The system will pump a 30% Sodium Hydroxide ($N_aOH$) solution from the caustic storage tank (Bid Item 9) to the process addition point. All equipment will be installed inside the chemical feed building.

5.2 Feed Pump: The feed pump shall be as specified in 2.2. Construction shall be compatible with Sodium Hydroxide and indoor operation.

5.3 Calibration Chamber: A 1000 ml calibration chamber shall be furnished to be installed upstream of the feed pump. The chamber shall be graduated in ml increments and shall be made from a high strength, caustic resistant, translucent material.

6. SPARE PARTS: The Supplier shall furnish a list of recommended spare parts for each item, to be stored at the Navajo refinery. The Supplier shall also furnish an itemized price list of all spare parts for each item.




## ANIONIC POLYMER SYSTEM

DRAWING 11-1

# Navajo REFINING COMPANY

ENGINEERING DEPARTMENT
ARTESIA, NEW MEXICO

Item No. P-877

13 AUG 1986

## CENTRIFUGAL PUMP DATA SHEET

Inquiry No. _____

Page 1 Of 2

NOTE: Information to be completed by: ◉ Purchaser ☐ Manufacturer
Applicable to: ○ Proposals ○ Purchase ○ As Built
For NAVAJO REFINING CO.
Site NAVAJO REFINING CO.
Unit _____ Rev/Date/By ___/___/___

Service API
Pump Mfr _____
Size & Type _____
No. Stages _____
Serial No. _____

No. Pumps Required ONE

| No. Motor Driven | No. Turbine Driven |
|---|---|
| Pump Item No. P-877 | Pump Item No. _____ |
| Motor Item No. M-877 | Turbine Item No. _____ |
| Motor Provided By MANUFACTURER | Turbine Provided By _____ |
| Motor Mounted By MANUFACTURER | Turbine Mounted By _____ |

### LIQUID

Name SLOP OIL PUMP
Pumping Temperature (°F)
Normal 105 Max. 140 Min. 90
Specific Gravity @ 110 °F .85
Vapor Pres (PSIA) .3
Viscosity (CP) @ ___ °F ___
Corrosion/Erosion Caused By: ACID & CAUSTIC
Remarks: pH 2 → pH 13

### OPERATING CONDITIONS

Capacity (U.S. GPM)
Normal 100 Rated ___
Disch. Pres. (PSIG) 60
Suct. Pres. (PSIG)
Max. ___ Rated ___
Diff. Pres. (PSI) ___
Diff. Head (Ft) 140'
NPSH Available (Ft) ___
Hyd. Power (HP) ___

### SITE CONDITIONS

Temp (°F) Max 105 Min 15
Rel. Hum. (%) Max 100 Min 0
Altitude (Ft) 3300
○ Indoor ○ Heated ○ Roof
◉ Outdoor ◉ Unheated ◉ Sun
Area Classification CL I, DIV I, GROUP D
Other: _____
Remarks: EXPLOSION PROOF MOTOR

### PERFORMANCE (TO BE COMPLETED BY MANUFACTURER)

Proposal Curve No. _____
Speed (RPM) _____
Efficiency (%) _____
Rated Power (BHP) _____
Min. Continuous Flow (GPM)
Thermal _____ Stable _____
Max. Head, Rated Imp. (Ft) _____
Max. Power, Rated Imp (BHP) _____
NPSH Required (Ft Water)
3% Head Drop _____
Suction Specific Speed _____
Remarks: _____

### CONSTRUCTION (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

| Nozzles: | SIZE | RATING | FACING | LOCATION |
|---|---|---|---|---|
| Suction | | | | |
| Discharge | | | | |
| Bal. Drum | | | | |

| Misc. Conn.: | SIZE | LOCATION |
|---|---|---|
| Drain | | |
| Vent | | |
| Pres. Gage | | |
| Warm Up | | |

Casing Mount. ☐ Foot
☒ Centerline ☐ Bracket
☐ Near Centerline ☐ Inline
☐ Vertical ☐ Sump
☐ Vertical Barrel
Casing Split ☐ Axial
☒ Radial
Casing Type ☒ Single Volute
☐ Diffuser ☐ Double Volute
☐ Stagged
Max. Allowable Pressure (PSIG)
At 60°F _____
At Norm. Pump Temp _____
Hydro Test Pressure (PSIG) _____

Impeller Diameter (In.):
Rated ___ Max. ___ Min. ___
Rotation (Viewed From CPLG) ☐ CW ☒ CCW
Imp. Mount ☐ Btwn Brgs ☒ Overhung
Packing
Manufacturer _____
Type _____
Size/No. Rings _____
Mechanical Seal
API Class Code BSTFL
Manufacturer JOHN CRANE
Model 8B-1
Manufacturer Code XF1D1

Bearings (Type/No.)
Radial BALL Thrust _____
Lubrication Type: ☐ API 614
☐ Grease ☒ Ring Oil ☐ Oil Mist
☐ Flood ☐ Flinger ☐ Pressure
Coupling
Manufacturer _____
Type FLEX Model _____
Driver Half-Coupling Mounted:
◉ Pump Mfr ○ Driver Mfr ○ Purchaser
Gland Type/Matl CARBON STEEL
Gland Plate Taps Required
○ Quench ○ Flush ☒ Drain ☒ Vent

Remarks: _____

# REFINING COMPANY

ENGINEERING DEPARTMENT
ARTESIA, NEW MEXICO

Item No. P-877

## CENTRIFUGAL PUMP DATA SHEET

### MATERIALS (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

○ Table E-1 Class _____ ☐ Case/Imp. Wear Rings CAST IRON Baseplate
☐ Barrel/Case CARBON STEEL ☐ Shaft STEEL ☐ Material/Type _____
☐ Impeller CAST IRON ☐ Sleeve 316 STAINLESS STEEL ☐ API 610 Std. No. 01
Remarks: _____

### AUXILIARY PIPING (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

○ Seal Flush Piping Plan 11 ○ Auxiliary Flush Plan _____ ○ Cooling Water Piping Plan _____
○ Tubing ○ Carbon Steel ○ Tubing ○ Carbon Steel ○ Tubing ○ Carbon Steel
○ Pipe ☒ Stainless Steel ○ Pipe ○ Stainless Steel ○ Pipe ○ Stainless Steel
Piping Assembly: ○ External Seal Flush Fluid ○ Copper
☒ Threaded ○ Flanged _____ ○ Sight Flow Indicators Required
○ Seal Welded ○ Socket Welded ☐ _____ GPM ☐ _____ PSIG ☐ Total Cooling Water Req'd (GPM) _____
Remarks: _____ ○ Packing Cooling Injection Required
☐ _____ GPM ☐ _____ PSIG

### INSPECTION AND TEST (TO BE COMPLETED BY PURCHASER)

| TEST | NON-WIT | WIT | OBSERVED |
|---|---|---|---|
| Performance | ☒ | ○ | ○ |
| Hydrostatic | ☒ | ○ | ○ |
| NPSH | ○ | ○ | ○ |

○ Shop Inspection ○ Material Cert.
○ Dismantle and Inspect After Test
○ Casting Repair Procedure Approval Required
○ Inspection Req'd For Nozzle Welds. ○ Mag. Particle ○ Dye Penetrant
○ Inspection Req'd For Castings: ○ Radiographic ○ Ultrasonic
○ Inspection Req'd For _____ ○ Mag. Particle ○ Dye Penetrant ○ Radiographic ○ Ultrasonic
Remarks _____

### MOTOR DRIVER (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

☐ 10 HP ☐ 3500 RPM ☐ Temperature Rise (GF) 70°C ☐ Bearings BALL
☐ Frame _____ ☐ Full Load AMPS _____ ☐ Lube GREASE
☐ Volts/Phase/Hertz 480/3/60 ☐ Locked Rotor AMPS _____ Vertical Shaft ○ Solid ○ Hollow
☐ Type HORIZONTAL ☐ Insulation CLASS B ☐ Vertical Thrust Capacity (LBS)
☐ Enclosure TEXP ☐ Manufacturer _____ Up _____ Down _____
Remarks: _____

### VERTICAL PUMPS (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

○ Pit or Sump Depth (Ft) _____
☐ Pump Length (Ft) _____
☐ Min. Submergence Req'd (Ft) _____
Column Pipe: ☐ Flanged ☐ Threaded
Line Shaft: ☐ Open ☐ Enclosed
Guide Bushings: ☐ Bowl ☐ Line Shaft
Guide Bushing Lube ☐ Water ☐ Oil ☐ Grease
☐ Float Switch _____
Float and Rod: ○ Cbn Stl ○ SS ○ Brz ○ None
☐ Pump Thrust (LBS) UP DOWN
At Min Flow _____ _____
At Design Flow _____ _____
At Runout _____ _____
Remarks: _____

### WEIGHTS (TO BE COMPLETED BY MANUFACTURER)

Weight of Pump (LBS) _____
Weight of Baseplate (LBS) _____
Weight of Motor (LBS) _____
Weight of Gear (LBS) _____
Total Weight (LBS) _____
Weight of Pump (LBS) _____
Weight of Baseplate (LBS) _____
Weight of Turbine (LBS) _____
Weight of Gear (LBS) _____
Total Weight (LBS) _____
Remarks: _____

### ADDITIONAL INFORMATION

API Standard 610 Governs Unless Otherwise Noted _____