DUFRANE NUCLEAR SHIELDING, INC.

Winsted Industrial Park

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PHONE: (860) 379-2318 FAX: (860) 379-2325

January 21, 2009 DNSI-09-20544

Professor Priscilla Cushman
Physics Department
University of Minnesota

Reference: Your request for a budgetary proposal and phone conversation on 11/20/08.

Dear Professor Cushman,

Dufrane Nuclear Shielding, Inc. (DNSI) is pleased to provide the following BUDGETARY proposal for the design, fabrication and supply of one (1) Water Shielded Room Assembly and a Water Purification System. The assembly is intended to be incorporated within the Deep Underground Science and Engineering Lab. General information was originally provided by Professor Jeff Martoff, of Temple University. I am providing the following conceptual drawings for your consideration and comments.

0808-10, revision 1, General Arrangement, Water Shielded Room
0808-15, revision 0, Support Structure, Water Shielded Room
0808-20, revision 0, DI Water Distribution, Water Shielded Room

The basic premise is to provide a 10'-0" wide x 12'-0" long x 9'0" high room with nominally 8'-0" of water shielding at its perimeter. This is accomplished using interlocking Water Shield Modules. They are constructed of stainless steel to prevent corrosion. There is a structural skeleton within the Modules for structural stability. Each Module is provided with multiple pipe fittings for fill/vent and return/drains. Connections between Modules include two-way shutoff quick disconnect fittings along with stainless flexible hoses.

Drawing 0808-10 shows the various profiles of the Modules and how they are stepped to interlock and prevent any direct streaming. By design, the floor tier and roof tier Modules are identical. The entire shield system is mounted within the Support Structure as shown on drawing 0808-15. There are three modules which are mounted on a mechanically operated Cart to allow access to the internal room. Stairs are provided to the room tier level. I have included drawing 0808-20 to show the inter-connections between Modules for fill, drain and filtration purposes.

DNSI has teamed with a sub-contractor to integrate the Water Purification System (WPS) with the Shield Modules. Attached is relevant descriptive information regarding the WPS.

BUDGETARY PRICING and DELIVERY INFORMATION

Pricing reflects purchase of one (1) Assembly.

All prices are F.O.B. ship point.

State taxes will not be collected or processed by DNSI

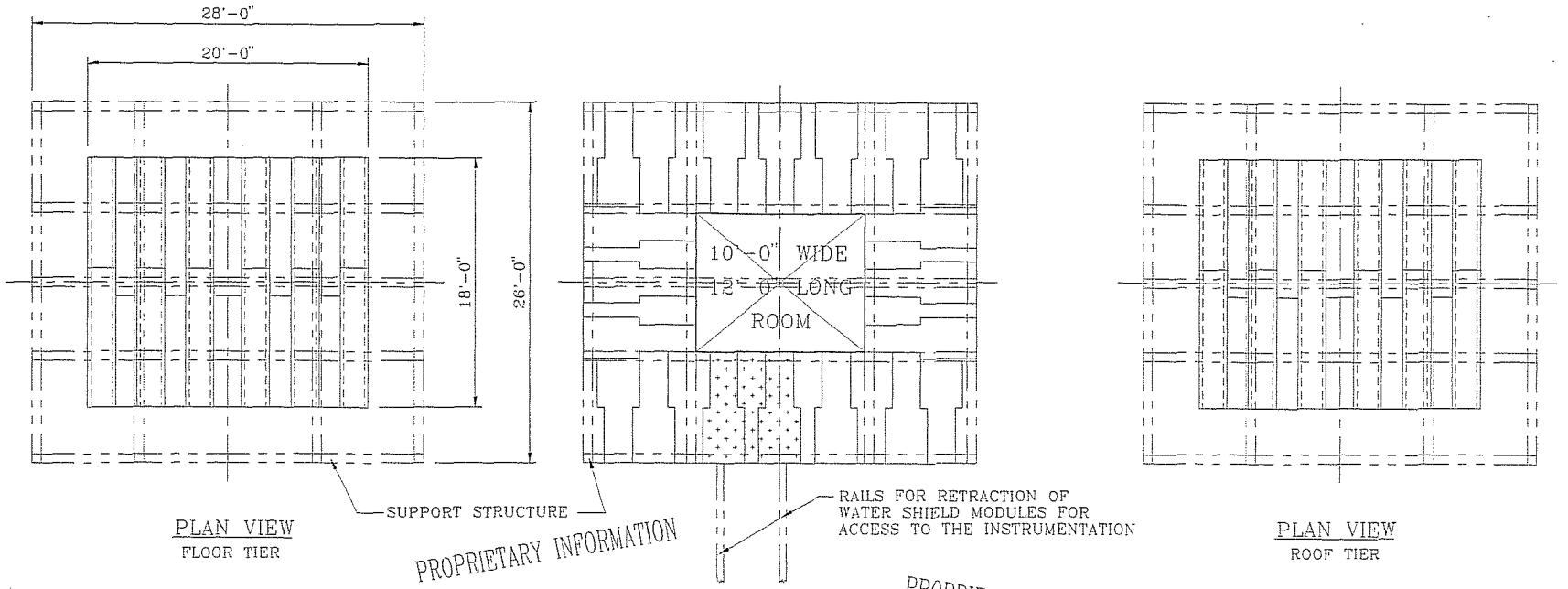
Terms are net thirty days

Product	Price each
Water Shielded Room Assembly	$2,785,305.00
Water Purification System, (Bag Filters & Resin extra)	$ 138,785.00

Thank you for your continued confidence in Dufrane Nuclear Shielding, Inc. Should you have any questions or comments regarding the above, please give me a call.

Very truly yours,
Dufrane Nuclear Shielding, Incorporated

Louis J. De Ritis
Project Manager



GENERAL NOTES:

1. ALL DIMENSIONS ARE NOMINAL AND LAYOUT IS CONCEPTUAL.
2. SUPPORT STRUCTURE SHALL BE HEAVY WALL SQUARE TUBING.
3. WATER SHIELD MODULES SHALL BE STAINLESS STEEL IN ACCORDANCE WITH CUSTOMER'S SPECIFICATIONS.
4. WATER SHIELD MODULES SHALL BE BRACED INTERNALLY WITH STRUCTURAL MEMBERS WELDED IN PLACE.
5. MODULES SHALL BE INDIVIDUALLY LEAK TESTED. NO LEAKS PERMITTED.

0' 6' 12'

SCALE IN FEET

PRELIMINARY DRAWING
FOR INFORMATION ONLY
DATE: JANUARY 12, 2009

REV.	DESCRIPTION	BY	DATE	APP'D	DATE
1	MADE ROOF TIER EQUAL TO FLOOR TIER	LDR	12/05/00	JCB	12/05/00

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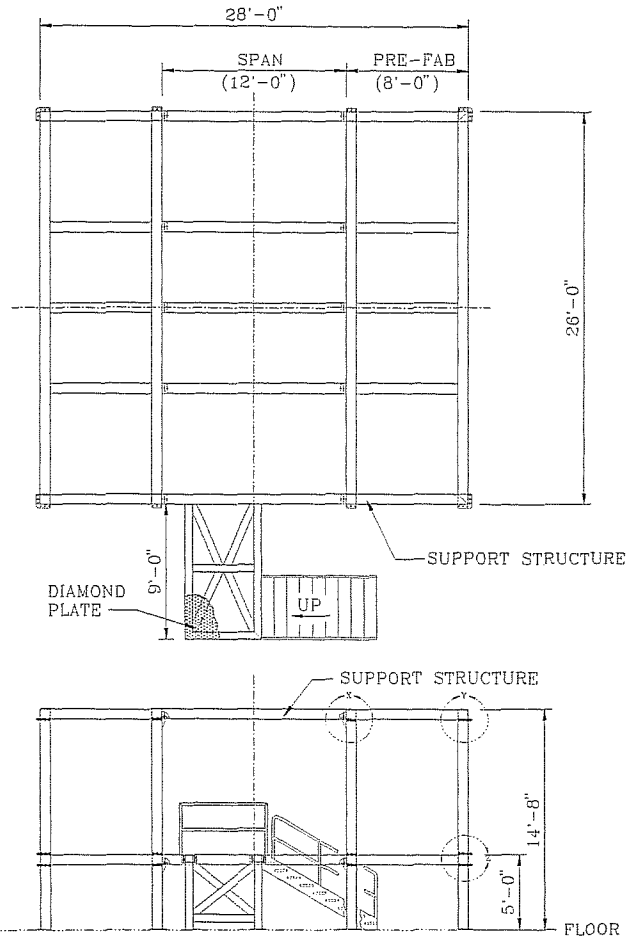
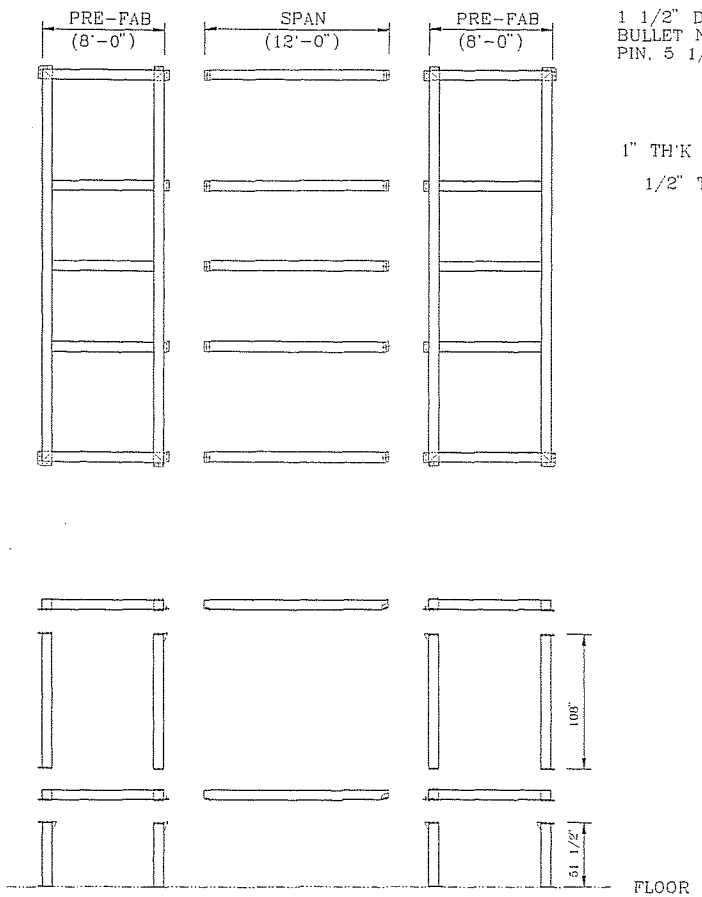
DRAWN: LOU DE RITIS 08/18/08
DESIGNED: LDR 08/18/08
APPROVED: J. BROOKS 08/18/08
TOLERANCES UNLESS OTHERWISE NOTED: TRIG. DEC. ANG.
SCALE NOT TO SCALE SIZE

TITLE: GENERAL ARRANGEMENT WATER SHIELDED ROOM UNDERGROUND NATIONAL LABORATORY CONCEPTUAL DESIGN

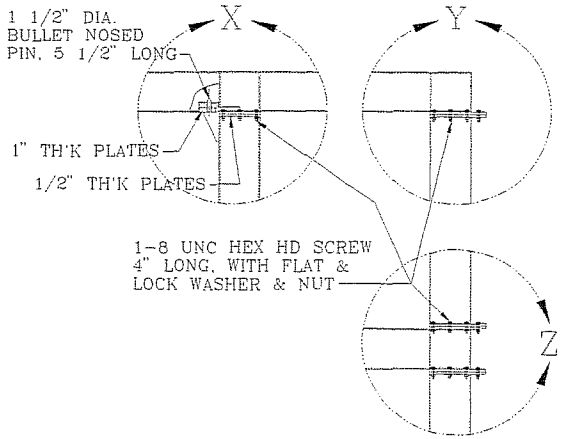
DRAWING NUMBER 0808-10 REV. 1



ELEVATION



ELEVATION
EXPLODED



PROPRIETARY INFORMATION

GENERAL NOTES:

1. ALL DIMENSIONS ARE NOMINAL AND LAYOUT IS CONCEPTUAL.
2. SUPPORT STRUCTURE SHALL BE 8" SQUARE TUBING, 1/2" TH'K. WALL. REMOVABLE PLATFORM MAY BE 16" SQUARE TUBING, 1/2" WALL.
3. ALL SURFACES SHALL BE PREPARED AND PAINTED WITH TWO COATS OF A TWO PART EPOXY COATING SYSTEM.

SCALE IN FEET

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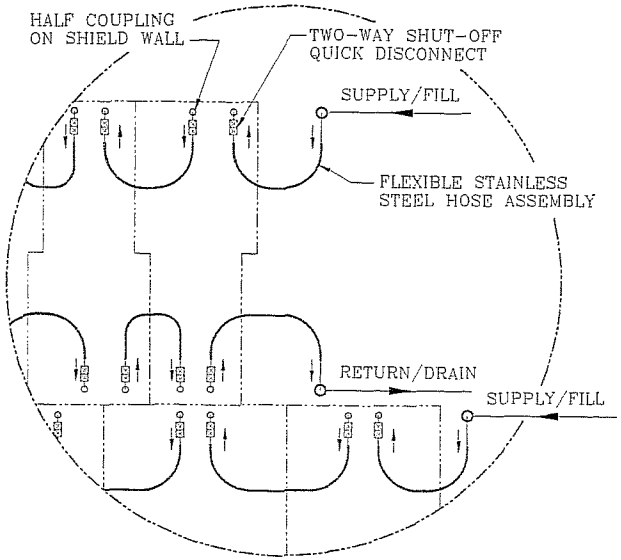
REV.	DESCRIPTION	BY	DATE	APP'D/DATE

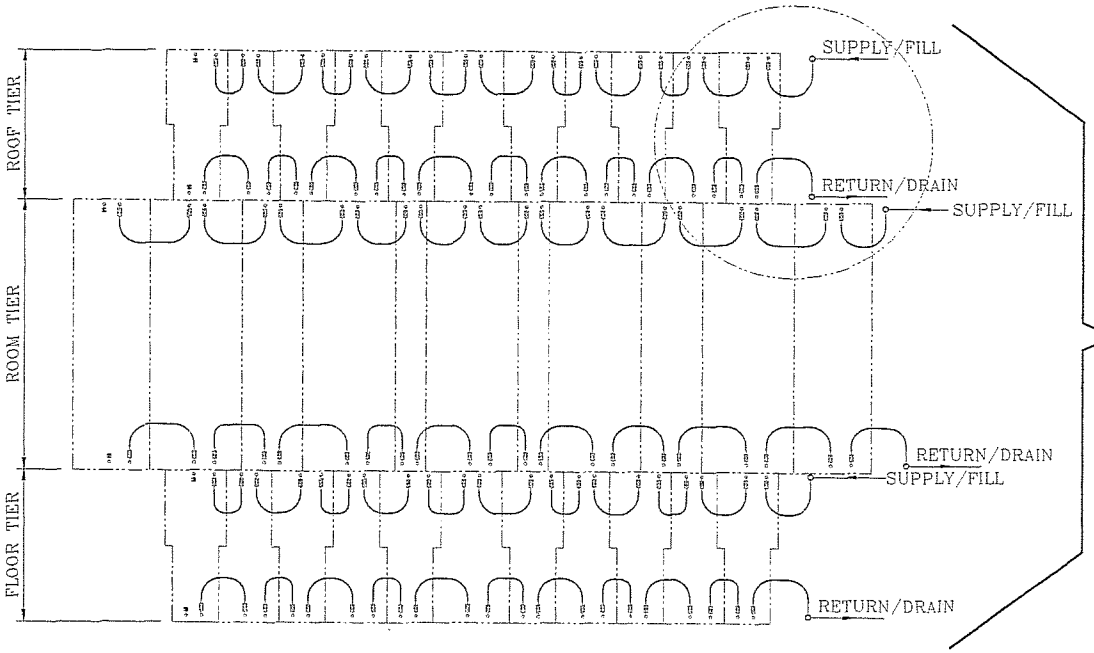
DESIGNED	LDS DE RIDDER	12/12/08
DRAWN	LDR	12/12/08
CHECKED	J. BROOKS	12/12/08
TOLERANCE UNLESS OTHERWISE NOTED		
FRACT.	DEC.	ANG.

SCALE: NOT TO SCALE

TITLE: SUPPORT STRUCTURE
WATER SHIELDED ROOM
UNDERGROUND NATIONAL LABORATORY
CONCEPTUAL DESIGN

DRAWING NUMBER: 0808-15 REV. 0





PRELIMINARY DRAWING
FOR INFORMATION ONLY
DATE: JANUARY 12, 2009

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PROPRIETARY INFORMATION

DRAWN	LOU DE RITIS	08/18/08
CHK'D	LDR	08/18/08
APPROVED	J. BROOKS	08/18/08

TITLE: DI WATER DISTRO
WATER SHIELDED ROOM
UNDERGROUND NATIONAL LABORATORY
CONCEPTUAL DESIGN

DRAWING NUMBER 0808-20 REV 0

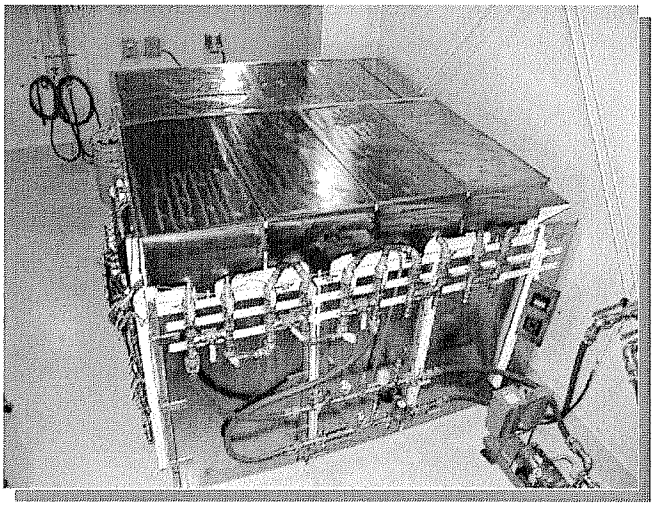
Budgetary Proposal

Liquid Radwaste Processing System for Cleanup of Shield Water Inventory

Proposal: P-1697-DTS

Date: January 19, 2009

For: Dufrane
Nuclear Shielding, Inc.



WPS™
w/Canopy Shielding
at Fort Calhoun

Contents:

Section I

Introduction

A. Introduction

The objective of this project is to maintain, by use of filtration and ion exchange, water purity and chemistry for an inventory of 70,000 gallons of shield water. The processing target is turnover of the water volume once a day, which calls for a system rated at 50 gpm (70,000 / 24 hrs / 60 min/hr = 48.6 gpm).

The proposed Water Processing System (WPS™) is a filtration and ion exchange train that is well suited to this cleanup. The WPS™ is designed to remove both organics and dissolved salts that include radioisotopes. In most cases, the WPS™ can achieve DF of 100 to 1000 when sufficient activity and contamination are present. This system is simple to operate, and has a low ownership cost.

B. DTS Capabilities & Quality

DTS specializes in providing liquid radwaste (LRW) processing systems and services. For over 20 years we have developed, designed, and brought to market improvements and innovations that have been widely adopted by the nuclear industry. DTS has processed LRW and provided processing equipment and supplies to facilities across the U.S. and around the world. Our list of industry and government clients attests to our long-term commitment to quality, performance, and customer satisfaction.

DTS offers a variety of proven technologies, including demineralization, ozone pretreatment, filtration, ultrafiltration, reverse osmosis, polymer solidification, dewatering, and drying. After analyzing the circumstances and challenges of each project, we work with our clients to formulate equipment and service packages that meet their facility needs, goals, and budget.

All DTS systems and system components are designed, procured, fabricated and tested in accordance with DTS' Approved Quality Assurance program, which complies with the full 18 criteria of 10CFR50 Appendix B.

DTS selects components and materials that are of the highest quality to assure safe, efficient and reliable equipment operation under the conditions encountered while processing LRW. The proposed system is designed, procured and fabricated to meet or exceed the requirements and specifications, where applicable, of:

- Nuclear Regulatory Guide 1.143
- USNRC ETSB Branch Technical Position 11-3
- ASME Boiler and Pressure Vessel Code, Section VIII
- 10 CFR 50.59, 10 CFR 61, 10 CFR 71
- ASME/ANSI NQA-1
- NIST Traceable Calibration

Section II

System Description

A. Water Processing System (WPS™) Components

The proposed system includes the **major** components listed below. A complete list and description of components appears at the end of this proposal section.

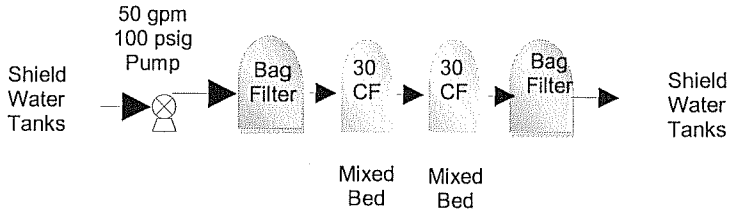
:

- 1 – 50-gpm Pump w/controls
- 2 - High-Performance Bag Filters
- 2 – 30-cf Pressure Vessels
- 1 - Influent Manifold w/Instrumentation
- 1- Effluent Manifold w/Instrumentation
- 2 - H-Headers (Control Manifolds)
- Influent, Effluent and Sluice Piping
- Sample Sink and Sample Ports

The system is fitted with controls, instrumentation, sample sink and sample points and protection against feed pump cavitation. It is designed to operate continuously for long periods without maintenance or monitoring. Site-specific operating procedures and maintenance and repair manuals are provided.

B. System Processing

Process Diagram



1. Process Description

The proposed process train includes a 10 hp centrifugal open faced pump that feeds directly from the shield water shield supply or surge tank. A bag filter is positioned downstream of the feed pump. The clean water exiting the filter is directed to the first of two (2) 30-cf ion exchangers.

The ion exchange vessels will maximize the process flow rate yet provide the best use of the media. The two vessels are operated in series to maximize resin life. Each will contain 30 cf of stoichiometrically balanced mixed bed resin. The first vessel will be run until there is ion breakthrough on the bed, evidenced by increased conductivity in the effluent. At that point, the second vessel will be valved into service to ensure high quality effluent.

The system will continue to run in this configuration until the resin in the first vessel is depleted, as evidenced by absence of conductivity or pH shift across the bed. The first vessel will then be sluiced out, reloaded with fresh resin and placed downstream of the second vessel. This logic change is achieved by altering the process flow; accomplished by changing connection points of the flex hoses. The ability to change vessel order is essential to production of high quality effluent with maximum resin life.

The effluent of the exchangers is routed through a final bag filter to capture any tramp resin fines and prevent them from migrating to the water shields.

2. Resin Selection & Water Quality

DTS recommends the use of nuclear grade DT-20/60 stoichiometrically balanced mixed bed resin to remove contaminants and maintain water chemistry. This resin is used at many nuclear power plants for cleanup of process and liquid wastewaters.

The bed-life of the resin is difficult to predict, since it varies with the concentration of ionic material in the water. The first resin loading will be depleted more quickly than subsequent loadings, as the inventory of residual contaminants is removed.

After the initial operation of the water shield system, filtration for removal of suspended solids will be a secondary objective, as there is no source for continued intrusion of dirt and particulate material into the system.

The ion exchange media will effectively remove all dissolved material that is likely to be present. Generally, a water quality target of 7.0 ±1.0 pH and conductivity of <5 umho/cc will ensure that the shield water is maintained in pristine condition. The proposed system is well suited to maintain the water inventory to those standards.

3. Operational Recommendation

DTS recommends that the shield water system be flushed, if possible, before being filled in preparation for service. After filling, but before irradiation, a single bed can be put in service to thoroughly clean the water inventory. This bed can then be removed and disposed of as "clean."

A new resin loading should be put in service just before the facility is brought on line. Ensuring that the resin is fresh will maximize bed life and reduce the volume of contaminated resin, saving disposal costs.

C. Component Description

1. Process Pump

The Gould 10hp centrifugal pump is equipped with controls and cam-lok fittings for each of connection and disconnection.

Height	25"
Length	30"
Weight	210#
Material	Stamped SS pump bowl
Design	150 PSIG (225 PSIG Hydro)
Specs	ANSI B31.1, ASME IX

2. Bag Filter

Dual Rosedale bag filters can be run individually or in parallel. The filters are equipped with pressure gauges, drain and blowdown ports

Height	40"
Length	14"
Weight	110#
Material	304SS
Design	150 PSIG (225 PSIG Hydro)
Specs	ANSI B31.1, ASME IX

3. Ion Exchange Vessel

The ion exchange vessels are designed to optimize ion exchange media performance by encouraging plug flow through the vessel. The low point sluice out leg ensures that the vessel is completely emptied of resin during the sluice out. Stainless steel vessel internals ensure long life. Finally, a key advantage of the vessel design is access to the vessel through the 8" RF opening. This permits inspection of the vessel interior and removal of internals for inspection and repair, should the need ever arise.

Height	74"
Width	36"
Volume	30 cf useable
Weight	2000# empty, 5600# water-filled
Wetted Surfaces	Non-metallic, polymer liner
Vessel Shell	Carbon Steel or 304/316SS (alternate)
Specs	ASME Sec.VIII Code Stamped & Nat'l Board Registered

4. Influent Manifold (IM)

The IM controls and monitors LRW influent. Pressure, conductivity, temperature and flow rate instrumentation provide on-line indication of process conditions. Easily accessed interface points allow the Operator to introduce plant service air/water to flush or blow-down individual components, or the whole system.

Height	10"
Length	50"
Weight	80#
Material	304SS
Design	150 PSIG (225 PSIG Hydro)
Specs	ANSI B31.1, ASME IX

5. Effluent Manifold (EM)

The EM provides totalizer/flow rate and pressure indicators, a sample point (also serves as a SA/SW interface point) and isolation valve. Combination strainer/sight glass provides media retention and visual monitoring of the waste stream.

Height	12"
Length	45"
Weight	150#
Material	304SS
Design	150 PSIG (225 PSIG Hydro)
Specs	ANSI B31.1, ASME IX

6. Utility Manifold (UM)

Providing multiple sources for access to Plant service air and water, the UM lets the Operator obtain air and water for several uses at once. While air is being provided to the AOD pumps, blow down lines and to operate the pneumatically-controlled Sluice Manifold valve, service water can be used to flood media containers for loading, as well as for sluicing, flushing lines, and other general uses - all from the same UM, and without multiple "tees," connectors, and hoses.

Pressure gauges and isolation valves provide positive control over each line. Multiple manual and automatic check valves prevent backflow into SA and SW lines, to prevent contamination of plant systems.

When the operation is complete, the quick-connect (two-way auto shutoff) hoses are disconnected and stored, improving cleanliness and contamination control.

Material	304SS
Design	150 PSIG (225 PSIG Hydro)
Specs	ANSI B31.1, ASME IX

7. Control Manifold (CM)

Isolation or bypassing of individual vessels is provided by the CMs. Their status can be visually monitored from a distance to minimize personnel exposure. Jumper hoses accommodate changing of the process logic and provide a valved access point for recharging vessels with new media.

Height	15"
Weight	13#
Material	304SS
Design	150 PSIG (225 PSIG Hydro)
Specs	ANSI B31.1, ASME IX

8. Sluice Manifold (SM)

The SM provides a convenient, trouble-free method of sluicing out process vessels. The entire sluicing process can be achieved without breaking a single non-valved pressure boundary connection -- while the system is operating.

The pneumatically operated, fail-safe closed valve is integrated with the Level Monitoring System to provide both automatic and manual override of the sluicing process. The simplicity and redundancy of this system provides safe, positive control of the transfer of depleted media. A media sampling port is incorporated in the SM to allow Part 61 sampling and provide another connection point for introduction of plant SA/SW for flushing of piping and hosing. A sight glass permits visual monitoring of the sluice process.

Height	20"
Length	35"
Weight	50#
Material	304SS
Design	150 PSIG (225 PSIG Hydro)
Specs	ANSI B31.1, ASME IX

9. Sample Sink

The Sample Sink provides a convenient method of sampling the liquid at multiple points in the process system, including before, between and after each vessel. Integrated pressure gauges give visual readout of pressure drops across each bed. The catch basin of the sink drains, through a hose, to the floor drain.

Height	30"
Length	36"
Weight	85#
Material	304SS
Design	150 PSIG (225 PSIG Hydro)
Specs	ANSI B31.1

10. Hose Set

A complete set of prefabricated, hydro tested hosing is supplied, including the appropriate SS fittings and bands. Hose set includes:

- 3 hoses (inf/eff/sluice) per vessel
- jumper hoses
- spare jumper hoses
- resin adding hoses
- intrasystem hoses
- influent hose from Plant to system
- effluent hose from Plant to system
- sluice hose from Plant to system

Material	Wire Reinforced Polyester Carcass
Design	300 PSIG WP
Hydrotest	225 psig, 20 minutes (B31.1 Piping Code)

11. Sluice Wand

The wand is a specially designed conduit to aid in suctioning new media from the shipping containers during the vessel recharging process.

12. Water Wand

A simple, convenient device consisting of a short piece of pipe with an isolation valve that is connected, via portable line, to the UM to supply water for flushing, rinsing and filling media containers prior to vessel recharging, and for other general purposes.

13. Misc. Component Set

Various small fittings, parts, pieces and valves are provided to assure a complete and functional system setup, including plant interface connections to waste supply and return and plant service air and water.

14. Instrument Package

Top quality instruments are used for the WPS™ including pressure, conductivity and flow instruments.

Note:

DTS will assemble the WPS™, test it, and demonstrate it to client personnel, if desired, before it is shipped. Any equipment or operational issues that surface at this time will be addressed prior to shipment.