

AWTS, INC. COMPANY PROFILE

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AUGUST 2013

INTRODUCTION

- KEN PANDYA, CHEMICAL ENGINEER (1970), IS THE SOLE PROPRIETOR OF AWTS, INC. WORKING IN WATER TREATMENT INDUSTRY SINCE 1972. INCORPORATED AWTS IN 1997.
 - HOUSTON AREA WATER TREATMENT OEM COMPANIES: APPLICATIONS ENGINEERING AND TECHNICAL SALES: 1972-1980.
 - NITTO DENKO/ HYDRANAUTICS – SALES DIRECTOR 1980-1989.
 - MCCORMACK/ARI TECHNOLOGIES/WHEELABRATOR: VICE PRESIDENT 1989-1995
- MEMBER, ASME COMMITTEE POWER PLANT/ENVIRONMENTAL CHEMISTRY SINCE 1995. AUTHOR OF SEVERAL TECHNICAL PAPERS, REVIEW OF EPRI MANUAL, REVIEW OF TECHNICAL PAPERS
- PROVIDE FULL SERVICE PROJECT CONSULTATION SINCE 1995, FROM CONCEPTUAL PHASE TO DESIGN, FABRICATION, INSTALLATION, STARTUP, O&M SUPPORT, TRAINING AND TROUBLESHOOTING FOR NEW AS WELL AS EXISTING WATER TREATMENT SYSTEMS RANGING FROM 200 GPM (45 M3/H) TO 56 MGD (3530 M3/H). SERVING INDUSTRIAL AND MUNICIPAL CLIENTS ALL ACROSS THE WORLD. PROJECTS ALL ACROSS THE USA, JORDAN, SAUDI ARABIA AND INDIA.
- TECHNOLOGIES FOCUS: HIGH PURITY WATER, WASTEWATER, ZERO LIQUID DISCHARGE TECHNOLOGIES. HIGHLY INTEGRATED, HIGHLY AUTOMATED, ADVANCED WATER TECHNOLOGIES USING CHEMICAL TREATMENT, COAGULATION, CLARIFICATION, FILTRATION, MEMBRANE DESALINATION, ION EXCHANGE, DEGASIFICATION. POWERFUL NETWORK WITH SYSTEM INTEGRATORS, SYSTEM DESIGNERS, SPECIALTY PRODUCTS MANUFACTURING COMPANIES , TURNKEY INSTALLATION CONTRACTORS
- OWNS TWO PATENTS: HIGH EFFICIENCY SOFTENING PROCESS AND FILTRATION NOZZLE AND SYSTEM FOR FLUID PROCESSING. AUTHORED AND REVIEWED SEVERAL TECHNICAL PAPERS. SERVED AS A SPECIALTY TRAINER FOR UPW MAGAZINE FOR 10 YEARS, PROVIDES SITE SPECIFIC OPERATOR TRAINING.
- HIGH EFFICIENCY SOFTENING PROCESS PATENT HAS HUGE POTENTIAL IN HYDRAULIC FRACKING/RECYCLE, PRECIOUS METALS RECOVERY AND ZERO LIQUID DISCHARGE MARKETS. HIGH EFFICIENCY FILTER NOZZLES HAS HUGE POTENTIAL IN REPLACING COMPETITIVE SYSTEMS

PANDYA PATENT 8,147,696

HIGH EFFICIENCY SOFTENING PROCESS



US008147696B1

(12) **United States Patent**
Pandya

(10) **Patent No.:** **US 8,147,696 B1**
(45) **Date of Patent:** **Apr. 3, 2012**

(54) **HIGH-EFFICIENCY WATER-SOFTENING
PROCESS**

(76) Inventor: **Ken V. Pandya**, Plano, TX (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 396 days.

(21) Appl. No.: **11/523,679**

(22) Filed: **Sep. 19, 2006**

(51) **Int. Cl.**
C02F 1/56 (2006.01)
C02F 5/02 (2006.01)

(52) **U.S. Cl.** **210/638**; 210/639; 210/709; 210/717;
210/725; 210/727; 210/912

(58) **Field of Classification Search** 210/705

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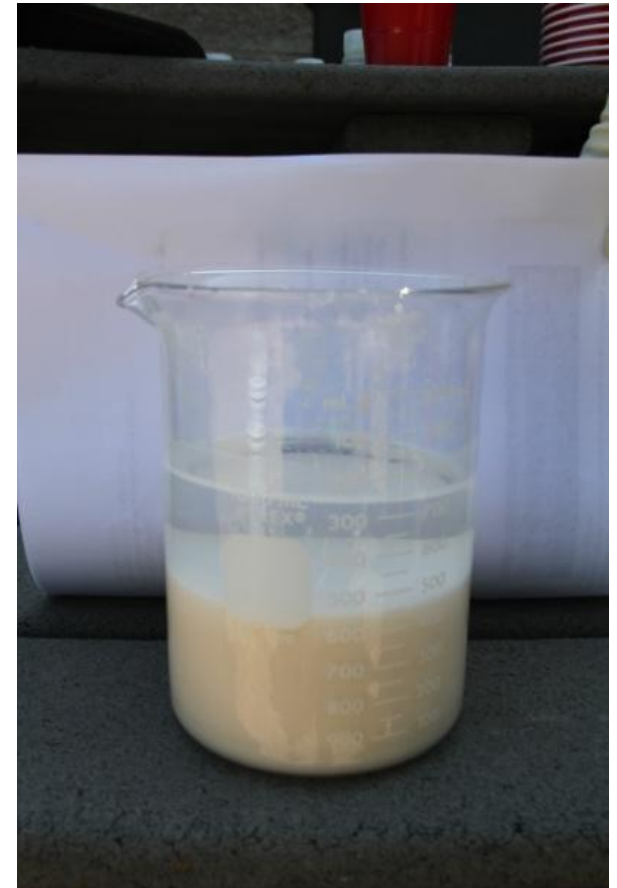
Primary Examiner — Peter A Hruskoci

(74) *Attorney, Agent, or Firm* — Jack D. Stone, Jr.; Scheef &
Stone, L.L.P.

(57) **ABSTRACT**

A method for purifying a water process stream whereby a

DEMONSTRATION OF PATENTED HIGH EFFICIENCY SOFTENING PROCESS, PRODUCED WATER TREATMENT, HYDRAULIC FRACKING OPERATIONS



HYDRAULIC FRACKING FLOWBACK WATER TREATMENT PILOT RESULTS

PARAMETER	FRAC WATER INLET	HESP OUTLET	% REDUCTION
Calcium + Magnesium (Hardness), Mg/L	10,500	<1.0	99.99
Barium	12	0.4	96.7
Strontium	382	16.9	95.6
Silica	61	8.6	85.9
Total Organic Carbon	30	4.7	84.3
Oil and Grease	21	<1.0	95.2
Iron	27	2.7	90
Copper	4.9	0.01	99.8
Zinc	2.76	0.01	99.6

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HESP[®] TEST RESULTS, PRODUCED WATER FROM CITY OF GRAND PRAIRIE

PARAMETER	BEFORE	AFTER	% REDUCTION
CALCIUM, PPM CACO3	39,832	39	99.9 %
MAGNESIUM, PPM CACO3	8901	188	97.9 %
STRONTIUM	616	<5	99.2 %
SILICA, mg/l	34	11	67.6 %
FLUORIDE, mg/l	102	26.4	74.1 %
ARSENIC, mg/l	1.36	0.13	75.7 %
pH	3.96	10.28	
CONDUCTIVITY, mmho	314,300	358,100	-
TDS, mg/l	174,300	133,330	23.5 %

MARKET POTENTIAL, HESP PROCESS

- THE HESP PROCESS IS SIMPLE, CAN BE INTEGRATED WITH CONVENTIONAL PRETREATMENT EQUIPMENT
- UP TO 99% REDUCTION IN HARDNESS, PRECIPITATION OF METALS. IDEAL PRETREATMENT FOR EVAPORATIVE EQUIPMENT. ELIMINATES NEED FOR LOW PH OPERATION
- PROCESS COMPETITIVE WITH LONG HAUL TRUCKING COSTS AND DEEPWELL INJECTION COSTS
- HUGE POTENTIAL FOR HYDRAULIC FRACKING INDUSTRY- EITHER ONSITE TREATMENT OR CENTRALIZED WATER TREATMENT.
- HUGE POTENTIAL FOR ZERO LIQUID DISCHARGE SYSTEMS REQUIRING RELIABLE PRETREATMENT FOR EVAPORATIVE PROCESSES
- PROCESS PROVEN IN BENCH TESTS AND SMALL SCALE PILOT. READY FOR FULL SCALE PILOTS

PANDYA PATENT 6,730,229

FILTER SCREEN NOZZLE AND SYSTEM FOR FLUID PROCESSING



US006730229B1

(12) **United States Patent**
Pandya

(10) **Patent No.: US 6,730,229 B1**

(45) **Date of Patent: May 4, 2004**

(54) **FILTER SCREEN NOZZLE AND SYSTEM
FOR FLUID PROCESSING**

(75) Inventor: **Ken V. Pandya**, Plano, TX (US)

(73) Assignee: **AWTS, Inc.**, Plano, TX (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 111 days.

(21) Appl. No.: **09/710,460**

(22) Filed: **Nov. 10, 2000**

(51) **Int. Cl.**⁷ **B01D 15/04**

Primary Examiner—Ivars C. Cintins

(74) *Attorney, Agent, or Firm*—Leydig, Voit & Mayer, Ltd.

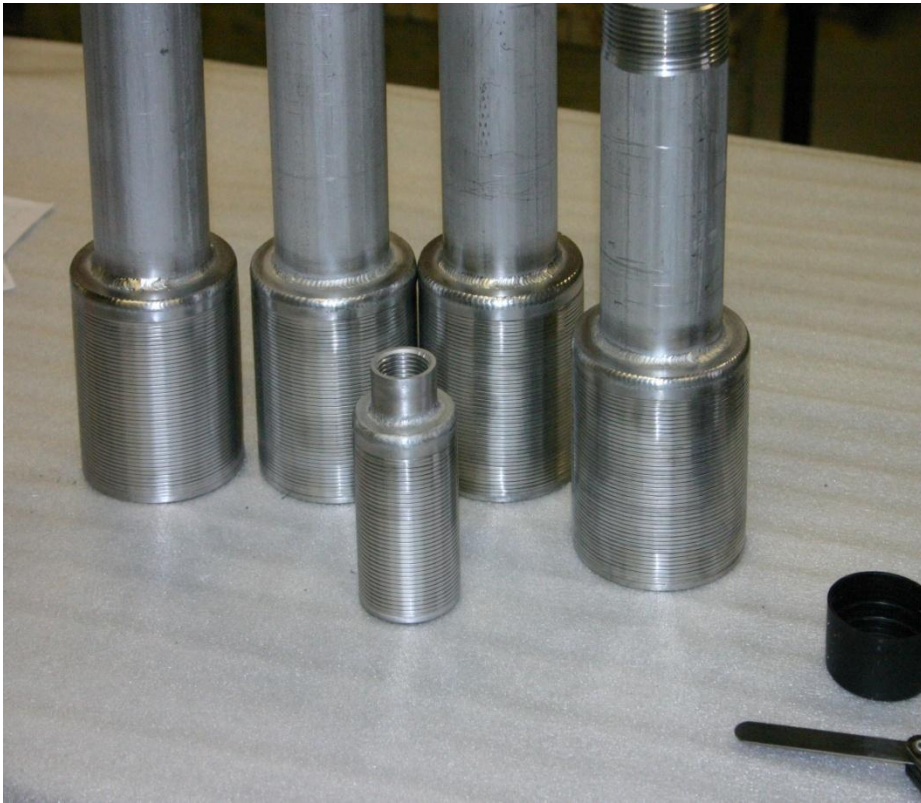
(57) **ABSTRACT**

A nozzle and associated system is for treating fluids is provided, particularly for a system including a reaction vessel containing a granular filter or ion exchange medium and a fluid manifold immersed in the granular or ion exchange medium. The nozzle has an outer screen defining a interior cavity, a duct for providing flow to the interior cavity, and a restrictor having at least one orifice through which the duct is in communication with the cavity. The orifice or orifices of the restrictor have a total open area that is less than the total open area of the outer screen. By this sizing relationship the nozzle flow rate is dictated by the inner orifice area, not the outer screen area. In some

MARKET POTENTIAL, PATENTED FILTER NOZZLES

- TESTED, PROVEN NOZZLES. TOTAL INSTALLED CAPACITY NEAR 40,000 GPM.
- MAXIMIZES EFFICIENCY OF ION EXCHANGE SYSTEMS USING WIDE RANGE OF ION EXCHANGE RESINS AND CONVENTIONAL FILTERS USING SAND, ANTHRACITE, GARNET, BIRM, MANGANESE GREENSAND, ETC.
- EXCELLENT RETROFIT / AFTERMARKET SERVICE FOR SEVERAL OLDER DEMINERALIZERS AND FILTERS
- SEPARATION OF FINE SUSPENDED SOLIDS DOWN TO 0.002" DIAMETER.
- EXCELLENT OPTION FOR NEW UNITS

PATENTED INTERNAL DISTRIBUTORS FOR FILTERS AND DEMINERALIZERS



PATENTED INTERNAL DISTRIBUTORS FOR 18,000 GPM CONDENSATE POLISHERS



PATENTED HASTALLOY C INTERNALS FOR 10' DIA
DEMINERALIZERS, CHEMICAL PLANT IN FREEPORT TX
UNDERDRAIN, CHEM FEED DISTRIBUTOR



INTERNAL DISTRIBUTORS, IX, FILTERS



CUSTOM ENGINEERED 4"-10" RESIN TRAPS



CUSTOM ENGINEERED INTERNALS FOR FILTERS AND IX UNITS



AWTS PROJECTS

CUSTOMER	SECTOR/ LOCATON	SIZE	SCOPE
NRG	POWER/USA	1600 GPM	UF/SWRO, PROJECT CONSULTING
NRG	POWER/USA	600 GPM	NEW INTERNALS, PROJECTS CONSULTING
NV ENERGY	POWER/USA	200 GPM	WASTE WATER MF/RO SYSTEM, CONSULTING
AEP	POWER/USA	250 GPM	IX SYSTEM, CONSULTING
ENTERGY	POWER/USA	600 GPM 2000 GPM 12000 GPM	HPW SYSTEM UPGRADE, RO SYSTEM, NEW INTERNALS, NEW DEGASIFIER, PRIMARY CLARIFICATION PROCESS, SEVERAL CONSULTING PROJECTS
ENTERGY	POWER/USA	18000 GPM	NEW INTERNALS, RESIN TRAPS, CONDENSATE POLISHER, CONSULTING
ENTERGY	POWER/USA	300 GPM	PRETREATMENT SYSTEM CONSULTING

AWTS PROJECTS

CUSTOMER	SECTOR/ LOCATION	SIZE	SCOPE
CONSUMERS ENERGY	POWER/USA	400 GPM	NEW HPW SYSTEM, PROJECT CONSULTING
PONDEROSA PINE	POWER/USA	300 GPM	PRETREATMENT / RO /EDI SYSTEM UPGRADE, PROJECT CONSULTING
BLACK HAWK ENERGY	POWER/USA	600 GPM – 2000 GPM	IX SYSTEM INTERNALS, FILTER INTERNALS, PROJECT CONSULTING
CALPINE POWER	POWER/USA	600 GPM	RO SYSTEM UPGRADE, CONSULTING
CALPINE POWER	POWER/USA	880 GPM	RO SYSTEM, CONSULTING
HOOSIER ENERGY	POWER/USA	600 GPM	HPW SYSTEM UPGRADE. NEW INTERNALS, CONSULTING

AWTS PROJECTS

CUSTOMER	SECTOR/ LOCATION	SIZE	SCOPE
DETROIT EDISON	POWER/USA	600 GPM	UF SYSTEM EVALUATION, CONSULTING
CONOCO PHILLIPS	PETROCHEM/USA	5500 GPM	NEW HPW SYSTEM, TROUBLESHOOT EXISTING
CONOCO PHILLIPS	PETROCHEM/USA	1600 GPM	NEW RO SYSTEM, TROUBLESHOOT EXISTING
CONOCO PHILLIPS	PETROCHEM/USA	2000 GPM	EVALUATE NEW PRETREATMENT
DOW CHEMICALS	CHEMICAL/USA	3500 GPM	ION EXCHANGE SYSTEM REHAB, CONSULTING
BURNWICK CELLULOSE	PAPER/USA	150-350 GPM	CONDENSATE SYSTEM EVALUATION, CONSULTING

AWTS PROJECTS

CUSTOMER	SECTOR/ LOCATION	SIZE	SCOPE
MONOCHEM	CHEMICAL/USA	1500 GPM- 5000 GPM	NEW INTERNALS FOR ION EXCHANGE SYSTEMS, FILTERS UPGRADE, CONSULTING
ARAB POTASH COMPANY	CHEMICAL / JORDAN	220 GPM 1320 GPM	COMPLETE HPW SYSTEM, COOLING SYSTEM MAKEUP, CONSULTING
SQWEC SHUQAIQ II	MUNICIPAL/SAUDI ARABIA	56 MILLION GALLONS PER DAY	TWO STAGE SWRO CONSULTING
GENERAL MOTORS	AUTOMOTIVE/ USA	300 GPM	NEW ION EXCHANGE VESSELS WITH INTERNALS

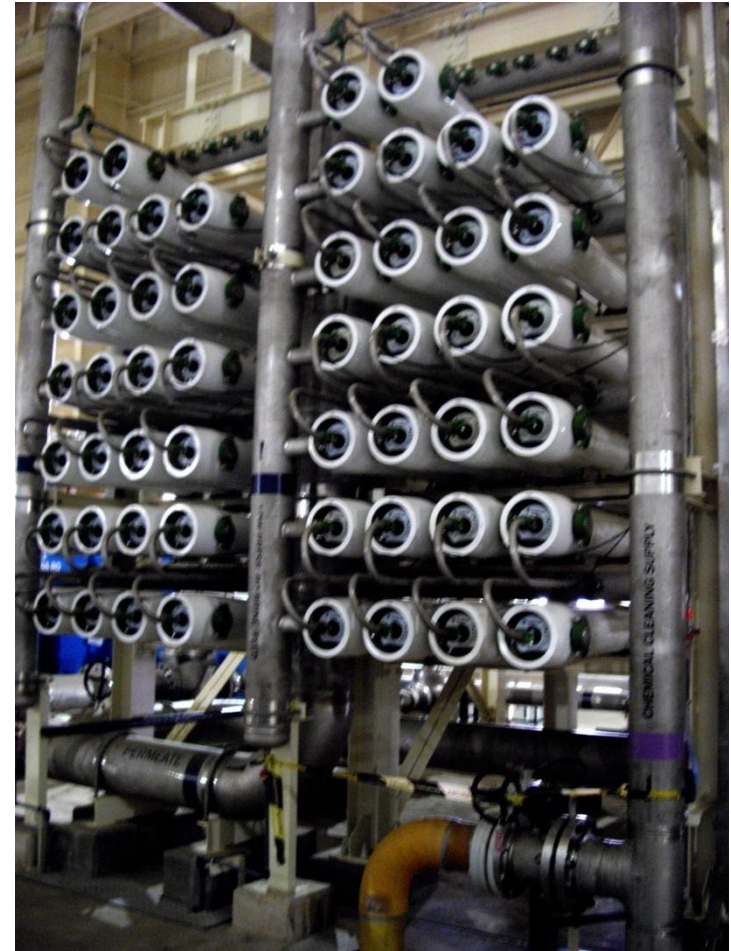
AWTS PROJECTS

CUSTOMER	SECTOR/ LOCATION	SIZE	SCOPE
EXELON GENERATION	POWER/USA	200 GPM	HPW SYSTEM UPGRADE, CONSULTING
MARIPOSA	POWER/USA	300 GPM	PRETREATMENT SYSTEM, HPW SYSTEM CONSULTING
ENTERGY	POWER/USA	300 GPM	NEW RO SYSTEM, PROJECT CONSULTING
VARIOUS OEMS	POWER, PETROCHEM	150-600 GPM	DESIGN OF UPW SYSTEM COMPONENTS, INTERNALS
TALL OAKS PUBLISHING (UPW MAGAZINE)	ELECTRONICS, POWER, NEWS ARTICLES	N/A	TRAINING WATER TREATMENT PROFESSIONALS FOR 10 YEARS

INVESTIGATION OF 212,000 M³/D (56 MGD) SEAWATER RO SYSTEM, SAUDI ARABIA CARTRIDGE FILTERS, RO BUILDING

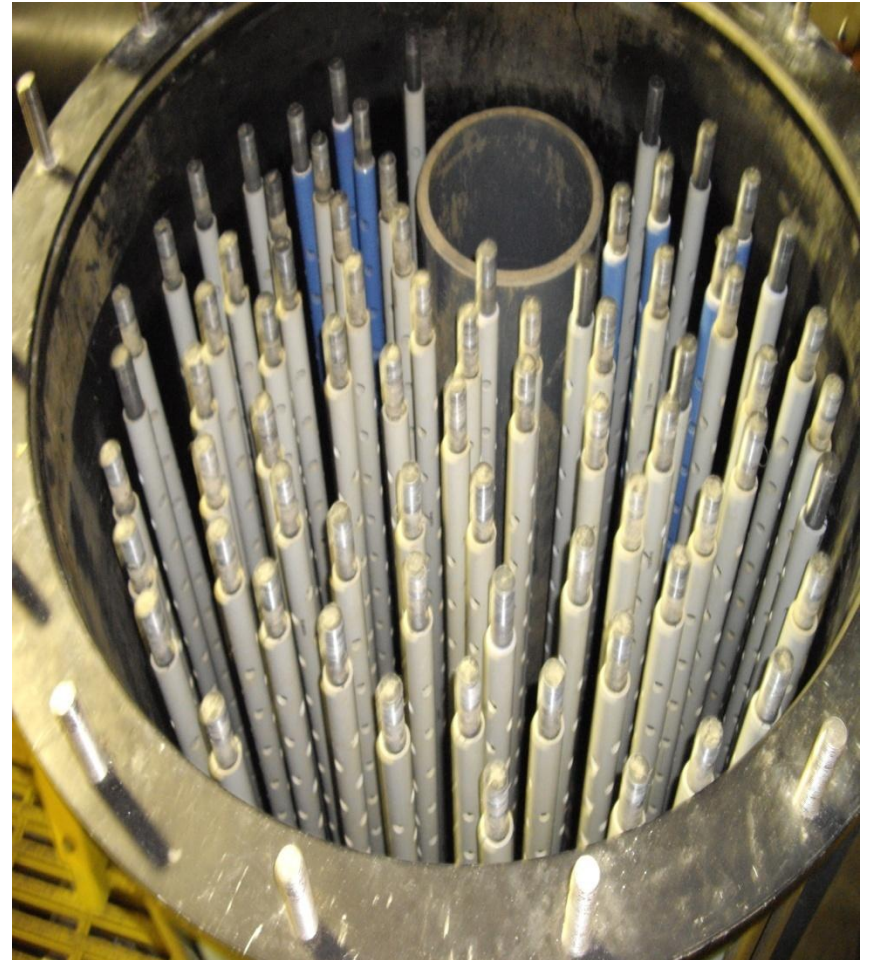


INVESTIGATION OF 212,000 M³/D (56 MGD) SEAWATER RO SYSTEM, SAUDI ARABIA FIRST PASS SWRO, SECOND PASS BWRO BLOCKS



PROJECT OVERSIGHT: 1600 GPM UF/SWRO FOR POWER PLANT, USA

INCLINED PLATE CLARIFIER, CARTRIDGE FILTERS



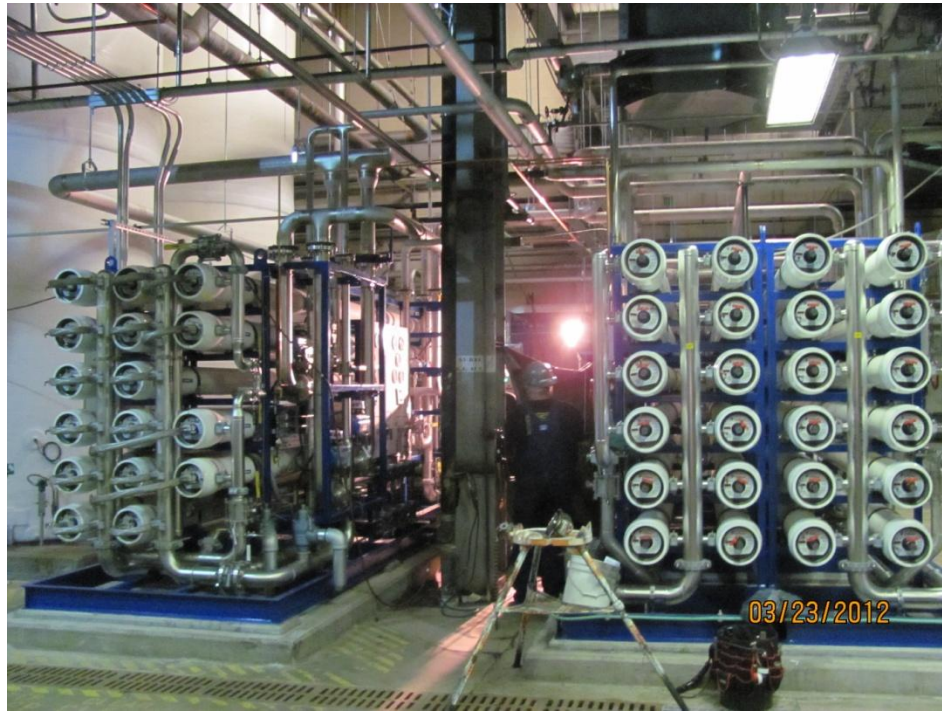
PROJECT OVERSIGHT: 1600 GPM UF/SWRO FOR POWER PLANT, USA UF BLOCKS, SWRO BLOCKS



50 M3/HR HIGH PURITY WATER SYSTEM, ARAB POTASH CO., JORDAN PRETREATMENT FILTERS, RO BLOCKS



DESIGN OF 400 GPM HIGH PURITY WATER SYSTEM FOR A POWER PLANT, USA RO BLOCKS, CHEM FEED, CARTRIDGE FILTERS



50 M3/HR HIGH PURITY WATER SYSTEM, ARAB POTASH CO., JORDAN MIXED BED POLISHERS, CIP SYSTEM



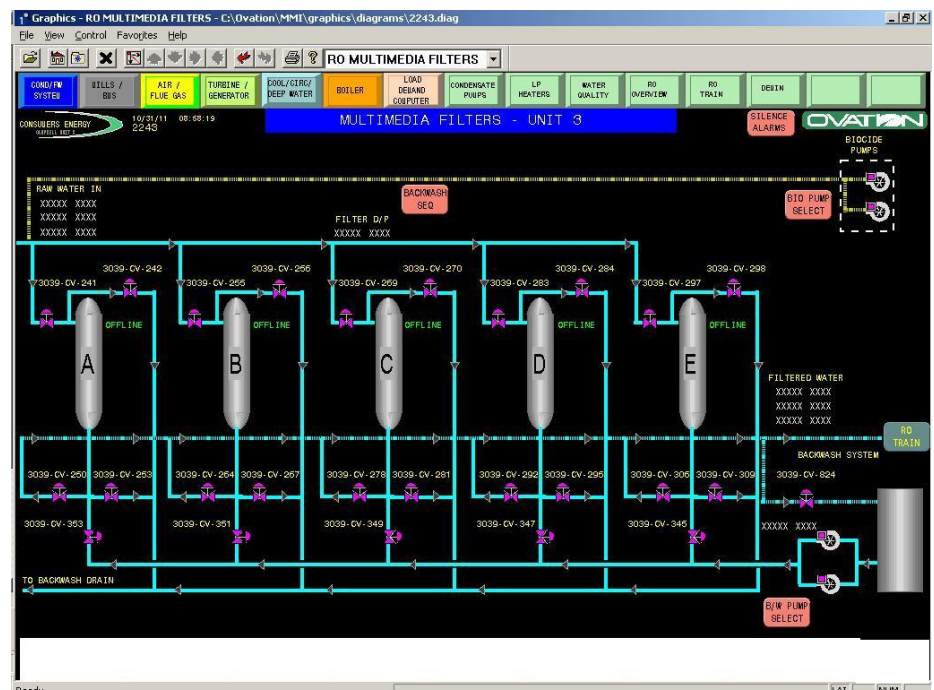
DESIGN OF 400 GPM HIGH PURITY WATER SYSTEM FOR A POWER PLANT, USA CUSTOM ENGINEERED RO BLOCKS



DESIGN OF 400 GPM HIGH PURITY WATER SYSTEM FOR A POWER PLANT, USA CUSTOM ENGINEERED MIXED BED POLISHERS



The screenshot displays the Ovation process control software interface for the RO Train diagram. The interface includes a menu bar (File, View, Control, Favorites, Help), a toolbar with various icons, and a status bar at the bottom. The main display area shows a detailed process flow diagram for the RO Train, including components like filters, pumps, tanks, and control valves. The diagram is color-coded with blue and red lines. The status bar at the bottom shows 'Ready' and 'LAT NUM'.



50 M3/HR HIGH PURITY WATER SYSTEM, ARAB POTASH CO., JORDAN CARTRIDGE FILTERS, MCC



600 GPM RO SYSTEM, POWER PLANT IN LAKE CHARLES, LA RO BLOCKS, FORCED DRAFT DEGASIFIER



AWTS DESIGN: FORCED DRAFT DEGASIFIERS

600 GPM TOWER, DEMISTER, 150 GPM TOWER



TROUBLESHOOTING DESIGN PROBLEMS



TROUBLESHOOTING ION EXCHANGE SYSTEMS



TROUBLESHOOTING RO SYSTEMS

