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2355 Hill Road
Fairbanks, Alaska 99709-5326
(907) 458-3100 FAX: 479-5691
E-mail: msl@shanwil.com

Transmittal

To:	Alaska Department of Environmental Conservation	Attn:	Mr. Dennis Harwood
	555 Cordova Street	Date:	June 30, 2010
	Anchorage, Alaska 99503	Job #	31-1-11472-001
		Re:	ADOT&PF Northway Maintenance Station, Mile 1256 Alaska Highway, Alaska

The following items are enclosed:

Copies	Description
2	Site Control Plan

These are transmitted:

X As requested ☐ For your use ☐ For your information
☐ For review and comment ☐ For your action **X** For your files

Comments:

Copies to:

By: Mark Lockwood
Title: Senior Principal Geologist

SITE CONTROL PLAN, ADOT&PF NORTHWAY MAINTENANCE STATION, MILE 1256 ALASKA HIGHWAY, ALASKA

June 2010

Submitted To:
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, Alaska 99501

By:
Shannon & Wilson, Inc.
2355 Hill Road
Fairbanks, Alaska 99709-5326

31-1-11472-001

SITE CONTROL PLAN
ADOT&PF NORTHWAY MAINTENANCE STATION
MILE 1256 ALASKA HIGHWAY, ALASKA

June 30, 2010

Prepared by:

SHANNON & WILSON, INC.
2355 Hill Road
Fairbanks, Alaska 99709-5326

Project Manager: Mark S. Lockwood, C.P.G.
Senior Principal Geologist

Reviewed by: Jon E. Lindstrom, Ph.D.
Associate

Prepared for:

Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, Alaska 99501

31-1-11472-001

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APPENDICES

SITE CONTROL PLAN
ADOT&PF NORTHWAY MAINTENANCE STATION
MILE 1256 ALASKA HIGHWAY, ALASKA

1.0 INTRODUCTION

We are pleased to present this site control plan for the water well at the Alaska Department of Transportation and Public Facilities (ADOT&PF) Northway Maintenance Station (NMS), Mile 1,256 Alaska Highway, Alaska (Alaska Department of Environmental Conservation [ADEC] File Number 170.38.035). A water sample collected in 1988 from the facility's 280-foot-deep water well contained 270 microgram per liter (µg/L) benzene; another water sample collected in October 2009 contained 678 µg/L benzene and 2.45 milligrams per liter (mg/L) gasoline range organics (GRO). The ADOT&PF has taken the well out of service, installed a holding tank, and hauls water from the town of Northway.

We developed this site control plan for the water-supply well so the ADOT&PF could use water from the well as a non-potable source for truck washing and other domestic tasks. We contracted with EcoWater Systems, LLC (EcoWater) in Fairbanks to develop a water treatment system. Using a water sample from the site, EcoWater developed specifications for a filtration system to remove benzene and gasoline from the water, and a maintenance program for the system. The ADOT&PF estimated the facility requires about 500 gallons a day.

We prepared this plan in accordance with the ADEC's request for proposal (RFP) dated May 27, 2009, and our Proposal dated July 8, 2009, and the provisions of our Contaminated Sites term contract #18-9028-14 NTP #105.

2.0 BACKGROUND

2.1 Site Location and Well Description

The ADOT&PF NMS is about 165 miles south of Delta Junction, at Mile 1256 of the Alaska Highway. The site is fenced, generally level, and developed with a metal shop building and a storage building. Water for the site was once obtained from an on-site well on the east side of the shop building; however, a holding tank has been installed and drinking water is now obtained from a source in Northway. The site is bounded on the east by the Richardson Highway and Yager Lake on the west.

According to the U.S. Army Corps of Engineer's as-built drawings, dated April 2, 1963, the 6-inch well is 250-feet deep with a submersible pump set at 212.5 feet below the ground surface. Groundwater is likely restricted to fracture zones within the granitic bedrock.

2.2 Subsurface Conditions

Site geology generally consists of granitic bedrock mantled by 1 foot to 2 feet of silt. The depth to bedrock likely varies throughout the site, depending on the amount of fill. The shop building appears to be constructed on fill consisting of weathered granite from a borrow pit east of the Alaska Highway.

2.3 Site History and Previous Work

The site was first developed by the U.S. Army in 1954 during the construction of the Haines Pipeline. Review of a 1968 air photo shows the completed pump station with two vertical fuel storage tanks, composite/pump building, storage shed, and residence trailers. The site appears to have been built on fill.

The ADOT&PF began occupying the site in 1986, at which time they hauled water from the U.S./Canadian border. They later rehabilitated the on-site well; in 1988, a sample from the well contained 270 µg/L benzene. Water samples collected from the on-site well in 2006 contained benzene and GRO in excess of ADEC cleanup levels. Following receipt of the sample results, the ADOT&PF disconnected power to the well, installed a water-holding tank, and began hauling drinking water from off-site.

In 2007, Shannon & Wilson observed the removal of three aboveground storage tanks (ASTs) and piping. The source of the groundwater contamination appears to be a cracked gasoline pipe that led into the pumps in the composite building. The ADOT&PF installed new double-wall ASTs following demolition.

In October 2009, Shannon & Wilson collected a water sample from the well that contained 678 µg/L benzene and 2.45 mg/L GRO.

2.4 Cleanup Levels

Groundwater cleanup levels for this site are established under 18 AAC 75.345 Table C. Samples for the NMS water well exceed maximum contaminant levels (MCLs) for benzene (5 µg/L) and GRO (2.2 mg/L).

3.0 WATER TREATMENT AND FILTRATION SYSTEM RECOMMENDATIONS

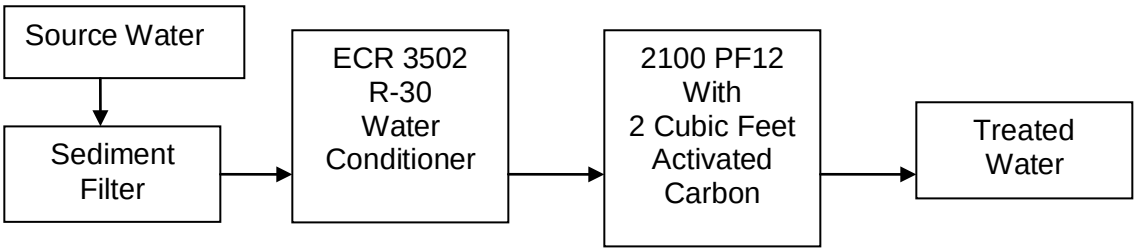
EcoWater designed a water treatment and filtration system for the well based on the ADOT&PF's estimated peak daily usage of 500 gallons per day. Appendix A contains EcoWater's recommendation report and the component specification sheets. EcoWater's system design is based on source-water conditions as determined by testing they conducted and results of our contaminant analyses.

ECOWATER TESTING RESULTS

Analyte	Concentration
Iron	0.3 parts per million (ppm)
Total Hardness	10 grams per gallon
Benzene	0.5 ppm*
Gasoline	1.6 ppm*

* - Benzene and gasoline concentrations are slightly less than current conditions Shannon & Wilson observed in the well.

3.1 System Schematic



3.2 System Components

This section provides a description of the treatment system components.

3.2.1 In-line Sediment Filter

The sediment filter serves to eliminate larger particulates from the treatment-system influent.

3.2.2 EcoWater ECR 3502 R-30 Water Conditioner

The EcoWater ECR 3502 R-30 water conditioner will remove iron and total hardness from the water, thereby reducing load on the activated carbon and increasing carbon-filter efficiency and useful life. The component will meter gallons of water that have been treated.

3.2.3 EcoWater 2100 PF 12 Carbon Filter

The 2-cubic-foot carbon filter will absorb benzene and gasoline from the water.

3.3 System Maintenance

With the anticipated water usage rates, EcoWater estimated the conditioner will require about 100 pounds of salt per year; the carbon filter will need to be changed out approximately once a year, or every 200,000 gallons of treated water.

4.0 RECOMMENDATIONS

The water treatment system was designed by EcoWater to remove benzene and gasoline from the NMS water well, allowing the treated water to be used for truck washing and domestic tasks; it should be considered non-potable. The ADOT&PF should post the treatment system operating procedures and signs alerting workers and visitors of the hazards of ingesting untreated water. We also recommend the system maintenance log be posted near the well to keep track of water conditioning media and carbon filter replacement as well as sampling results; an example of a maintenance log is provided in Appendix B.

To operate properly, the system must be maintained and the conditioner and treatment media replenished or changed on a regular basis.

EcoWater estimated 2-cubic feet of carbon would filter about 200,000 gallons of water at current benzene and GRO influent concentrations. We recommend the treated water be sampled following system installation to determine the system's effectiveness; the water should not be used until sample results indicate the concentrations of benzene and GRO do not exceed ADEC cleanup levels (Section 2.4). Sampling should be conducted monthly until a break-through volume is established. Break-through is the point at which the carbon filter media becomes saturated with contaminants and is no longer effective. If sample results exceed ADEC cleanup levels, the system should be shut down and the carbon replaced. If sampling indicates the carbon filter is working at its anticipated capacity, the carbon should be replaced after 200,000 gallons.

The carbon-filtration media will contain benzene, a regulated substance, and should be disposed in accordance with state and federal regulations.

After one year of operation, it is likely quarterly sampling will be sufficient to assure the filter is working.

5.0 LIMITATIONS

This site control plan was prepared for the use of the ADEC and its representatives for treating fuel-contaminated water at the ADOT&PF NMS. This plan presents our professional judgment as to the conditions in the area and EcoWater's recommendation for filtration. These recommendations are based on theoretical filtering capacities; no pilot testing was conducted. Testing of the system once it is constructed and operating will be required to evaluate filter efficiency.

Conclusions and recommendations presented here are based on sampling and analyses we performed, along with a limited review of records and other data available to the public. They should not be construed as definite conclusions about the soil or groundwater in the area, and it is possible our tests may not represent the highest levels of contamination in the area. We have not performed an independent evaluation of the accuracy or completeness of third-party information, and shall not be responsible for errors or omissions contained in such information.

Due to such changes, or others beyond our control, our observations and recommendations applicable to this site may need to be revised. If substantial time has elapsed between submission of this report and the start of activities or action based upon it, we recommend this report be reviewed to determine the applicability of the conclusions and recommendations considering the lapsed time or changed conditions.

This report was prepared for the exclusive use of our client. All documents prepared by Shannon & Wilson are instruments of service with respect to the project for the sole use of our Client. Only our Client shall have the right to rely upon such documents. Such documents are not intended or represented to be suitable for reuse by our Client or others after the passage of time, on extensions of the project, or on any other project. Any such reuse without written verification or adaptation by Shannon & Wilson, as appropriate for the specific purpose intended, shall be at the user's sole risk.

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APPENDIX A

ECOWATER'S FILTRATION SYSTEM
RECOMMENDATIONS AND PRODUCT SPECIFICATION SHEETS

RICHARDS DISTRIBUTING, INC.
Dba: ARCTIC HOME LIVING
ECOWATER SYSTEMS
1698 AIRPORT WAY #1
FAIRBANKS, AK 99701

PH: 907-451-8717 FAX: 907-451-8716

TO: MARK LOCKWOOD
SHANNON & WILSON

FROM: ROB RICHARDS
ECOWATER SYSTEMS

RE: NORTHWAY D.O.T. WATER TREATMENT

Mr. Lockwood,

Following is a system design for a water treatment system for the Northway D.O.T. station. System Design is based off of the following product water specifications.

Iron	.3 p.p.m.
Total Hardness	10 g.p.g.
Benzene	.5 p.p.m.
Gasoline	1.6 p.p.m.

Estimated Water Usage:

Peak Daily Usage	500 gallons per day
Peak Flow Rate	10 gallons per minute

Recommended Equipment
EcoWater ECR 3502 R-30 Water Conditioner.
System will remove the iron and total hardness from the water. System is comes with a remote monitoring system.

EcoWater 2100 PF 12 with 2 feet of activated carbon
System will absorb the Benzene and Gasoline from the water.
With above specifications carbon will need to be changed out approximately once a year, or every 200,000 gallons of through water. System will meter the gallons of through water

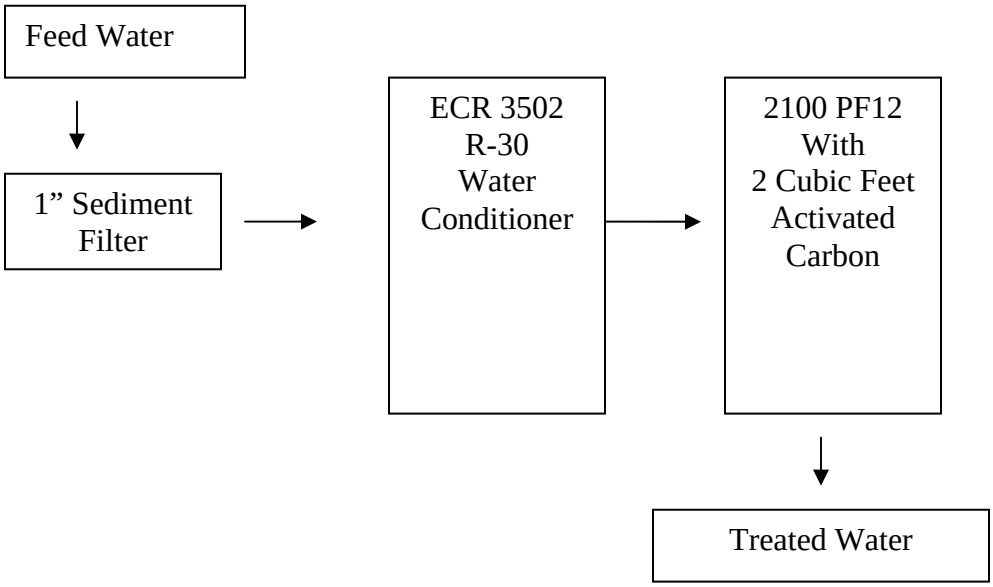
I have attached spec sheets for both machines.
Equipment cost F.O.B. Fairbanks

ECR 3502 R-30	$2590.00
2100 PF12 w/2cubic feet of activated carbon	$2390.00

If the facility doesn't currently have a pre sediment filter in line I would recommend one for the elimination of larger particulates prior to this treatment system. I would recommend 1" inlet outlet housing. 4 ½" x 9 ¾" with a 20 micron pleated filter.

Cost for housing	$79.00
Filters	$29.00 ea.

System Schematic:



If you have any further questions of need any more information please give me a call.

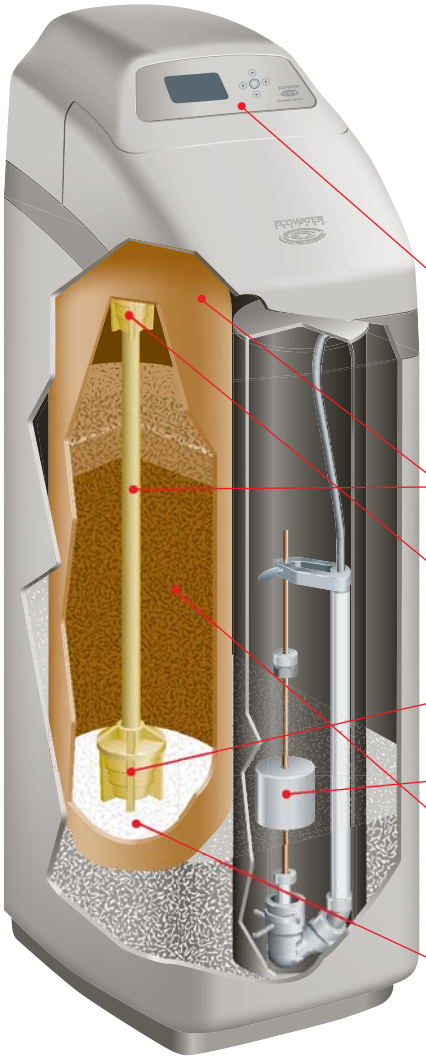
Thank You,

Rob Richards
President
Richards Distributing, Inc.

ECR 3500

ECOWATER SERIES • WATER CONDITIONER

It's That Good.®



The Latest Technology for Water Treatment

Bypass Valve (optional)
Brass-free and lead-free bypass valve lets you manually bypass the system.

Patented Electronic Digital Demand Module
Solid-state electronics record usage patterns and control regeneration frequency based on predicted needs. Full menu-driven options.

Full One-Inch Riser
One-inch diameter for increased flow rates, which ensures that household demand is adequately met.

Multi-Wrap Fiberglass Reinforced Resin Tank
Polymeric tank liner with a fiberglass wrapped exterior for strength. Doesn't deteriorate, rust, or corrode.

Self-Cleaning Distributors
Distributors exhibit excellent flow rates and are cleaned automatically by counter-current water pressure.

Positive-Action Brine Valve
Snap-together construction eliminates use of solvents that may contaminate water. Positive action helps prevent overfilling.

Patented Six/Eight-Cycle Valve with Easy-Clamp Ring and Patented Teflon® Discs

Patented Stratified Resin Bed
Patented mix of stratified resins provides superior filtration and iron removal without sacrificing flow rate capability.

Washed Quartz Underbedding
Washed quartz doesn't impart hardness into softened water and allows for more powerful "piston effect" during counter-current cycles.

HydroLink™ Remote (patent pending)
Two-way remote technology that makes it possible to control and monitor the Series 3500 water conditioner from anywhere in the home.

24-Volt Transformer – ENERGY STAR® qualified

Barium and Radium
This softener has been tested and certified by NSF International and WQA against NSF/ANSI Standard 44 for the reduction of Barium and Radium 226/228.

Patented Exclusive Features

- Teflon Disc Valve
- Electronics
- Design
- Remote
- Salt Level Monitor
- Stratified Resin Bed

SERIES 3500
HYDROLINK™ REMOTE

FC Tested to comply with FCC Standards IC3590A-7695.

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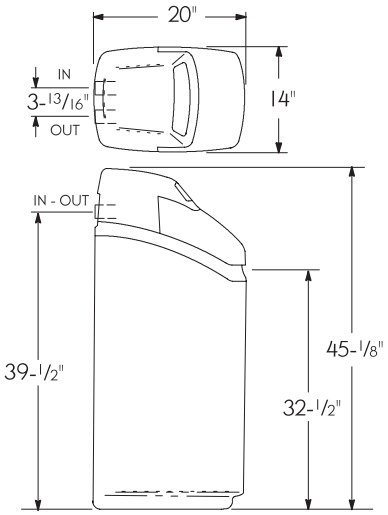
ECR 3500

dimensions



	ECR 3500R20	ECR 3500R30
Nominal Resin Tank Size	8" Dia. x 35"	10" Dia. x 35"

specifications

	ECR 3500R20	ECR 3500R30
Efficiency (gr./lb. @ min. lb. salt dose)	5,150 @ 1.1	5,160 @ 1.6
Hardness Capacity (gr. @ max. lb. salt dose)	20,400 @ 7.5	30,200 @ 11.3
Certified Flow Rate (gpm @ psi)	9 @ 10	11 @ 8
Intermittent Flow Rate (gpm @ psi)[1]	12.0 @ 15	16.5 @ 15
Intermittent Flow Rate (gpm @ psi)[1]	19.4 @ 30	25.8 @ 30
Patented Resin Bed #5464532 (lbs.)	32	47
Quartz Gravel Base (lbs.)	8	10
Maximum Recommended Water Hardness (gpg @ 500 gpd water usage)	40	60
Maximum Clear Water Iron (ppm-Fe)[2]	10	12
Average Water Used Each Regeneration (gal.)[3]	29	36
Salt Storage Capacity (lbs.)	225	200
Supply Water Pressure Limits (psi)[4]	20 – 125	20 – 125
Supply Water Temperature Limits (°F)	40 – 120	40 – 120
Ambient Temperature Range (°F)	35 – 150	35 – 150
Plumbing Connection Provided (inches)	1 to 1½	1 to 1½
Electrical Rating (transformer provided)	24V-50/60Hz	24V-50/60Hz

[1]Intermittent flow rate does not represent the maximum service flow rate used for determining the softener's rated capacity and efficiency. Continuous operation at flow rates greater than the certified flow rate may affect capacity and efficiency performance. The validity of these flow rates is verified by NSF.
[2]Increased amounts of clear water iron can reduce softeners efficiency. Refer to owner's manual for details. Wisconsin requires additional treatment if water supply contains greater than 5 ppm clear water iron.
[3]When operated at 35 psi water pressure
[4]Maximum pressure for Canadian use is 7.0 Kg/cm2

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ETF 2100

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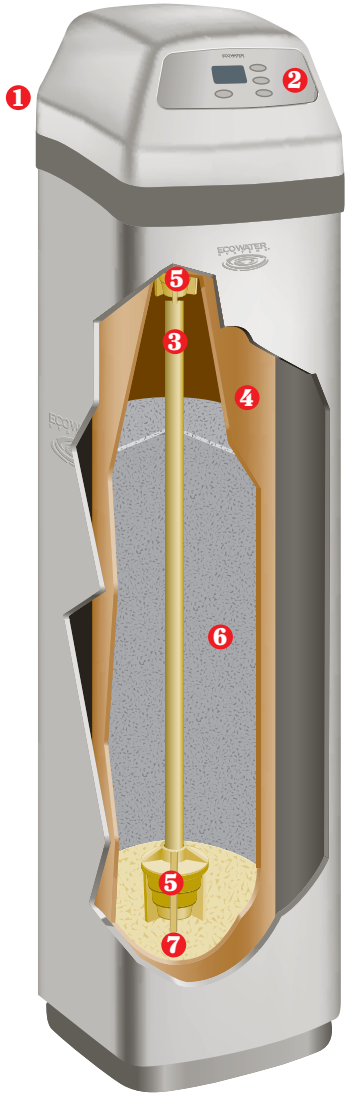
A Proven System for Removing Iron and Treating Problem Water



1. **Bypass Valve (optional)**
   Brass-free and lead-free bypass valve lets you manually bypass the system.
2. **Electronic Timer Controls**
   Electronic timer controls regeneration frequency. Full menu-driven options.
3. **Full One-Inch Riser**
   One-inch diameter for increased flow rates, which ensures that household demand is adequately met.
4. **Multi-Wrap Fiberglass Reinforced Media Tank**
   Durable fiberglass-wrapped exterior for strength. Doesn't deteriorate, rust, or corrode.
5. **Self-Cleaning Distributors**
   Distributors exhibit excellent flow rates and are cleaned automatically by counter-current water pressure.
6. **Choose Media for Custom Application**
7. **Washed Quartz Underbedding**
   Washed quartz doesn't impart hardness into softened water and allows for more powerful "piston effect" during counter-current cycles.

Fully Ported One-Inch Valve with Easy-Clamp Ring and Patented Teflon® Disc

24-Volt Transformer – ENERGY STAR® Qualified
Simplifies installation, maintenance and reduces electrical hazards.

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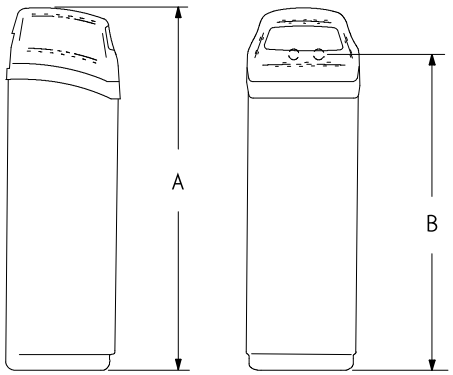
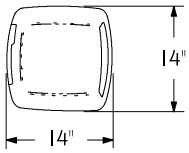
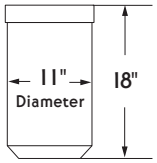
ETF 2100 (PF10 and PF12, IF10)

DIMENSIONS





For ETF 2100-IF-10 Only.



	ETF 2100 IF10 & PF10	ETF 2100 PF12
Nominal Resin Tank Size	10" Dia. x 47"	12" Dia. x 54"
A	57"	62.5"
B	50"	55.75"

SPECIFICATIONS

Multi-purpose Filters (3 media choices)	ETF 2100 - PF10	ETF 2100 - PF12
Sediment Removal Service Water Flow Rate (gpm)	4	4 – 8
Type of Media: Filter Aggregate Contaminant Limits	Based on water analysis	
Acid Neutralizer Service Water Flow Rate (gpm)	8	8
Type of Media: Neutralite Lower pH Limit	6.0	6.0
Taste and Odor Removal Service Water Flow Rate (gpm)	8	8
Type of Media: Activated Carbon Contaminant Limits	Based on water analysis	
Amount Media Recommended (cu. ft.)	1 to 1¼	2
Amount Washed Quartz (lbs.)	17	29
Supply Water Pressure Limits (psi)	20 – 125	20 – 125
Supply Water Temperature Limits (°F)	35 – 120	35 – 120
Mininum Inlet Water Flow (gpm) – Required for Backwash and Fast Rinse on media listed above.*	5	7

*Check with media manufacturer for other media requirements.

Iron Filter	ETF 2100 - IF10
Iron Removal (media)	Birm (Ferrite) or Manganese Treated Green Sand
Iron Removal Limits (ppm)	20
Amount Media Recommended (cu. ft.)	1 to 1¼
Service Water Flow Rate (gpm)	8
Supply Water Pressure Limits (psi)	20 – 125
Supply Water Temperature Limits (°F)	35 – 120
Mininum Inlet Water Flow (gpm) – Required for Backwash and Fast Rinse on media listed above.*	7
Media Regenerate Material	Potassium Permanganate
Amount Used Each Recharge (oz.)	2

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Mississauga, Ontario
Canada L4W 1G7

EcoWater Systems Europe N.V.
Geelseweg 56
2250 Olen
Belgium

Kunshan EcoWater Systems Company, Ltd.
483 San Xiang Road
Kunshan Economic & Technical
Development Zone
Kunshan, Jiangsu Province, PRC 215335

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0602405 (Rev. F) 3/07

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APPENDIX B

MAINTENANCE LOG

Carbon Filter Maintenance Record

Date Installed	*Gallons*	*Initials*

Water Softener Maintenance Record

Date salt was added	*Gallons*	*Initials*

Water Sample Results Record

Date Sampled	*Benzene*	*Gasoline Range Organics (GRO)*