Pump Selection for a Non-Pressurized System

 2.0 feet	2.0	'Add-on' Friction Losses
None inches	None	Flow Meter
 2.00 inches	2.00	Discharge Assembly Size
	40	Transport Pipe Class/Schedule
 2.00 inches	2.00	Transport Line Size
 feet	10.0 feet	Transport Length
 5.5 feet	5.5	Lift to Discharge
	None	Distributing Valve Model
35 gpm	35	Design Flow Rate
		Input Parameters

Total Dynamic Head (TDH), feet

0.2 feet 0.0

feet

Calculations -

Head Loss Through Distributing Valve

Head Loss Through Flow Meter Head Loss Through Discharge Head Loss in Transport Pipe

2.5 0.0 2.0

feet feet feet

'Add-on' Friction Losses

Total Flow Rate TDH

35.0 gpm 10.2 feet

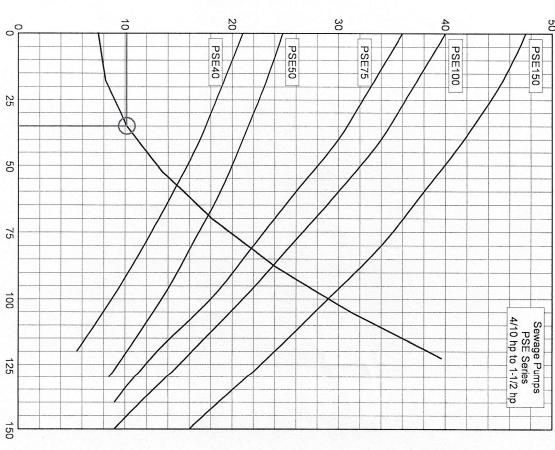
www.orenco.com

(541) 459-2884

FACSIMILE:

(541) 459-4449

TELEPHONE:



Net Discharge, gpm



Orenco Systems* Incorporated

TOLL FREE:

(800) 343-9843

97479

SUTHERLIN, OREGON 814 AIRWAY AVENUE

MODEL AT 1500

UV DISINFECTION SYSTEM

INSTALLATION AND OPERATION MANUAL

The Model AT 1500 UV disinfection system is listed with Underwriters Laboratories (UL) under Standard 979 as a residential treatment device. The installer should provide a power disconnect switch mounted to the exterior of the facility being served to de-energize power to the unit during maintenance. Electrical work must be performed in accordance with the latest edition of the National Electrical Code, as well as all applicable local codes. The Model AT 1500 UV disinfection system conforms to the applicable provisions of the Code of Federal Regulations (CFR) requirements including Title 21, Chapter 1, Subchapter J, Radiological Health. CAUTION: DO NOT LOOK DIRECTLY AT THE UV LAMP OR EXPOSE SKIN DURING OPERATION. PERMANENT EYE DAMAGE AND SKIN BURNS WILL OCCUR FROM UV RADIATION EXPOSURE. UV BLOCKING SAFETY GLASSES MUST BE WORN DURING INSTALLATION, SERVICE OR ANY TIME THE LAMP MAY BE ILLUMINATED. UV BLOCKING SAFETY GLASSES ARE AVAILABLE FROM NORWECO.

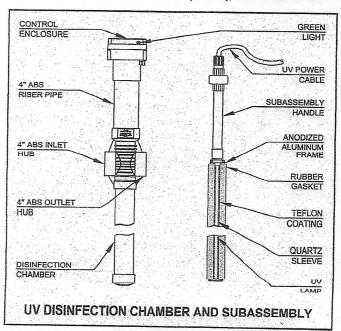
COMPONENTS

The Model AT 1500 UV disinfection system consists of the following components:

- 1) Control enclosure
- 2) 4" ABS riser pipe
- Disinfection chamber with turbulence inducer
- 4) UV lamp (bulb) with male connector
- Power cable with female twist lock connector
- UV subassembly with quartz sleeve and Teflon coating
- 7) Subassembly handle

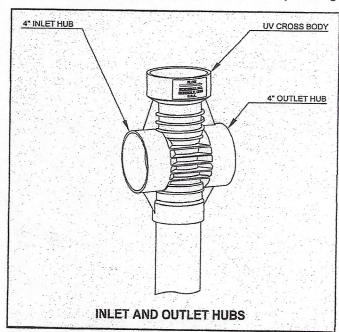
The components should be supplied by the installer:

- 1) Disconnect switch
- 2) Solvent cement
- 3) Hacksaw
- 4) Glycerin (optional)
- 5) Clean, soft cloth
- 6) Isopropyl alcohol
- 7) #14/2 AWG cable
- 8) Conduit and fittings
- 9) Flat head screwdriver
- 10) Phillips head screwdriver



INSTALLATION INSTRUCTIONS

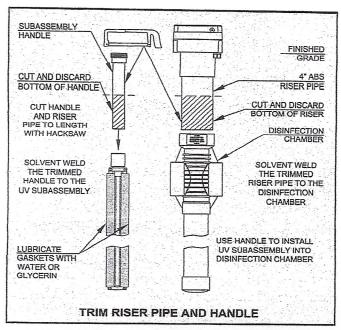
- The excavation for the upstream wastewater treatment system should include an additional 3 feet of length to allow for installation of the Model AT 1500.
- Carefully unpack the Model AT 1500 system. Remove and properly discard all packaging materials from the system components. The UV lamp should remain in the protective shipping sleeve until it is installed.
- Flow direction indicator arrows are molded into the disinfection chamber. When installing the disinfection chamber, be sure to orient the chamber correctly with the flow arrows pointing towards the effluent plumbing.



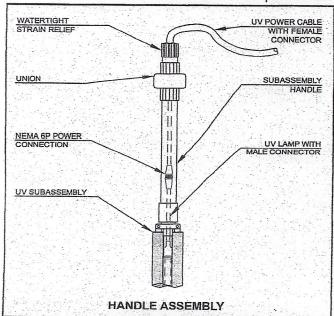
4. Solvent weld the effluent line of the upstream treatment system to the 4" inlet hub of the Model AT 1500. Next, solvent weld the 4" outlet hub to the final effluent line. Cover the open top of the disinfection chamber and backfill up to the bottom of the plumbing.

AT 1500 UV DISINFECTION INSTALLATION AND OPERATION (Cont.)

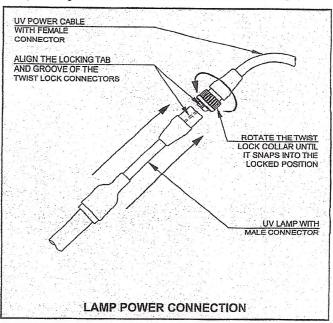
5. The control enclosure should be completely above grade in the finished installation. The riser pipe and subassembly handle are purposely manufactured longer than necessary and must be trimmed. Fit the riser pipe into the top of the disinfection chamber and mark a trim line on the bottom. Mark the subassembly handle on the bottom to trim the same amount.



- Disassemble the union on subassembly handle and set aside the top portion with UV power cable.
- 7. Use a hacksaw to cut along the trim line on both the riser pipe and handle to make them the proper length.
- Solvent weld the riser pipe to the disinfection chamber and solvent weld the handle to the UV subassembly.
- The Model AT 1500 is shipped with the UV power cable connected to the control enclosure. If this power cable



has become disconnected, it must be reconnected at this time. To do so, remove the gasketed cover from the control enclosure. Connect the lead labeled "ONE" on the UV power cable to the terminal block marked "1". Connect the lead labeled "TWO" to the terminal block marked "2". Connect the lead labeled "THREE" to the terminal block marked "3". Connect the yellow/green lead to the terminal marked "Y/G".



- 10. Remove the threaded access plug from the riser pipe.
- 11. Match the alignment tab on the male connector from the UV lamp to the alignment groove in the female twist lock connector on the UV power cable. Push the two connectors together until the male connector is fully seated in the female connector. Rotate the twist lock collar until it snaps into the locked position.
- 12. Insert the UV lamp and power cable into the handle assembly until the base of the lamp is seated in the bottom of the quartz sleeve. Rotate the power cable if the lamp becomes misaligned.
- 13. Lower the union onto the handle assembly, making sure to pull any slack cable through the strain relief connector. Assemble and tighten the union and strain relief to insure a watertight seal.
- 14. Use water or glycerin to lubricate the rubber gaskets located on both sides of the UV subassembly.
- 15. Do not touch the Teflon coating or allow excess glycerin to contact it. Use a clean, soft cloth and isopropyl alcohol to thoroughly clean the coating.
- 16. Fill the disinfection chamber with clean water.

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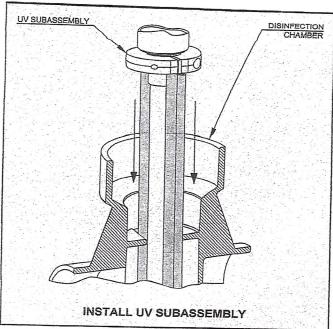
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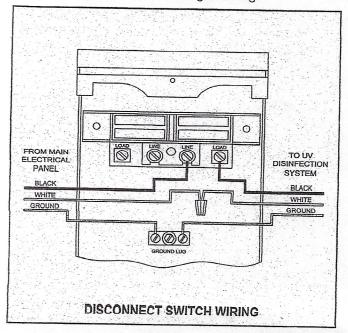
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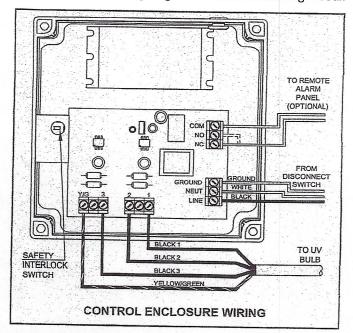
AT 1500 UV DISINFECTION INSTALLATION AND OPERATION (Cont.)



- Align the rubber gaskets with the rectangular opening and lower the UV subassembly into the disinfection chamber.
- 18. Tuck the excess power cable into the riser pipe.
- Use a dedicated 115 volt AC single phase 15 amp circuit in the main electrical panel for the AT 1500. CAUTION: Make sure the breaker is off before proceeding.
- Use a disconnect switch to de-energize power during service. Mount directly to the facility being served.
- 21. Install a #14/2 AWG cable from the dedicated breaker in the main electrical panel to the disconnect switch.
- 22. In the disconnect switch enclosure, connect the hot (black) lead from the main electrical panel to the "LINE" terminal. Connect the black lead from the UV system to the "LOAD" terminal. Wire nut both white leads together. Connect ground leads to the ground lug.



- 23. Remove the control enclosure cover and black electrical insulator. Install a #14/2 AWG cable from the disconnect switch to the control enclosure. Insure the connection to the UV system is made in conduit, solvent welded to the conduit fitting provided. A watertight connection is critical for proper operation and safety.
- 24. Attach the incoming hot (black) lead to the terminal block marked "LINE". Attach the common (white) lead to the terminal block marked "NEUT". Attach the incoming ground lead to the terminal block marked "GROUND".
- 25. If a remote alarm panel is required, the alarm leads should be installed in a separate conduit, solvent welded to the second conduit fitting provided. Connect one alarm lead to either the normally open (NO) terminal or the normally closed (NC) terminal. Choose the correct terminal for the type of signal required by the remote alarm panel. Connect the other lead to the common (COM) terminal.
- 26. Solvent weld a conduit plug into any unused fittings.
- Apply thread sealant to the access plug and install plug in the riser opening. Tighten to insure a watertight seal.



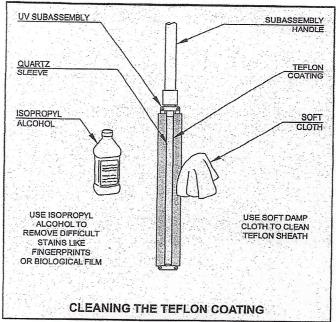
- Reinstall the electrical insulator and four thumb screws. Make sure that the cutout for the safety interlock switch is positioned correctly over the switch.
- 29. Reinstall the control enclosure cover, insuring that the safety interlock post is aligned with the safety interlock switch. Tighten the four screws on the cover to insure a watertight seal. NOTE: If the switch is not aligned with the post, the UV lamp will not operate and the green light on the side of the enclosure will not illuminate.
- Backfill around the disinfection chamber and riser pipe.
 Finished grade should be below the control enclosure to prevent the entry of surface water.
- 31. Turn on power at the disconnect switch and main service panel. Confirm the green light on the enclosure is illuminated indicating proper operation.

AT 1500 UV DISINFECTION INSTALLATION AND OPERATION (Cont.)

MAINTENANCE AND SERVICE

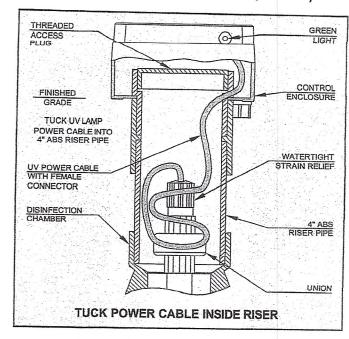
UV protective eyewear must be worn during service or any time the lamp may be illuminated. It is recommended that the subassembly be removed and serviced every six months to insure proper disinfection. To inspect and clean the Teflon coating:

- Turn off power to the UV system at the disconnect switch and/or main service panel. Confirm that the green light on the side of the enclosure is off.
- 2. Remove the control enclosure cover and access plug.
- Carefully remove the UV subassembly from the disinfection chamber
- 4. Inspect the quartz sleeve and Teflon coating for signs of damage or an accumulation of biological film. If the quartz sleeve has been damaged, the UV subassembly must be replaced. If biological film is present on the surface of the Teflon coating, the coating must be cleaned to insure proper disinfection.
- Use a soft damp cloth to carefully and thoroughly clean the Teflon coating.
- Use isopropyl alcohol on a soft cloth to carefully remove difficult stains like fingerprints or biological film.
- Remove all accumulated solids from the disinfection chamber using a vacuum or service pump.



It is recommended that the UV lamp be replaced every two years to insure proper disinfection of the treatment system effluent. The green light on the side of the control enclosure will no longer illuminate when the lamp needs replaced. To replace the lamp:

- 1. Repeat steps 1, 2 and 3 above.
- Disassemble the union on the subassembly handle and remove the UV lamp using the power cable.
- 3. Disconnect the UV lamp from the UV power cord by rotating the twist lock collar 1/4 turn.



- Connect new lamp and carefully lower into the UV subassembly. Make sure the lamp is fully seated in the quartz sleeve.
- 5. Reassemble union and tighten strain relief.
- 6. Lower the subassembly into the disinfection chamber.
- 7. Reinstall the threaded access plug into the riser.
- Reinstall the enclosure cover, insuring that the safety interlock post is aligned with the safety interlock switch.
 Tighten the four screws to insure a watertight seal.
- Turn on power at the disconnect switch or main service panel. Verify that the green light on the side of the control enclosure is illuminated.

NOTE: UV lamps contain mercury which is harmful to the environment. Recycle old UV lamps at an authorized center.

ALARM CIRCUIT

The Model AT 1500 system is equipped with a current sensing circuit to monitor the UV lamp performance. If the UV lamp output drops below an acceptable level for proper disinfection, the alarm circuit will turn off the green light on the enclosure. When connected to the Service Pro control center, the service provider can be immediately notified that maintenance to the UV system is required. For more information regarding connection of the Model AT 1500 UV disinfection system alarm to a Service Pro control center, please refer to the Service Pro Control Center with MCD Technology Installation and Operation Instructions,



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Please use form essentially identical to the following MassDEP template.

- 1. Fill out blanks completely
- 2. Submit to Bourne Health Department to be reviewed and signed
- 3. Record document and any attachments at applicable Registry of Deeds or Land Court Office in the chain of title of the property served by an I/A system
- 4. Submit recorded copy to Bourne Health Department

NOTICE OF ALTERNATIVE SEWAGE DISPOSAL SYSTEM

M.G.L. c. 21A, § 13 and 310 CMR 15.0287(10)

ADDRESS OF PROPERTY SERVED BY ALTERNATIVE SYSTEM:
TITLE REFERENCE FOR PROPERTY SERVED BY ALTERNATIVE SYSTEM [check and complete each that applies]:
☐ Deed recorded with the Barnstable Registry of Deeds in Book 33556, Page 53 ☐ Certificate of Title No. issued by the Land Registration Office of the Registry District ☐ Source of title other than by deed
NAME(S) OF OWNER OF PROPERTY SERVED BY ALTERNATIVE SYSTEM:
OWNER(S) MAILING ADDRESS:
OWNER(S) TELEPHONE NUMBER: E-MAIL ADDRESS:
[If Alternative System Owner(s) is other than Property Owner(s), complete the following:] Alternative System Owner Name:
Alternative System Owner Address:
Alternative System Owner Telephone Number: E-mail Address:

WHEREAS, Section 15.280 of Title 5 of the State Environmental Code ("Approval of Alternative Systems"), provides for the Massachusetts Department of Environmental Protection (the "Department") to approve or certify, as appropriate, all proposals to construct, upgrade or replace on-site sewage disposal systems using alternative systems;

WHEREAS, owners and/or operators of approved or certified alternative systems are subject to general conditions, as specified in Section 15.287 of Title 5 of the State Environmental Code, 310 CMR 15.287, and may be subject to special conditions, as specified in the Department's approvals or certifications; such general and special conditions potentially including, without limitation, requirements relating to the use of trained operators, periodic inspections, maintenance, sampling, reporting and/or recordkeeping;

WHEREAS, the owners and/or operators this alternative system acknowledges and agrees to comply with the provisions of all of the Bourne Board of Health Alternative Septic System Regulations and any other conditions for the existence of the system;

WHEREAS, Section 15.287(10) of Title 5 of the State Environmental Code, 310 CMR 15.287(10), requires that "prior to obtaining a Certificate of Compliance for installation of a new or upgraded system, the system owner shall record in the chain of title for the property served by the alternative system in the Registry of Deeds and/or Land Registration Office, as applicable, a Notice disclosing both the existence of the alternative on-site system and the Department's approval of the system. The system owner shall also provide evidence of such recording to the Bourne Board of Health [;]" and

WHEREAS, the Property is served by an alternative sewage disposal system.

NOW, THEREFORE, Notice of an alternative sewage disposal system is hereby given for the above-referenced Property, as follows:

1. Existence. An alternative system has been installed as a new or upgraded alternative sewage disposal system, on or adjacent to the Property, and serves the Property. The trade name and model number(s) of the alternative system are as follows:

e name of technology: AST Treatment System	
Manufacturer Name: Bio-Microbics, Inc.	
Model number(s): MicroFAST	
A copy of the Department of Environmental Protection's Approval/Certification is available online at Department's website: https://www.mass.gov/guides/title-5-innovative-alternative-technology-approval-letters	the
2. Approval/Certification. On[date], the Department, pursuant to its authority und the section of Title 5 as specified below, approved or certified the technology used in the above reference alternative system, under MassDEP Transmittal Number[Transmittal Number].	er
[Check one of the following, as applicable:] □ Approved for remedial use under 310 CMR 15.284 □ Approved for piloting under 310 CMR 15.285 □ Provisionally approved under 310 CMR 15.286 □ Certified for general use under 310 CMR 15.288	

This Notice of Alternative Sewage Disposal System must be submitted to the Bourne Board of Health
WITNESS the execution hereof under seal this day of, 20, made by the above-
named Alternative System Owner(s).
[Alternative System Owner(s) Signature(s)]
Print Name(s):
COMMONWEALTH OF MASSACHUSETTS
, SS
On this day of, 20, before me, the undersigned notary public, personally appeared
evidence of identification, which were, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that (he) (she) signed it voluntarily for its stated purpose.
(official signature and seal of notary)
[Complete the following Property Owners Consent if Alternative System Owner is other than the Property Owner:]
CONSENTED TO:
[Property Owner(s)]
Print Name(s):
COMMONWEALTH OF MASSACHUSETTS
, SS
On this day of, 20, before me, the undersigned notary public, personally appeared
evidence of identification, which were, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that (he) (she) signed it voluntarily for its stated purpose.
(official signature and seal of notary)

Approved and Accepted By:

Terri A. Guarino, R.S. Health Agent Town of Bourne

Please use form essentially identical to the following MassDEP template.

- 1. Fill out blanks completely
- 2. Submit to Bourne Health Department to be reviewed and signed
- 3. Record document and any attachments at applicable Registry of Deeds or Land Court Office
- 4. Submit recorded copy to Bourne Health Department

GRANT OF TITLE 5 BEDROOM COUNT DEED RESTRICTION

The second could be the restriction
This Grant of Title 5 Bedroom Count Deed Restriction is made as of[Date]by[Grantor's Name]("Grantor"), of[Town/City],[County],[State], pursuant to M.G.L. c. 21A, §13and 310 CMR 15.000 (collectively, "Title 5").
WITNESSETH
WHEREAS, Grantor, being the owner(s) in fee simple of[address], that certain parcel of land located in Bourne, Barnstable County, Massachusetts, [with the buildings and improvements thereon], pursuant to a deed from to Grantor, dated, and recorded with Barnstable County Registry of Deeds in Book, Page [source of title other than by deed] and/or pursuant to Certificate of Title No issued by the Land Registration Office of the County Registry District, said parcel(s) of land being more particularly bounded and described in Exhibit A, attached hereto and made a part hereof, and being shown on a plan entitled, ", dated, prepared by, recorded with Barnstable County Registry of Deeds as Plan No, in Plan Book [[[and/or registered as Land Court Plan No, on file with the Land Registration Office of County Registry District]]]
WHEREAS, Grantor desires to restrict the number of bedrooms, as the term bedroom is defined at 310 CMR 15.002 ("Bedroom") and the Board of Health regulation dated effective April 24, 1992 regarding bedroom definition, through the granting of this Title 5 Bedroom Count Deed Restriction;
NOW, THEREFORE, Grantor does hereby GRANT to the Town of Bourne of Barnstable County, Massachusetts, a municipal corporation located in Barnstable County, having a mailing address of 24 Perry Avenue, Buzzards Bay, Massachusetts, and acting by and through its Board of Health ("Local Approving Authority"), for nominal and nonmonetary consideration, the sufficiency and receipt of which are hereby acknowledged, with QUITCLAIM COVENANTS, a TITLE 5 BEDROOM COUNT DEED RESTRICTION ("Restriction") in, on, upon, through, over and under the Property.
Said Restriction operates to restrict the Property as follows:
1. Restriction. Grantor hereby restricts the total number of Bedrooms in, on, upon, through, over and under he Property to Three Bedrooms , such that at no time shall there exist more than Three Bedrooms in, on, upon, through, over and under said Property.
2. Severability. Grantor hereby agrees that, in the event that a court or other tribunal determines that any provision of this instrument is invalid or unenforceable:
(i) That such provision shall be deemed automatically modified to conform to the requirements for

validity and enforceability as determined by such court or tribunal; or

(ii) That any such provision, by its nature, cannot be so modified, shall be deemed deleted from this instrument as though it had never been included herein.

In either case, the remaining provisions of this instrument shall remain in full force and effect.

- **3.** Enforcement. Grantor expressly acknowledges that a violation of the terms of this Restriction could result in the following:
- (i) upon determination by a court of competent jurisdiction, in the issuance of criminal and civil penalties, and/or equitable remedies, including, but not limited to, injunctive relief, such injunctive relief could include the issuance of an order to modify or remove any improvements constructed upon the Property in violation of the terms of this Restriction; and
- (ii) in the initiation of an enforcement action and/or assessment of penalties by the Bourne Board of Health and/or the Massachusetts Department of Environmental Protection, a duly constituted agency with a principal office located at One Winter Street, Boston, MA 02108 (DEP), to enforce the terms of this Restriction pursuant to Title 5; M.G.L. c.111, §§ 2C, 17, 31, 122, 123, 125, 127A-O, inclusive, and 129; and M.G.L c. 83, §11.
- **4.** Provisions to Run with the Land. The rights, liabilities, agreements and obligations created under this Restriction shall run with the Property and any portion thereof for the term of this Restriction. Grantor hereby covenants for [himself/herself/itself] and [his/her/its] executors, administrators, heirs, successors and assigns, to stand seized and to hold title to the Property and any portion thereof subject to this Restriction.

The rights granted to the Bourne Board of Health, its successors and assigns, do not provide, however, that a violation of this Restriction shall result in a forfeiture or reversion of Grantor's title to the Property.

- 5. Concurrence Presumed. It is agreed that:
- (i) Grantor and all parties claiming by, through, or under Grantor agree to and shall be subject to the Provisions of this Restriction; and
- (ii) Grantor and all parties claiming by, through, or under Grantor, and their respective agents, contractors, sub-contractors and employees, agree that the Restriction herein established shall be adhered to and shall not be violated, and that their respective interests in the Property shall be subject to the provisions herein set forth.
- 6. Incorporation into Deeds, Mortgages, Leases, and Instruments of Transfer. Grantor hereby agrees to incorporate this Restriction, in full or by reference, into all deeds, easements, mortgages, leases, licenses, occupancy agreements or any other instrument of transfer by which an interest and/or a right to use the Property, or any portion thereof, is conveyed.
- 7. Recordation. Grantor shall record and/or register this Restriction with the appropriate Registry of Deeds and/or Land Registration Office within 30 days of receiving the approved Restriction from the Local Approving Authority. Grantor shall file with the Bourne Board of Health and the DEP a certified Registry copy of this Restriction as recorded and/or registered within 30 days of its date of recordation and/or registration.
- 8. Amendment and Release. This Restriction may be amended only upon the approval and acceptance of such amendment by the Local Approving Authority. Release of this Restriction shall be granted by the Local Approving Authority upon (i) Grantor's request of such release; and (ii) the Property being connected to a municipal sewer system and the septic system serving the Property being abandoned in accordance with 310

CMR 15.354. Any such amendment or release shall be recorded and/or registered with the appropriate Registry of Deeds and/or Land Registration Office and a certified Registry copy of said amendment or release shall be filed with the Bourne Board of Health and the DEP within 30 days of its date of recordation and/or registration.

- 9. Term. This Restriction shall run in perpetuity and is intended to conform to M.G.L. c.184, §26, as amended.
- 10. Rights Reserved. This Restriction is granted to the Bourne Board of Health. It is expressly agreed that acceptance of this Restriction by the Bourne Board of Health shall not operate to bar, diminish, or in any way affect any legal or equitable right of the Bourne Board of Health or of DEP to issue any future order with respect to the Property or in any way affect any other claim, action, suit, cause of action, or demand which the Bourne Board of Health or DEP may have with respect thereto. Nor shall acceptance of the Restriction serve to impose any obligations, liabilities, or any other duties upon the Bourne Board of Health.
- 11. Effective Date. This Restriction shall become effective upon its recordation and/or registration with the appropriate Registry of Deeds and/or Land Registration Office.
- 12. No construction permits shall be issued for the Property until a certified Registry copy is submitted to the office of the Bourne Board of Health unless written approval is otherwise granted by the Board of Health.

day of, 20	
, 2016	
[Grantor's Name]	and
[his/her]_ free act and deed before	•
Date	
Date:	
	, 2016, [Grantor's Name][his/her] free act and deed before