DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 377TH AIR BASE WING (AFGSC)

NOV 1 0 2015

Colonel Eric H. Froehlich
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117-5600

Mr. John Kieling, Manager
RCRA Permits Management Program
Hazardous Waste Bureau (HWB)
New Mexico Environment Department (NMED)
2905 Rodeo Park Road
Santa Fe, New Mexico 87505

Dear Mr. Kieling,

Please find attached, "*Groundwater Disposition Letter Work Plan Addendum #2, Bulk Fuels Facility, Kirtland Air Force Base, New Mexico*". This addendum summarizes the variances to the work performed under the Groundwater Disposition Letter Work Plan.

If you have any questions or concerns, please contact Mr. L. Wayne Bitner at (505) 853-3484 or at ludie.bitner@us.af.mil or Ms. Victoria Branson at (505) 846-6362 or at victoria.branson@us.af.mil.

ERIC H. FROEHLICH, Colonel, USAF
Commander

cc:
NMED-EHD (Roberts, McQuillan, Agnew)
NMED-HWB (Cobrain, McDonald)
NMED-GWQB (Huddleson, Pullen, Hunter)
NMED-PSTB (Reuter)
NMED-OGC (Kendall)
SAF-IEE (Lynnes)
U.S.EPA Region 6 (King, Ellinger)
AFCEC-CZRX (Bodour)
USACE-ABQ District Office (Simpler, Phaneuf)
Public Info Repository (Central New Mexico Community College), Administrative Record/Information Repository (AR/IR), and File

40 CFR 270.11
DOCUMENT CERTIFICATION
NOVEMBER 2015

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

ERIC H. FROEHLICH, Colonel, USAF
Commander, 377th Air Base Wing

This document has been approved for public release.

KIRTLAND AIR FORCE BASE
377th Air Base Wing Public Affairs

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November 9, 2015

Subject: Groundwater Disposition Letter Work Plan Addendum #2, Bulk Fuels Facility, Kirtland Air Force Base, New Mexico

This Kirtland Air Force Base (KAFB) Bulk Fuel Facility (BFF) Groundwater Disposition Letter Work Plan Addendum #2 proposes well rehabilitation procedures for well KAFB-7.

KAFB-7 Evaluation Description

Per the Groundwater Disposition Letter Work Plan (U.S. Army Corps of Engineers [USACE], 2015), a pump test was conducted on well KAFB-7, then the removal of all downhole equipment, followed by a video footage collected by a downhole camera. The video footage was provided to NMED on a DVD on October 29, 2015. Based on pump test results and an evaluation of the video footage, a conservative well rehabilitation to remove some of the incrustation in the well prior to installing injection equipment will be implemented. Screen slots below 700 feet are covered with thick incrustation. Varying amounts of slots in the liner are open from 580 to 700 feet indicating this is the interval producing the majority of the groundwater from KAFB-7. The well rehabilitation will be focused on this interval. The following procedures will be implemented:

- A wireline nylon Cotey casing brush, built to fit tightly inside the well, will be used to brush and swab from approximately 580 feet to 700 feet. A steel brush will not be used because it could potentially damage the slotted liner.
- A sand pump run on a wire line will be used to suck up loosened incrustation material. Solid material from the well will be placed in an onsite storage tank and/or drums and sampled for disposal purposes prior to removing from the site.
- A submersible pump will be placed in the well and approximately 4,000 to 5,000 gallons of water (about one and a half well casing volumes) will be removed. The water will be placed in an onsite storage tank prior to transportation and discharge to the BFF temporary treatment system.
- A flocculant that is NSF International certified (NSF-60) for use in drinking water supply wells will be used to ensure that solids settle out and turbidity is minimized prior to video logging of the well. The flocculant proposed is Aquamark AQ 109 and a material safety data sheet is provided as Attachment 1. Absent flocculant, it is likely that small particulates suspended in the water will adversely impact the ability of the camera to image the well screen.
- A downhole camera will be used to provide a video log of the liner after rehabilitation. DVDs of the video footage will be provided to NMED.
- Immediately following the downhole camera work, a V-Smart Injection Valve will be installed in the well with the top of the valve at approximately 550 feet. A description of the valve is provided as Attachment 2.

All equipment will be hot pressure washed (i.e., decontaminated) prior to sending downhole. As already discussed in the Groundwater Disposition Letter Work Plan (USACE, 2015), we may also use a three-arm caliper probe to further evaluate the condition of the well after video logging. This will allow an evaluation of corrosion of the slotted liner by comparing the current inside diameter with the nominal diameter for the liner.

References

USACE. 2015. *Rapid Response Action to Notice of Violation Groundwater Disposition Work Plan, Bulk Fuels Facility, Kirtland Air Force Base, New Mexico.* Prepared by CB&I Federal Services, Inc. for the USACE Omaha District, under Contract No. W9128F-12-D-0003, Task Order 0025. September.

ATTACHMENT 1

AQM

AQUAMARK, INC.
AQ 109
SAFETY DATA SHEET

AQUAMARK, INC,
P.O. Box 773
Chesterland, OH 44026

Emergency Telephone Numbers
(440) 564-1227 Aquamark (weekdays)
(800)424-9300 Chemtrec (24 hrs.)

Supersedes: 12-12-96
MSDS no.: 3935

SECTION 1. IDENTIFICATION

PRODUCT NAME: **AQ 109**
SYNONYMS: None
CHEMICAL FAMILY: WasteWater Treatment

NFPA -	HEALTH HAZARD	1
	FIRE HAZARD	0
	REACTIVITY HAZARARD	0

NFPA Scale Key: 4 = extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Insignificant; NA = Not Applicable, ND = Not Determined

SECTION 2. HAZARD(s) IDENTIFICATION

SINGNAL WORD: WARNING!
NSF Max. Use: 50mg/L

Chemical Name(s)	Cas. No.	% WT	TLV-TWA	PEL	SEC.313	Carcinogen?
None	NA		NA	NA	No	NA

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

Components	CAS NO	Amount

Non Hazardous Components:
1) SALT
2) Anionic Polyacrylamide Solution Polymer.

SECTION 4. FIRST-AID MEASURES

SKIN: Remove contaminated clothing and flush exposed skin with soap and water. If irritation persists or develops get medical attention. Launder contaminated clothing before reuse.
EYES: Immediately flush eyes with large amounts of water for 15 minutes and get medical attention.
INGESTION: If swallowed, DO NOT INDUCE VOMITING. Get medical attention immediately. Never give anything by mouth to and unconscious person.
INHALATION: Move to fresh air. Aid in breathing, if necessary, get medical attention.

ENVIRONMENTAL DATA

SPILL OR LEAK PROCEDURES	Avoid skin contact. Flush with water to sanitary sewer. Product is extremely slippery when spilled.
WASTE DISPOSAL METHOD	Dispose of in accordance with all federal, state and local regulations.
HAZARDOUS WASTE 40CFR261	No.
CONTAINER DISPOSAL	Empty containers may contain residuals. Thoroughly clean, then offer for recycling, reuse or disposal in accordance with all regulations.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION	NIOSH/MSHA approved filter type mask for dusts, fumes and mists as needed to maintain P.E.L.

SECTION 5. FIRE-FIGHTING MEASURES

FLASH POINT: (Test Method)	NA
AUTOIGNITION TEMP:	NA
FLAMMABILITY LIMITS IN AIR (%V)	NA
EXTINGUISHING MEDIA	Not Combustible
SPECIAL FIRE FIGHTING PROCEDURES	NA
UNUSUAL FIRE & EXPLOSION HAZARDS	No Unusual Hazards

SECTION 6. ACCIDENTAL RELEASE MEASURES

STEPS TOP BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: USE ABSORBENT MATERIAL TO COLLECT AND CONTAIN. WASH WITH CLEAR WASTER ONLY.

PERSONAL PROTECTIVE EQUIPMENT.

EYES: USE PROPER PROTECTION: SAFETY CLASSES AS A MINIMUM.
SKIN: WASHING AT MEALTIME AND END OF SHIFT IS ADEQUATE.
INHALATION: NO RESPIRATORY PROTECTION IS NEEDED UNLESS PRODUCT FORMS MIST.

WASTE DISPOSAL METHOD: MUST CONFORM WITH LOCAL STATE AND FEDERAL; REGULATING CONCERNING HEALTH AND POLLUTION.

D.O.T. (49CFR 171.8)/E.P.A. (40CFR 117) SPILL REPORTING INFORMATION:

HAZARDOUS SUBSTANCE:	NONE
REPORTABLE QUANTITY:	NOT APPLICABLE
CONCENTRATION OF HAZARDOUS SUBSTANCE:	NOT APPLICABLE
REPORTABLE QUANTITY OF PRODUCT:	NOT APPLICABLE.

SECTION 7. HANDLING AND STORAGE

THESE PRECAUTIONS ARE FOR ROOM TEMPERATURE HANDLING. USE AT ELEVATED TEMPERATURES OR AEROSOL/SPRAY APPLICATIONS MAY REQUIRE ADDED PRECAUTIONS.

*GOOD PRACTICE REQUIRES THAT GROSS AMOUNT OF ANY CHEMICAL BE REMOVED FROM THE SKIN AS SOON AS PRACTICAL, ESPECIALLY BEFORE EATING OR SMOKING.

PRECAUTIONS TO BE TAKEN IN STORAGE AND HANDLING: USE REASONABLE CARE AND CAUTION. STORE BETWEEN 0 %C AND 49 %C.

COMMENTS: AVOID EYE CONTACT.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

VENTILATION	Local and/or mechanical exhaust to maintain exposure below P.E.L.
PROTECTIVE CLOTHING	Neoprene gloves, apron, boots – as necessary to prevent skin contact.
EYE PROTECTION	Chemical goggles.
OTHER PRECAUTIONS	Safety shower and eyewash fountains should be easily accessible.

SECTION 9. PHYSICAL & CHEMICAL PROPERTIES

BOILING/FREEZING POINT @760 mmHg	212•F (100•C) / No
pH	7.0
VAPOR PRESSURE mm Hg @20• C	ND
VAPOR DESITY (Air =1)	>1
PERCENT VOLATILE BY WEIGHT (%)	<1
SPECIFIC GRAVITY @20•c	1.07

SOLUBILITY IN WATER	Complete
EVAPORATION RATE	(Water=1) <1
MAX USE (NSF Drinking Water):	50mg/L

SECTION 10. STABILITY & REACTIVITY

APPERANCE AND ODOR	Clear Liquid with Characteristic Odor.
PRODUCT STABILITY	Stable
Conditions to Avoid	None Known
CHEMICAL INCOPATIBILITY	None Known
HAZARDOUS DECOPOSTION	None Known
HAZARDOUS POLYMERIZATION	Will Not Occur

SECTION 11. TOXICOLOGICAL INFORMATION

HEALTH HAZARDS
Ingestion: Ingestion may cause irritation of the mucous membranes, esophagus and stomach. May cause nausea, vomiting and diarrhea. Large amounts may cause liver and kidney effects.
Inhalation: Inhalation of mists may cause irritation of the nose, throat and upper respiratory tract.
Eye: May cause moderate to severe irritation with pain and tearing. Corneal damage is possible.
Skin: May cause irritation on prolonged or repeated contact.
Sensitization: This material is not known to cause sensitization.
Carcinogenicity: None of the components is listed as a carcinogen or suspected carcinogen by IARC, NTP or OSHA.
Mutagenicity: None currently known.
Medical Conditions Aggravated by Exposure: Employees with pre-existing eye, skin and respiratory disease may be at risk from exposure.
Acute Toxicity values: No data available.

SECTION 12. ECOLOGICAL INFORMATION

LC50 determinations without added suspended solids overestimate the true toxicity of polymers. Suspended solids and other dissolved organic materials like humic acid are present in natural waters and reduce the effective concentration of the polymer thereby its toxicity.

LC50

Ceriodaphnia dubia 48 hour:	>1.8 g/L
Daphnia magna 48 hour:	>5.0 g/L
Pimephales Promelas 96 hour:	>12.0 g/L

SECTION 13. DISPOSAL CONSIDERATIONS

Dispose in accordance with local, state and federal environmental regulations.

SECTION 14. TRANSPORT INFORMATION

D.O.T. PROPER SHIPPING NAME	NA
D.O.T. HAZARD CLASS	NA
D.O.T. LABELS REQUIRED	NA
UN/NA I.D. NUMBER	NA
PACKAGING GROUP	NA
NON-BULK SHIPPING NAME	Compound, Industrial Process Water Treating
BULK SHIPPING NAME	Same

SECTION 15. REGULATORY INFORMATION

CERCLA: This product is not subject to CERCLA reporting requirements. Many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

SARA Hazard Category (311/312): Acute Health

SECTION 15. REGULATORY INFORMATION (cont.)

SARA 313: This product contains the following chemicals subject to Annual Release Reporting Requirements Under SARA Title III, Section 313 (40 CFR 372): None

EPA TSCA Inventory: All of the ingredients in this product are listed on the EPA TSCA Inventory.

CANADA: This product has been classified under the CPR and this MSDS discloses information elements required by the CPR.

Canadian CEPA: All the components of this product are listed on the Canadian DSL.

Canadian WHMIS Classification: Class D-2_B (Toxic material causing other chronic effects).

SECTION 16. OTHER INFORMATION

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of manufacturer. The data on this sheet relates only to the specific material designated herein. Manufacturer assumes no legal responsibility for use or reliance upon this date.

Revision Date: 5.20.2013

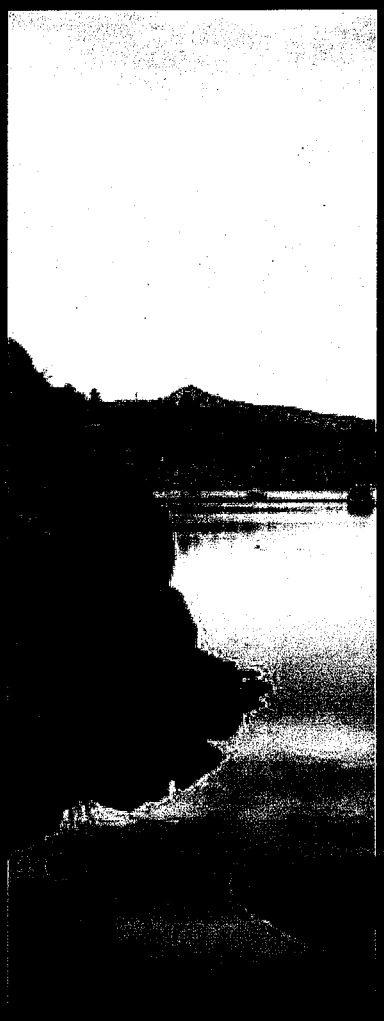
*NEW FORMAT

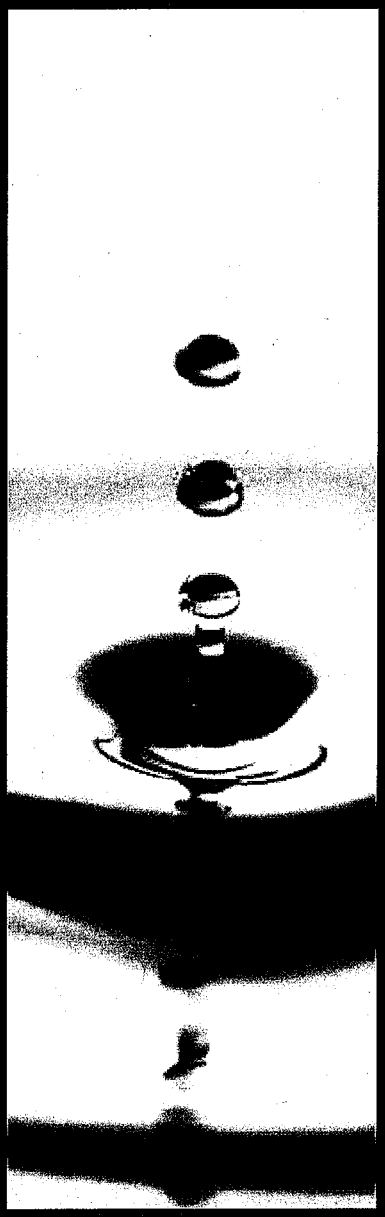
ATTACHMENT 2

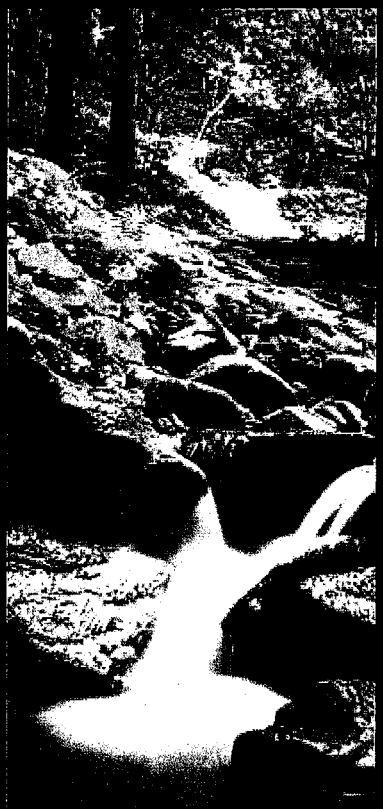
Aquifer Storage & Recovery

ASR RESOURCES

Developing cost effective and environmentally sustainable aquifer storage and recovery systems.







Design ≈ Equipment ≈ Solutions

ASR Overview

Water supplies are limited making water resource management, sustainability and security a challenge in communities of all sizes and locations.

Aquifer Storage & Recovery (ASR) is a technology being implemented around the world as a dependable, cost-effective, and proven method for safely storing and then recovering excess water underground.

ASR is a process by which water is injected into an aquifer through wells or by surface spreading and infiltration. When the water is needed, it is pumped back out of the aquifer which functions as a water bank protecting the water from evaporation, seepage and contamination.

ASR Benefits

Environmentally Friendly

ASR systems help the environment by eliminating the need to construct water treatment facilities, thus preserving the areas' ecosystems. While other types of wells do not replenish water to the aquifer, the water pulled out of an ASR well is water that has been accumulated by the ASR system.

Less Expensive

ASR technology costs less. The reason: ASR uses very little land, or requires large quantities of equipment. Therefore, vast amounts of water can be stored underground more economically than with other storage methods.

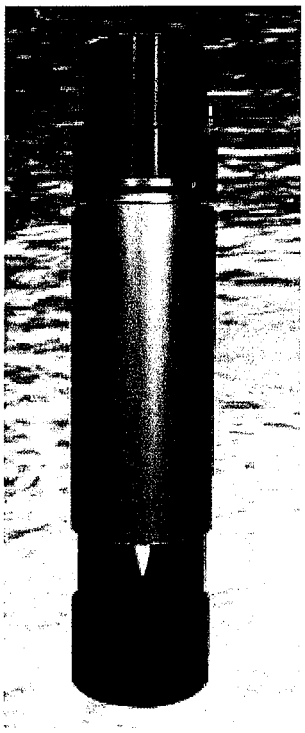
Expands Aquifer Function

Aquifers benefit from ASR in cases in which water levels have been impacted by continuous pumping. ASR will restore and perhaps increase aquifer function enabling fluctuating water demand needs to be met.

Groundwater Remediation

ASR flow control devices have been successful in areas in which existing groundwater supplies have been compromised. The extracted water is treated and the ASR flow control device is capable of balancing the flow in a series of recharge wells to provide a uniform curtain of water.

V-Smart Valve Overview



The V-Smart (Variable Orifice Selective Monitored Artificial Recharge Throttle) Valve is a flow control device for use in wells and pathways to a downhole flow controller for use in recharge, injection and storage recovery wells.

The V-Smart Valve is a hydraulically actuated, near linear flow control device that permits the operator to adjust the flow rate using PLC/ SCADA control system.

Applications

The V-Smart Valve functions quite efficiently in Aquifer Storage and Recovery (ASR) Wells in conjunction with a submersible or vertical turbine pump. The valve may be used with Water Banking Wells, Injection Wells, Salt Water Barrier Wells, Vadose Zone Wells and Groundwater Remediation Wells, or other applications requiring linear flow control. Unique design features provide this valve with cavitation-free operation.

Elimination of Cascading Water

At startup and during recharge, the valve is set in the closed position allowing the drop pipe to fill with water. The air in the pipe is evacuated through an air-vacuum valve at the wellhead ensuring the elimination of cascading water.

Elimination of Air Entrainment

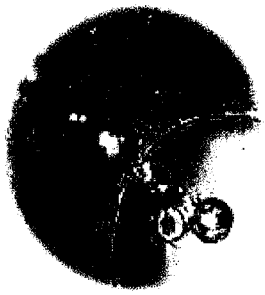
Air entrainment in recharge or injection wells leads to air fouling, increased bio-fouling and calcite formation along with the costs of well rehabilitation. The correct operation of this valve effectively eliminates air entrainment.

Near Linear Flow Control

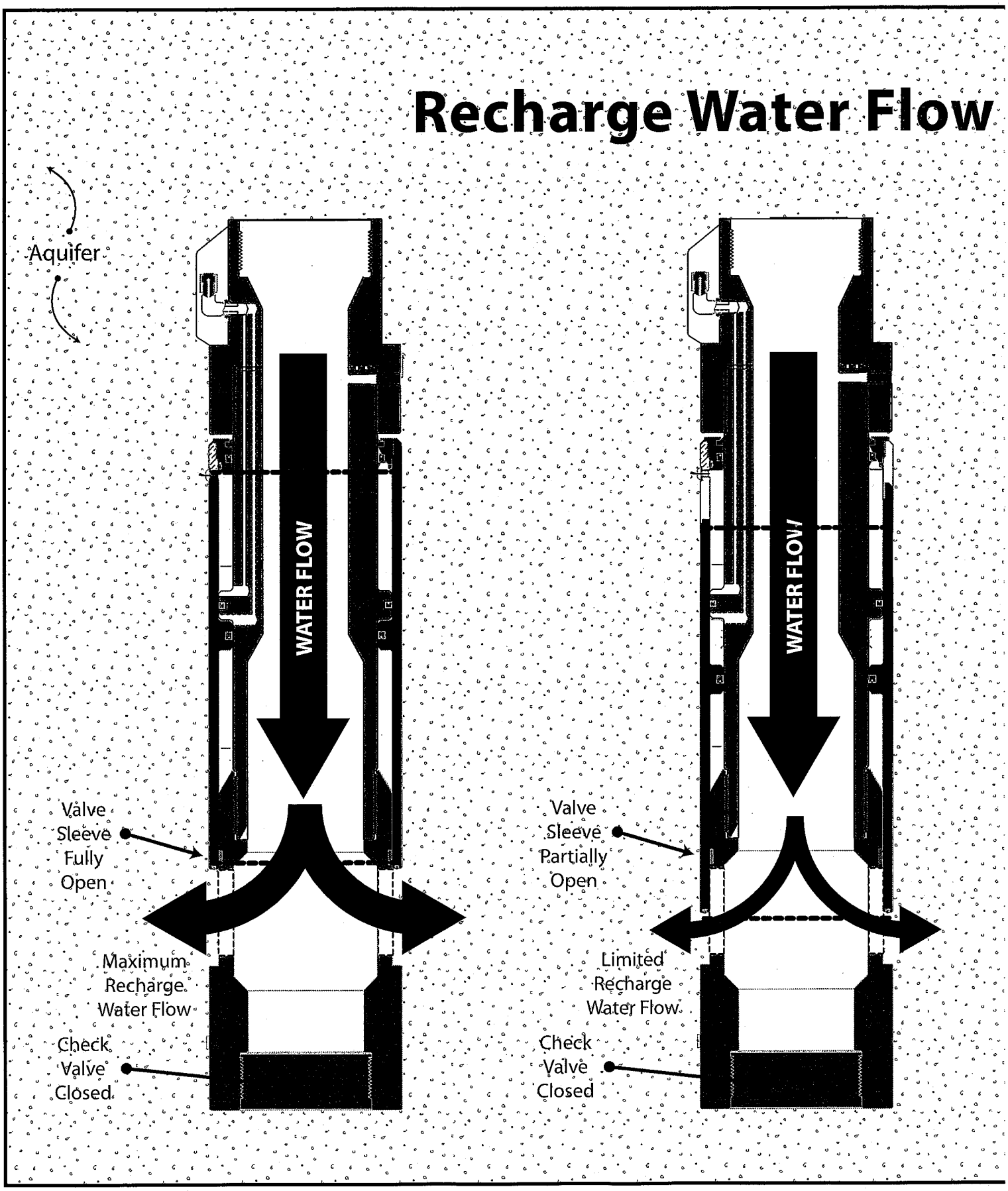
The recharge rate may be set using a manual or electric hydraulic control valve with local and/or SCADA control. Flow may be adjusted using a null loop, a dead band, a magnetic flow meter and the dynamic water level along with a PLC to control the water flow through the D ports for near linear control.

Shock Reduction

The V-Smart Valve is designed to smoothly start a recharge well, adjust the flow linearly, and place the water into the formation gently under laminar conditions.

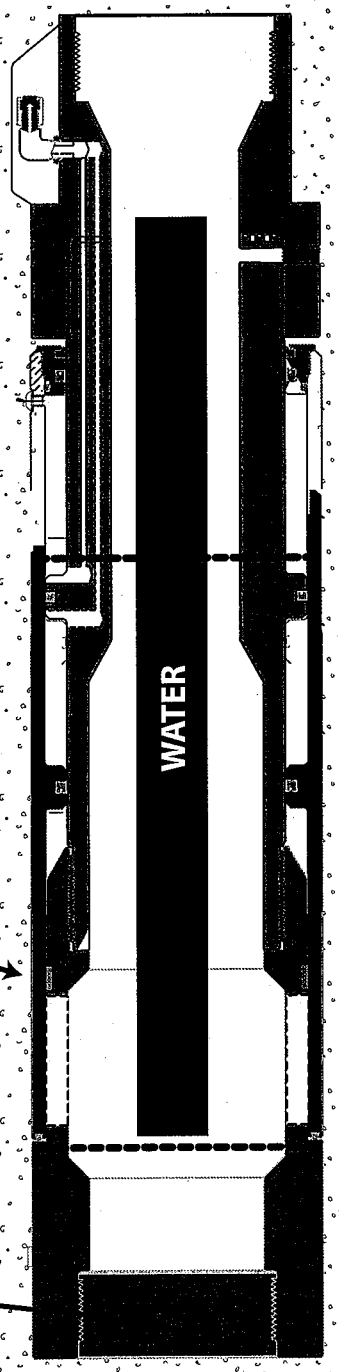


V-Smart Valve

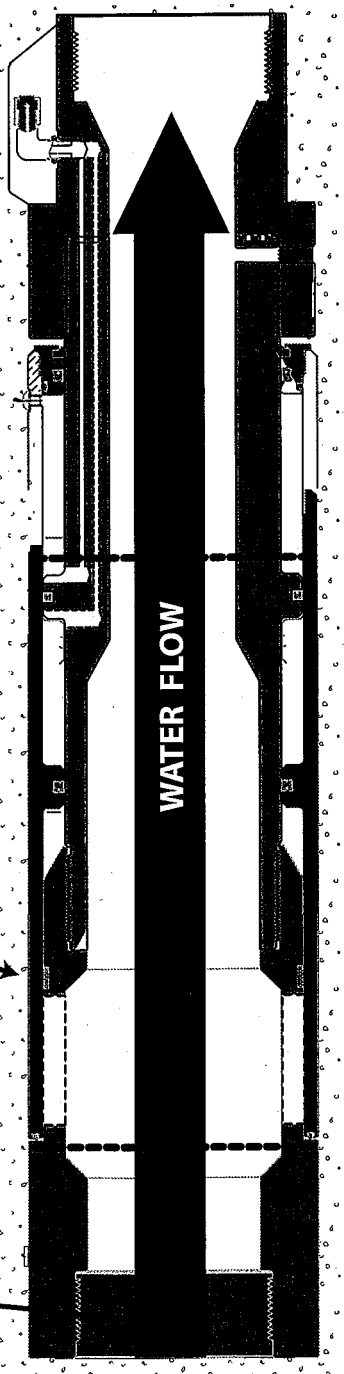


Water Flow Diagrams

Diagrams



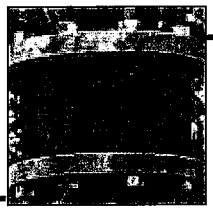
Well Water Flow



V-Smart Valve Process

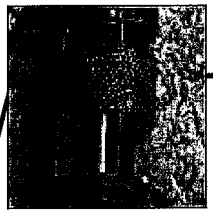
Incremental adjustment allows for precise water flow when well is in recharge mode. Valve remains closed when well is in water recovery mode.

Detail photo shows valve partially open.



A check valve prevents water from entering pump assembly when well is in recharge mode.

Detail photo shows direction of water flow through valve.



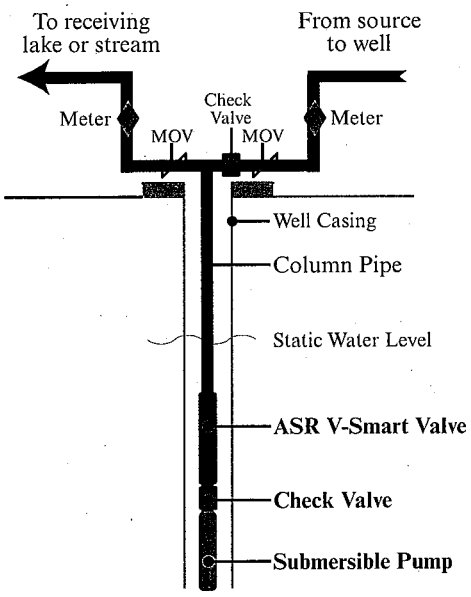
The pump is submersed for groundwater withdrawal and subsequent purging of the well.

Detail photo shows water intake area on pump.

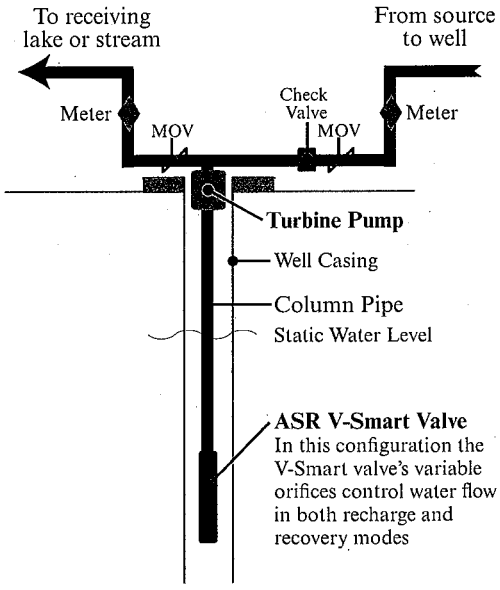
Submersible Pump Motor

Typical V-Smart Valve Placement Options

Submersible Pump Below Valve



Turbine Pump Above Valve



V-Smart Valve Testimonials

The V-Smart Valves have been critical to the success of the Sun Lakes Aquifer Storage & Recovery wells. The valves have provided reliable service since they were installed in 1997. They allow the operators to regulate the flow of water into the wells at the same time they regulate pressure at the surface to prevent air entrainment. The valves are installed together with submersible pumps to allow the wells to be pumped out on a regular scheduled basis to prevent clogging. Each of the three wells has continued to recharge between 0.5 and 1.0 million gallons of water per day since they were installed. The valves have interfaced well with the controlling SCADA system to allow automatic remote operation.

Fred Goldman, Ph.D., P.E.
Kennedy/Jenks Consultants
Phoenix, AZ

The V-Smart Valve is highly reliable and efficient. During the initial installation of the valve, I was amazed by its smooth operation and infinite control. When you see the valve operate, the simplicity of the design is the first thing you notice. The utility has an extensive effluent recharge and groundwater recovery system. Currently we have four valves in service with a fifth valve and well coming on line later this year. In the near future, our utility division will install two additional large recharge systems, and I am proud to say that the V-Smart Valve will be our valve of choice.

Dave Voorhees
Operations Manager
Pima Utilities Company
Chandler, AZ

HydroSystems Inc. specializes in groundwater recharge through wells in the Southwestern United States. We have been involved with the development of the V-Smart valve since its inception. This valve has evolved into a very functional, efficient and effective way to manage recharge flows to wells while minimizing the problems associated with air entrainment. The V-Smart can be fully automated making it a perfect solution for dealing with varying flow rates and back flush cycles.

Gary G. Small, M.S., P.G., C.E.I.
Principal Hydrogeologist
President, HydroSystems Inc.
Phoenix, AZ