



29 Palms Laboratory  
47-250 Harrison Place  
Coachella, CA 92236  
Phone: 760-398-0050  
Fax: 760-398-0028

Title: Redi-Flo Performance Pump Operation  
Number: SP0004  
Release Date: 10-13-00  
Revision Date: 07-19-04  
Version: 2.0

---

**DOCUMENT TYPE:** Standard Operating Procedure

**TITLE:** Redi-Flo Performance Pumps

**PREPARED BY:** Jeff Geraci, Environmental Scientist I \_\_\_\_\_

**REVISED BY:** Kristina Davis, Environmental Scientist III \_\_\_\_\_

**REVIEWED BY:** Jan Kilduff, Environmental Scientist V \_\_\_\_\_

**APPROVED BY:** Marshall K. Cheung, Ph.D., Laboratory Director \_\_\_\_\_

## Table of Contents

1. Scope and Application .....	5
2. Summary of Method.....	5
3. Equipment .....	5
4. Operating Conditions .....	6
5. Reagents .....	6
6. Procedure.....	6
7. Bibliography.....	8



**29 Palms Laboratory**  
**47-250 Harrison Place**  
**Coachella, CA 92236**  
**Phone: 760-398-0050**  
**Fax: 760-398-0028**

**Title: Redi-Flo Performance Pump Operation**  
**Number: SP0004**  
**Release Date: 10-13-00**  
**Revision Date: 07-19-04**  
**Version: 2.0**

---



29 Palms Laboratory  
47-250 Harrison Place  
Coachella, CA 92236  
Phone: 760-398-0050  
Fax: 760-398-0028

Title: Redi-Flo Performance Pump Operation  
Number: SP0004  
Release Date: 10-13-00  
Revision Date: 07-19-04  
Version: 2.0

<b>Document No.:</b>	<b>SP 0004 –001</b>
<b>Copy provided to:</b>	<b>Marshall K. Cheung</b>
<b>Title:</b>	Laboratory Director 29 Palms Laboratory 47-250 Dillon Road Coachella, CA 92236
<b>Copy provided by:</b>	<b>Alison Millar</b>
<b>Title:</b>	Environmental Technician II
<b>Date:</b>	July 28, 2004



**29 Palms Laboratory**  
**47-250 Harrison Place**  
**Coachella, CA 92236**  
**Phone: 760-398-0050**  
**Fax: 760-398-0028**

**Title: Redi-Flo Performance Pump Operation**  
**Number: SP0004**  
**Release Date: 10-13-00**  
**Revision Date: 07-19-04**  
**Version: 2.0**

---



## 1. Scope and Application

- 1.1. This procedure is to be followed when operating the Redi-Flo Variable Performance Pump.

## 2. Summary of Method

- 2.1. Start generator (See SOP #SP007 Generac EXL Generator Operation).
- 2.2. Connect Redi-Flo Variable Frequency Drive (RF-VFD) to pump and generator
- 2.3. Insert pump into water for cleaning in following order.
  - 2.3.1. Distilled water (TDS less than 5 mg/L=acceptable)
  - 2.3.2. Reagent water (TDS less than 2 mg/L=acceptable)
- 2.4. Start pump, RSR switch to Run, at slow rate and slowly increase pump rate.
- 2.5. Collect equipment blank samples
- 2.6. Stop pump by switching RSR switch to stop.
- 2.7. Repeat 2.1- 2.2 at sampling site.
- 2.8. Insert pump into monitoring well for sampling.
- 2.9. Start pump for sampling.
- 2.10. Stop pump
- 2.11. Insert pump into tap water for cleaning before storing.
- 2.12. Start pump
- 2.13. Stop pump

## 3. Equipment

- 3.1. Redi-Flo 2 Variable Performance Pump (RF2)
- 3.2. Motor lead (tubing and spool)
- 3.3. Discharge hose
- 3.4. Redi-Flo Variable Frequency Drive (RF-VFD)
- 3.5. Redi-Flo Pump Logbook
- 3.6. Generac EXL Generator
- 3.7. 55 gallon drum
- 3.8. Two (2) pipette baskets (a little under 5 gallons)
- 3.9. Cleaning rags
- 3.10. Tool box
  - 3.10.1. 2 ten inch wrenches
  - 3.10.2. Stop watch or timer
  - 3.10.3. Scissors
  - 3.10.4. Plumbers/Teflon tape
  - 3.10.5. Plastic bags
    - 3.10.5.1. 1 for garbage,
    - 3.10.5.2. 1 to cover pump after sampling and cleaning.
  - 3.10.6. Plastic-tie to secure bag around pump head after use.
  - 3.10.7. Pinch pliers to remove ring in pump head if necessary while cleaning.
  - 3.10.8. Alternative power source for Volt meter, either batteries or AC adapter
  - 3.10.9. Power surge protector
  - 3.10.10. Volt meter



#### 4. Operating Conditions

- 4.1. The RF2 pump must be installed vertically with the discharge end pointed upwards.
- 4.2. The electrical voltage supply to the RF-VFD must always be between 103 and 126 VAC from 120v outlet (See SOP #SP007 Generac EXL Generator Operation).
- 4.3. The pump and motor must always be completely submerged in fluid to ensure lubrication and cooling of the motor.
- 4.4. Ensure that the pump remains at least 3 feet below the well water level through frequent depth sounding at the beginning of well purge (See SOP #SP006 Static Water Level Determination). Never let the pump run dry!
- 4.5. The pump is not recommended for continuous operation applications.
- 4.6. When the pump is used to purge wells, start the pump at minimum speed and then gradually increase to the desired speed.
- 4.7. Do not stop the pump until the pumped fluid contains no visible particles (to avoid blockage within the pump).

#### 5. Reagents

- 5.1. Tap water (40 gallons)
- 5.2. Distilled water (Bottled) (5 gallons)
- 5.3. Reagent water (deionized/*Nanopure* water) (5 gallons)
- 5.4. 500 mL squirt bottle of reagent water

#### 6. Procedure

- 6.1. Start pump
  - 6.1.1. Start the generator and allow it to warm up (See SOP # SP007 Generac EXL Generator Operation).
  - 6.1.2. Plug the RF-FD into the power surge protector that is plugged into generator.
  - 6.1.3. Select **RF2M** with the mode selection knob.
  - 6.1.4. Connect the motor lead to RF-VFD.
  - 6.1.5. The Frequency Display on the RF-VFD should read 0.0.
    - 6.1.5.1. If not, refer to Troubleshooting, pp 19-20 in manual.
    - 6.1.5.2. Let the RF-VFD stay on for 5 minutes before starting pump
  - 6.1.6. Submerge pump (RF2) must be placed in water source at least 3 feet below water level.
    - 6.1.6.1. If pre-sampling cleaning refer to section 6.3.
    - 6.1.6.2. If purging or sampling then refer to SOP SP 002 version 1.3.
    - 6.1.6.3. If post sampling cleaning refer to section 6.7.
  - 6.1.7. Switch RSR switch to Run.
  - 6.1.8. Turn the speed dial (10-turn potentiometer) slowly at first until the desired performance is attained (200 Hz = 2 gallons/minute for cleaning pump).
  - 6.1.9. Perform procedures
    - 6.1.9.1. If pre-sampling cleaning refer to section 6.3.
    - 6.1.9.2. If purging or sampling then refer to SOP SP 002 version 1.3.
- 6.2. Stop pump
  - 6.2.1. Turn speed dial all the way down until it reaches 25 Hz
  - 6.2.2. Switch RSR switch to Stop



- 6.2.3. Unplug the RF-VFD from the generator BEFORE removing the motor lead from the RF-VFD or turning off the generator.
- 6.2.4. Wipe down RF-VFD and put away.
- 6.3. Pre-sampling pump cleaning
  - 6.3.1. Place pump in clean pipette basket and fill to top with distilled water (about 5 gallons).
  - 6.3.2. Turn pump on according to 6.1 and again pump at 200 Hz (2 gallons/min), allowing the first gallon pumped to exit the basket and then allowing the remaining 4 gallons to re-circulate through pump, hose, and basket for 15 minutes.
    - 6.3.2.1. Take a sample every 5 minutes to test for conductivity and TDS.
      - 6.3.2.1.1. If TDS is less than 5 mg/L then proceed with next step, otherwise repeat 6.3.5. with fresh distilled water ( $< 5\text{mg/l} = \text{acceptable}$ ). Record results in Conductivity Log.
  - 6.3.3. Turn pump off (Section 6.2).
  - 6.3.4. Place pump in clean pipette basket and fill with 5 gallons of deionized water.
  - 6.3.5. Start pump according to section 6.1 and pump rate to 200 Hz or 2 gallons/minute.
  - 6.3.6. Check temperature, conductivity and TDS every 5 minutes for 15 minutes. Record results in Conductivity Log.
    - 6.3.6.1. If after 15 minutes the TDS is not less than 2mg/l then repeat 6.3.8 with new deionized water.
  - 6.3.7. Turn pump off (Section 6.2).
  - 6.3.8. Use remaining distilled and deionized water from steps 6.3.5 and 6.3.8 to rinse hose and hose reel.
  - 6.3.9. Gently clean RF-VFD housing and case with damp rag.
- 6.4. Purging monitoring well and Sampling
  - 6.4.1. Place pump at desired depth
  - 6.4.2. Refer to section 6.1 for starting pump operation
  - 6.4.3. Purge well at "high speed".
  - 6.4.4. Sample monitoring well at "low speed".
  - 6.4.5. Section 6.2 for turning off pump
  - 6.4.6. Cover pump with plastic bag and tie to protect clean pump head.
- 6.5. Post sampling pump cleaning back at office
  - 6.5.1. Set pump in clean 55-gallon drum filled with clean tap water.
  - 6.5.2. Start pump according to section 6.1 and run at an approximate 2 gallons per minute rate (RF-VFD setting of 200 Hz).
  - 6.5.3. Pump tap water to ground or recycle it back into drum for 15 minutes.
    - 6.5.3.1. Take sample every 5 minutes and test for conductivity and TDS, record in Conductivity log (SOP # PP002)
  - 6.5.4. Turn off pump (Section 6.2)
  - 6.5.5. Disassemble pump motor head for cleaning.
    - 6.5.5.1. Use pinch ring pliers to remove ring inside top of casing.
    - 6.5.5.2. Use ten-inch wrench to remove from encasing
    - 6.5.5.3. Use ten-inch wrench to remove tubing from pump.
    - 6.5.5.4. Clean all items with rag and water
  - 6.5.6. Assemble pump to lead to reuse again
    - 6.5.6.1. Wrap screws with Teflon tape before assembling.

