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EST. 1943

ENTERED

Environmental Stewardship Division
Water Quality & Hydrology Group (ENV-WQH)
P.O. Box 1663, Mail Stop K497
Los Alamos, New Mexico 87545
(505) 667-7969/FAX: (505) 665-9344

Date: March 25, 2005
Refer To: ENV-WQH: 05-053

RECEIVED
MAR 2005
NMED Hazardous Waste Bureau

Mr. Christopher F. Vick
Ground Water Pollution Prevention Section
Ground Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive
P.O. Box 26110
Santa Fe, New Mexico 87502-6110

SUBJECT: NOTICE OF INTENT TO DISCHARGE PURGE WATER FROM ALLUVIAL GROUND WATER WELLS AT LANL

Dear Mr. Vick:

This Notice of Intent to Discharge (NOI) for purge water from alluvial ground water wells at Los Alamos National Laboratory (LANL) is being submitted for your agency's review and approval pursuant to Section 1201 of the New Mexico Water Quality Control Commission Regulations. Alluvial ground water wells at LANL are purged before sampling to assure that each sample collected is representative of the water in the aquifer. Purged ground water will be discharged to surface of the land in the vicinity of the well.

This NOI covers the periodic discharge of approximately 100 gallons of ground water produced during the purging of the following five alluvial ground water monitoring wells located in Los Alamos, DP, and Pueblo Canyons: LAO-5, LAUZ-1, LLAO-1b, LLAO-4, and PAO-4. These wells have been previously sampled under the LANL's Environmental Surveillance Program. However, we are unable to locate any documentation showing that an NOI was approved by your agency for these five wells. This NOI is being submitted to ensure that these wells are covered during future sampling.

The enclosed analytical data indicate that ground water produced from these five wells conforms to the numerical ground water standards in NM WQCC Regulation 3103 and do not contain any toxic pollutants as defined in NM WQCC Regulations. It should be noted that Sr-90 and Gross Beta activities in a September 4, 1998, sample from LAUZ-1 (see Table 3.0) exceeded federal drinking water standards, but were less than Department of Energy (DOE) Derived Concentration Guides (DCGs) for Public Dose.

Please call me at (505) 667-7969 if you have any questions regarding this NOI.

Sincerely,

Bob Beers
Water Quality & Hydrology Group

BB/tml

Attachments: a/s

Cy: J. Young, NMED-HWB, Santa Fe, NM, w/att.
M. Leavitt, NMED-SWQB, Santa Fe, NM, w/att.
S. Yanicek, NMED/DOE/OB, Santa Fe, NM, w/att.
M. Johansen, NNSA/LASO, w/att., MS A316
K. Hargis, ENV-DO, w/o att., MS J591
D. Stavert, ENV-DO, w/o att., MS J591
T. George, ENV-DO, w/o att., MS J591
S. Rae, ENV-WQH, w/att., MS K497
D. Rogers, ENV-WQH, w/o att., MS K497
M. Saladen, ENV-WQH, w/o att., MS K497
A. Groffman, ENV-WQH, w/att., MS M992
ENV-WQH File, w/att., MS K497
IM-5, w/att., MS A150

NOTICE OF INTENT TO DISCHARGE

1. **Name and address of facility making the discharge.**
   Los Alamos National Laboratory
   Environmental Stewardship Division (ENV-DO)
   P.O. Box 1663
   Los Alamos, New Mexico 87545

2. **Location of the discharge (In Township, Range and Section, if available).**
   The following five alluvial monitoring wells in Los Alamos, DP, and Pueblo Canyons are included in this Notice of Intent (NOI): LAO-B, LAUZ-1, LLAO-1b, LLAO-4, and PAO-4. The well locations are shown in Map 1.0.

3. **The means of discharge. (To lagoon, Flowing stream, Water course, Arroyo, Septic tank)**
   Ground water produced during well purging will be discharged to the land surface in the vicinity of the well. The discharge will not be permitted to enter a watercourse. When necessary, Best Management Practices (BMPs) will be utilized to minimize erosion.

4. **The estimated concentration of contaminants (if any) in the discharge.**
   The Laboratory's Water Quality Database (WQDB) and Environmental Restoration Project's Database (ERDB) were queried for all analytical detections (query condition: less than symbol (<) is null) for the five wells referenced above. Queries targeted the following analytical suites: general water chemistry (anions/cations), metals, radiologicals, and organics. These results are presented in Tables 1.0-3.0. A discussion on each well is presented below.

   LAO-B. Analytical results from the sampling of LAO-B in 1998 showed that it is compliant with all NM WQCC 3103 Ground Water Standards and does not contain any toxic pollutants as defined in the NM WQCC Regulations. No VOA or SVOA detections were reported.

   LAUZ-1. Analytical results from the sampling of LAUZ-1 in 1998 showed that it is compliant with all NM WQCC 3103 Ground Water Standards and does not contain any toxic pollutants as defined in the NM WQCC Regulations. No VOA or SVOA detections were reported.

   The Gross Beta activity in the 1998 sample (175 pCi/L +/-18) was greater than the SDWA Screening Level of 50 pCi/L, but less than the Department of Energy's Derived Concentration Guide (DCG) for Public Dose of 1,000 pCi/L. The Sr-90 activity in the 1998 sample (43.2 pCi/L +/-8.5) was greater than the SDWA Primary Drinking Water Standard of 8 pCi/L and the DOE DCG for Drinking Water of 40 pCi/L, but less than the DOE DCG for Public Dose of 1,000 pCi/L.

   LLAO-1b (also referred to as LLAO-1). Analytical results from the sampling of LLAO-1b in 2002 showed that it is compliant with all NM WQCC 3103 Ground Water Standards and does not contain any toxic pollutants as defined in the NM WQCC Regulations. No VOA or SVOA detections were reported.

   LLAO-4. Analytical results from the sampling of LLAO-4 in 2000 showed that it is compliant with all NM WQCC 3103 Ground Water Standards and does not contain any toxic pollutants as defined in the NM WQCC Regulations. No VOA or SVOA detections were reported.

   PAO-4. Analytical results from the sampling of PAO-4 in 2002 showed that it is compliant with all NM WQCC 3103 Ground Water Standards and does not contain any toxic pollutants as defined in the NM WQCC Regulations. No VOA or SVOA detections were reported.

NOTICE OF INTENT TO DISCHARGE

5. **The type of operation from which the discharge is derived.**
This discharge is from the purging of ground water from alluvial monitoring wells prior to sample collection. Ground water standing in the well casing is subject to chemical reactions over time that may alter its composition. Purging the well assures that the sample collected is representative of the water in the aquifer.

See Attachment 1.0, *Standard Operation Procedure for Groundwater Sampling Using Bladder Pumps* (RRES-WQH-SOP-048.0) for additional detail on the sampling of alluvial monitoring wells.

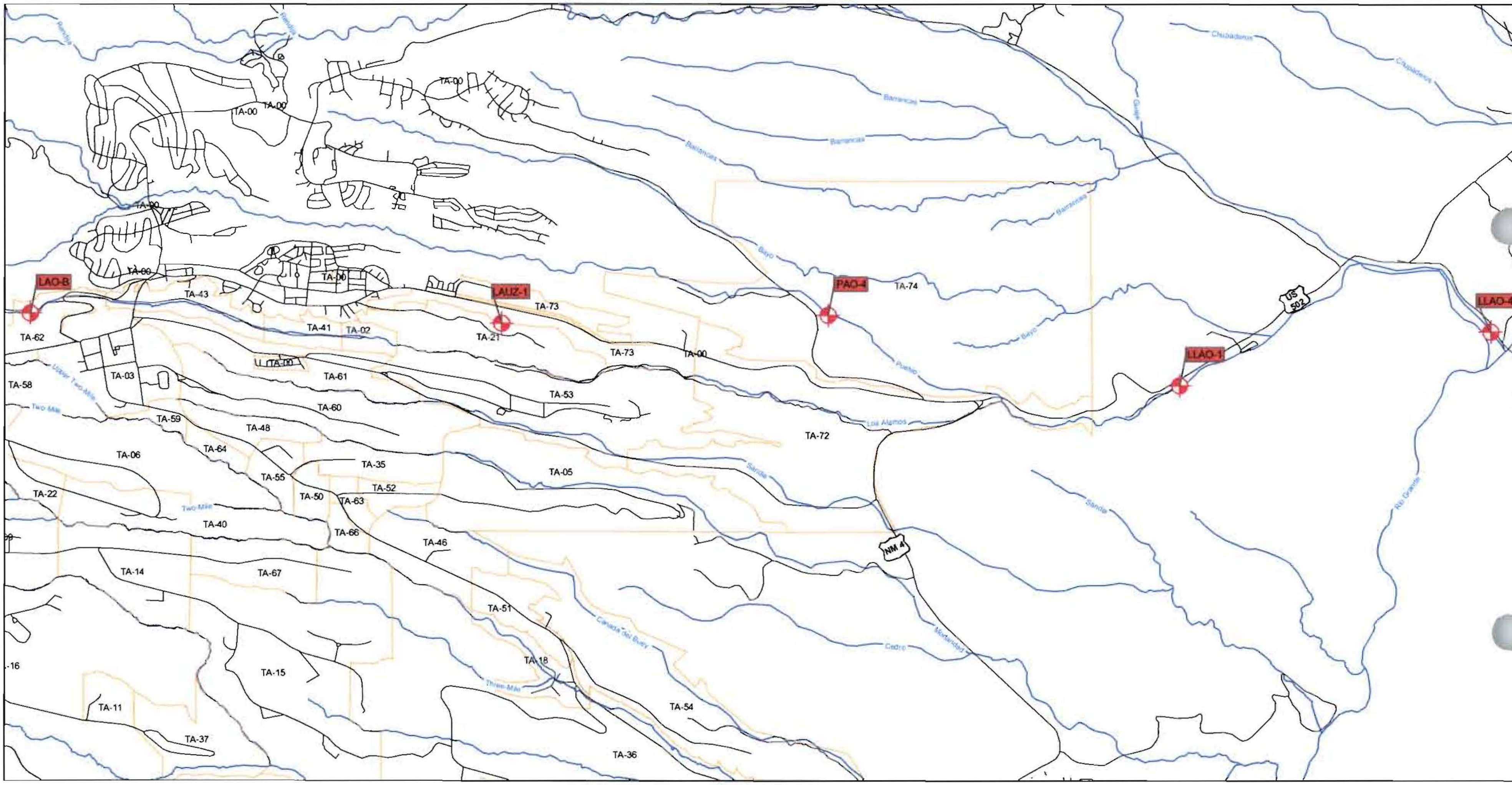
6. **The estimated flow to be discharged per day.**
Table 4.0 presents the estimated purge volume for each well. The total purge volume per sampling event is less than 100 gallons.

7. **The estimated depth to ground water (if available).**
Depths to regional aquifer vary from approximately 950 ft bgs at LAO-B in upper Los Alamos Canyon to less than 50 ft bgs at LLAO-4 in lower Los Alamos Canyon (LLAO-4 is less than 1000 ft from the Rio Grande).

Signed: Steven Rae   Date: March 25, 2005

Steven Rae, Group Leader
Environmental Stewardship Division
Water Quality and Hydrology Group

Map 1.0 Location Map of Alluvial Monitoring Wells PAO-4, LLAO-4, LAUZ-1, LLAO-1b, and LAO-B



Alluvial Wells

Watercourse

Roads

TA Boundaries

1:43,000

N

0 0.25 0.5 1 Miles

Author: McLean
Date: March 22, 2005
05-0026-1

This map was created for work processes associated with a Notice of Intent. All other uses for this map are disclaimed.

Users are solely responsible to confirm data accuracy.

Table 1.0. Database Query, All Detections, General Chemistry Analytes.

Location	Date	Analyte	Result	Units	NMWQCC 3103 Ground Water Standards
LAO-B	01/17/95	Cl(-1)	10	mg/L	250
LAO-B	08/31/98	Cl(-1)	9.8	mg/L	250
LAO-B	08/31/98	F(-1)	0.1	mg/L	1.6
LAO-B	08/31/98	SO4(-2)	3.3	mg/L	600
LAO-B	08/31/98	TDS	141	mg/L	1,000
LAUZ-1	09/04/98	Cl(-1)	17.7	mg/L	250
LAUZ-1	09/04/98	F(-1)	0.91	mg/L	1.6
LAUZ-1	09/04/98	SO4(-2)	4.8	mg/L	600
LAUZ-1	09/04/98	TDS	203	mg/L	1,000
PAO-4	05/23/02	CL(-1)	43	mg/L	250
PAO-4	05/23/02	F(-1)	0.411	mg/L	1.6
PAO-4	05/23/02	SO4(-2)	53.5	mg/L	600
PAO-4	05/23/02	NO3-NO2	1.04	mg/L	10
PAO-4	05/23/02	NH3	21.1	mg/L	NA
LLAO-4	10/06/00	Ba	0.15	mg/L	1,000
LLAO-4	10/06/00	SO4(-2)	21	mg/L	600
LLAO-4	10/06/00	CL(-1)	29	mg/L	250
LLAO-1b	05/29/02	NO3-NO2	6.25	mg/L	10
LLAO-1b	05/29/02	CL(-1)	44.2	mg/L	250
LLAO-1b	05/29/02	F(-1)	0.435	mg/L	1.6
LLAO-1b	05/29/02	SO4(-2)	24.1	mg/L	600

Notes:
All samples were filtered unless noted otherwise.

Table 2.0. Database Query, All Dections, Dissolved Metals (except as noted).

Location	Date	Analyte	Result	Units	NM WQCC 3103 Ground Water Standards
LAO-B	08/31/98	Al	218	ug/L	5,000
LAO-B	08/31/98	B	34.4	ug/L	750
LAO-B	08/31/98	Ba	29.1	ug/L	1,000
LAO-B	08/31/98	Fe	112	ug/L	1,000
LAO-B	08/31/98	Mo	7.3	ug/L	1,000
LAO-B	08/31/98	Hg[1]	0.1	ug/L	2
LAUZ-1	09/04/98	B	55.7	ug/L	750
LAUZ-1	09/04/98	Ba	74.2	ug/L	1,000
LAUZ-1	09/04/98	Fe	72	ug/L	1,000
LAUZ-1	09/04/98	Hg	0.1	ug/L	2
LAUZ-1	09/04/98	Mn	48.8	ug/L	200
PAO-4	05/23/02	As	6.36	ug/L	100
PAO-4	05/23/02	Ba	74.5	ug/L	1,000
PAO-4	05/23/02	Fe	5,850	ug/L	1,000
PAO-4	05/23/02	Mn	2,210	ug/L	200
PAO-4	05/23/02	Mo	2.38	ug/L	1,000
PAO-4	05/23/02	Zn	7.57	ug/L	10,000
LLAO-1b	05/29/02	As	6.18	ug/L	100
LLAO-1b	05/29/02	Ba	130	ug/L	1,000
LLAO-1b	05/29/02	Mo	3.65	ug/L	1,000
LLAO-1b	05/29/02	Va	8.22	ug/L	NA
LLAO-4	10/06/00	**No detections Reported**			

Notes:

All samples were filtered unless noted otherwise.

[1]Result is total mercury (unfiltered sample).

Table 3.0. Database Query, All Detections, Radiologicals.

Location	Date	Analyte	Field Prep	Result	Uncertainty (+/-)	Units	DOE DCG for Public Dose	DOE DCG for Drinking Water	EPA Primary Drinking Water Standard	EPA Drinking Water Screening Level
LAO-B	08/31/98	GROSSA	F	5.23	1.41	pCi/L	30		15	
LAO-B	08/31/98	H-3	F	85	19	pCi/L	2,000,000	80,000	20,000	
LAUZ-1	09/04/98	GROSSA	F	9.15	2.37	pCi/L	30		15	
LAUZ-1	09/04/98	GROSSB	F	175	18	pCi/L	1,000			50
LAUZ-1	09/04/98	Sr-90	F	43.2	8.5	pCi/L	1,000	40	8	
PAO-4	05/23/02	AM-241	UF	0.0355	0.01	pCi/L	30	1.2		
PAO-4	05/23/02	CS-137	UF	5.23	2.3	pCi/L	3,000	120		
PAO-4	05/23/02	PU-239	UF	0.169	0.024	pCi/L	30	1.2		
PAO-4	05/23/02	PU-239	F	0.194	0.021	pCi/L	30	1.2		
PAO-4	05/23/02	U-234	UF	0.128	0.02	pCi/L	500	20		
PAO-4	05/23/02	U-234	F	0.121	0.022	pCi/L	500	20		
PAO-4	05/23/02	U-238	UF	0.067	0.014	pCi/L	600	24		
PAO-4	05/23/02	U-238	F	0.0678	0.016	pCi/L	600	24		
PAO-4	05/23/02	SR-90	UF	0.709	0.12	pCi/L	1,000	40	8	
PAO-4	05/23/02	SR-90	F	0.877	0.15	pCi/L	1,000	40	8	
LLAO-4	10/06/00	SR-90	F	0.19	0.185	pCi/L	1,000	40	8	
LLAO-4	10/06/00	SR-90	UF	0.35	0.2	pCi/L	1,000	400	8	
LLAO-1b	05/29/02	PU-239	F	0.00944	0.0055	pCi/L	30	1.2		
LLAO-1b	05/29/02	U-234	UF	0.428	0.049	pCi/L	500	20		
LLAO-1b	05/29/02	U-234	F	0.448	0.045	pCi/L	500	20		
LLAO-1b	05/29/02	U-238	UF	0.34	0.041	pCi/L	600	24		
LLAO-1b	05/29/02	U-238	F	0.34	0.035	pCi/L	600	24		

Table 4.0. Well Location, Screening, and Purge Volume Information.

Well Name	Location	Zone	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Casing Diameter (in)	Approximate Purge Volume (gal)
LAO-B	Upper Los Alamos	alluvial	11.84	26.84	4	40
LAUZ-1	DP	alluvial	5.35	10.55	4	11
LLAO-1b	Lower Los Alamos	alluvial	11.32	21.32	4	8
LLAO-4	Lower Los Alamos	alluvial	5.24	15.24	4	20
PAO-4	Lower Pueblo	alluvial	1.97	6.97	4	12

GROUNDWATER SAMPLING USING BLADDER PUMPS

Purpose

This RRES Water Quality and Hydrology Group (RRES-WQH) procedure describes the process for collection of groundwater samples using bladder pumps.

Scope

This procedure applies to all RRES-WQH staff, contractors, and students assigned to collect groundwater samples from wells using bladder pumps.

In this procedure

This procedure addresses the following major topics:

Hazard Control Plan

The hazard evaluation associated with this work is documented in RRES-WQH-SOP-002, Attachment 1, and RRES-WQH-SOP-043, Attachment 1. Initial risk = **medium**. Residual risk = **Low.** Work permits required: **none**.

Signatures

First authorization review date is one year from group leader signature below; subsequent authorizations are on file in group office.

Prepared by: Signed by Jeff Waltersheid, 6/28/04 Jeff Walterscheid, RRES-WQH	Date:
Approved by: Signed by Bruce Gallaher for David Rogers, 7/22/04 David Rogers, Environmental Surveillance Team Leader	Date:
Approved by: Signed by Mike Alexander, 6/28/04 Mike Alexander, RRES-WQH Operations Team Leader	Date:
Approved by. Signed by Robert F. Bourque, 6/29/04 F. Bourque, Pressure Safety Officer, HSR-5	Date:
Approved by: Signed by Steve Rae, 7/22/04 Steve Rae, RRES-WQH Safety Committee Chair	Date:
Approved by: Signed by Steve Rae, 7/22/04 Steve Rae, RRES-WQH Group Leader	Date:

General information about this procedure

Attachments This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Equipment and supplies checklist	2
2	Groundwater sampling log	1
3	Well purging worksheet	1
4	Pressure sytem diagram	1

History of revisions This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	6/04	New document

Who requires training to this procedure The following personnel require training before implementing this procedure:

- RRES-WQH staff, contractors, and students assigned to collect groundwater samples from wells using bladder pumps.
- Those who participate and assist in the field collection of groundwater samples from wells using bladder pumps.

Training method The training method for this procedure is **on-the-job** training by a previously trained individual and is documented in accordance with the procedure for training (RRES-WQH-QP-024).

Prerequisites In addition to training to this procedure, the following training is also required prior to performing this procedure:

- RRES-WQH-SOP-002, General Field Work
- RRES-WQH-SOP-043, Pressure System Use for Groundwater Sampling
- RRES-WQH-SOP-020, Custody, Packaging, and Transportation of Samples

General information, continued

Definitions to this procedure

Groundwater: Subsurface water in the saturated zone from which wells and springs are supplied

References

The following documents are referenced in this procedure:

- LANL-RRES-WQH-SOP-002, General Field Work
- RRES-WQH-SOP-043, Pressure System Use for Groundwater Sampling
- RRES-WQH-SOP-020, Custody, Packaging, and Transportation of Samples
- LANL-EM-8-TP-003, RO, *Chain-of-Custody for Environmental Samples*
- USEPA SW-846, *Test Methods for Evaluating Solid Waste*, 3rd edition, U.S. Environmental Protection Agency, November 1986 p11.4.3
- USEPA/530-R-93-001, *RCRA Ground-water Monitoring: Draft Technical Guidance*, November 1992
- LIR 402-1200-01, Pressure, Vacuum, and Cryogenic Systems
- LIR 404-00-02, General Waste Management Requirements
- LIR 404-50-01, Water Pollution Control
- LIR 405-10-01, Packaging and Transport
- New Mexico Environment Department, Hazardous Waste Bureau Position Paper, October 30, 2001, "Use of Low-flow and Other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring", 15 pp.
- Puls, R.W., and M.J. Barcelona, April 1996, "Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures", U.S. Environmental Protection Agency, Office of Research and Development, EPA Groundwater Issue, EPA/504/S-95/504, 12 pp.
- Riebsomer, E., Chemistry Variation during Purging of Alluvial Wells at Los Alamos National Laboratory, Los Alamos National Laboratory Report LA-UR-02-7605, May 2003.
- MONOFLEX, Isomega Bladder Pumps, Instruction Manual
- TIMCO, Isomega Bladder Pumps, Instruction Manual

Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Preparations for sampling

Equipment needed

The equipment needed for a sampling activity is given in Attachment 1, "Equipment and Supplies Checklist."

Purging wells for a representative groundwater sample

Why are wells purged?

Groundwater that remains in the well casing is subject to chemical reactions over time that may alter its composition. This water may not be representative of the water in the aquifer.

Upon exposure to atmospheric pressure and oxygen, the groundwater's oxidation-reduction potential (ORP or Eh) and hydrogen ion activity (pH) may change. The solubility of some chemical constituents may then change, resulting in water chemistry different from that in the aquifer. Reactions of the water with casing material and bacterial activity may also affect its composition.

Low flow purging

The type of pump (or other sampling device such as a bailer) used for sampling and the pumping rate affect turbidity of water in the well casing and may introduce oxygen into the water samples. Pumping at lower rates and with little drawdown produces more representative groundwater samples and may allow sample collection after purging less than three casing volumes (Puls and Barcelona 1996).

Ideally, a well should be purged at a low flow rate and with little drawdown until the dissolved oxygen and turbidity stabilize. Other parameters - water temperature, specific conductance, and pH, are less sensitive indicators of formation water. Three casing volumes is a usual target for purging. Low-flow purging methods may also be used to ensure that the sample is representative of the aquifer being sampled. Such sampling methods shall comply with NMED guidance (NMED 2001) to the extent practicable.

Purging wells for a representative groundwater sample, continued

Low flow purging, con't

The following NMED stabilization and purging guidelines apply to the variation between three parameter values taken five minutes apart (from Riebsomer 2003):

Purging guidelines and stabilization criteria for the field parameters (NMED, 2001)

Purging Characteristic	**Purging Guideline**
Purge rate	< 1 liter per minute
Drawdown*	Not more than 0.3 ft
Field Parameter (measured every five minutes)	**Stabilization Criteria**
Turbidity*	< 5 NTU ± 10%
Dissolved Oxygen	± 10%
pH	± 0.5 pH units
Specific Conductance	± 10%
Temperature	± 10%

* Turbidity < 5 NTU and drawdown of less than 0.3 ft are ideal, but may vary based on site conditions.

Turbidity measurements are often noisy (about ± 0.5 NTU between measurements), and a variation of less than 10% over three readings below 5 NTU is unlikely to be met. Consider that turbidity has stabilized if three readings taken five minutes (or more) apart show a variation of:

- No more than 10% if turbidity is above 10 NTU,
- No more than 1 NTU if between 5 and 10 NTU, or
- No more than 0.5 NTU if turbidity is below 5 NTU.

Purging wells for a representative groundwater sample, continued

Steps to purge a well To purge a well, perform the following steps:

Step	Action
1	Measure and record on the Groundwater Sampling Log (Attachment 2) the depth from the top of casing (MP) to the water table and obtain the total well depth from well construction diagrams. • Measure height of MP above ground surface. • Make sure to adjust well and water depth to the same datum (land surface or MP) to determine water column height. • Fill out Groundwater Sampling Log and casing volume calculation on the Well Purging Worksheet (Attachment 3).
2	Calculate the volume of standing water by multiplying the height of fluid in feet by the factor in the table at the end of this section. Record calculations on the Well Purging Worksheet for this purpose. **Example**: If a casing has a diameter of 4 inches, a total depth of 55 ft., and a depth to water level of 15 ft., then the total casing volume would be: • 55-15 = 40 ft. of water column in well • 40 ft. × 0.65 gallons/ft. = 26 gallons Ideally, 3 casing volumes need to be purged, therefore • 26 × 3 = 78 total gallons need to be purged before collecting a sample.
3	Assess pumping rate. 1. Begin pumping at a slow rate and increase rate if drawdown is small. 2. Never decrease pumping rate after observing that drawdown is too great; the well will not recover and turbidity will not be reduced by decreasing pumping rate. 3. Try not to lower the water level over a large part of the screen or decrease the water column by over 25%. 4. Ideally, pumping rate should be low enough so that drawdown is less than 0.3 ft. This may not be possible for all wells.

Continued on next page.

Purging wells for a representative groundwater sample, continued

Steps to purge a well, con't

Step	Action
4	Calculate discharge rate: • Fill a one-gallon bucket • Record the time required to fill the bucket • Repeat three times and average the gallons pumped per minute OR • Use an in line flow meter.
5	Calculate time required to pump total required volume: purge time (minutes) = casing volume (gallons) ÷ discharge rate (gallons per minute).
6	Periodically monitor water level during pumping (about every 5 minutes for the first half hour and every 10-15 minutes thereafter).
7	Periodically measure and record turbidity, temperature, specific conductance, pH, and dissolved oxygen (if requested) about every 5 minutes for the first half hour and every 10-15 minutes thereafter, as well as during purging.
8	Periodically (about every casing volume) redetermine discharge rate as described in step 4 to see whether it has changed. Reference Well Purging Worksheet (Attachment 3). If purge rate has changed more than about 20%: • Determine quantity of water purged to that point by averaging old and new discharge rates • Redetermine time to pump total required volume • Record all calculations on field sheet or log book present purge volume (gallons) = [previous discharge rate + present discharge rate] (gallons per minute) × ½ × elapsed purge time (minutes). remaining purge time (minutes) = [purge volume – present purge volume] (gallons) ÷ present discharge rate (gallons per minute).

Continued on next page.

Purging wells for a representative groundwater sample, continued

Steps to purge a well, con't

Step	Action
9	The well is ready to sample when: • A minimum of three casing volumes of water have been extracted at a low flow rate, or • After purging one casing volume at a low flow rate, drawdown turbidity (and dissolved oxygen, if measured) have stabilized. Turbidity has stabilized when three readings show a total range of: • No more than 10% if turbidity is above 10 NTU, • No more than 1 NTU if between 5 and 10 NTU, or • No more than 0.5 NTU if turbidity is below 5 NTU.
10	Record on Groundwater Sampling Log (Attachment 2): • Final, stable readings of turbidity • Temperature • Specific conductance • pH • Dissolved oxygen (if requested)
11	Record on Well Purging Worksheet (Attachment 3): • Total volume purged (the number of casing volumes purged)

Disposal of water purged from wells

Prior to sampling, ensure that there is a process for disposing of purge water. An NOI for disposal of purge water is in place for many wells. Verify that this is the case for wells you are sampling.

Calculating water volume in well

To determine casing volumes, use the following factors in the equation in step 2 above:

Well Diameter, inches	Gallons per linear foot	Well Diameter, inches	Gallons per linear foot
1	0.04	6	1.47
2	0.16	8	2.61
3	0.37	10	4.08
4	0.65	12	5.88

Operating pump at well sites

Dedicated bladder pumps at each shallow well

Most shallow alluvial monitoring wells in the RRES-WQH Environmental Surveillance Monitoring Program are equipped with Monoflex Isomega bladder pumps dedicated to each well. The bladder pumps are constructed of Teflon™.

Hazards

Before operating the pressure system for operating the well, review RRES-WQH-SOP-043, *Pressure System Use for Groundwater Sampling*, Attachment 1, for hazards associated with using a pressure system for groundwater monitoring.

System setup

Bladder pumps are used to obtain representative water samples from monitoring wells. During operation, the bladder pump chamber fills with water through a screen inlet and ball valve into the pump chamber collapsing the bladder. The introduction of nitrogen gas into the bladder causes the bladder to expand forcing the water into the sample discharge line. Venting the bladder allows it to collapse permitting the pump to refill. A pressure of 0.45 PSI per foot of depth is required to lift a sample to the surface. A vacuum pump increases the pumping rate and makes it less dependent upon head.

Perform the following steps when preparing the system for use. It is assumed that dedicated pumps have previously been installed.

Step	Action
1	Ensure the nitrogen tank is secured in the vehicle used to conduct the sampling.
2	Install the safety manifold on the nitrogen tank, snug fitting onto tank fill valve with a wrench. Check for leaks. Safety manifold includes: • regulator with two gages, • manual vent valve, • pressure relief valve set to 125 psi (set at 20% over the maximum working pressure) and • "quick connect coupling".

Continued on next page.

Operating pump at well sites, continued

System setup, con't

Step	Action
3	Connect dedicated pressure hose to the quick connect coupling on safety manifold and secure hose with cable whip restraint. Note: Safety manifold, hoses and pump controller, and well assembly have been pre-fabricated. **DO NOT** remove or change coupling, valves, whip restraints, quick connects, or any other components of the pressure system in the field.
4	Connect the other end of the dedicated pressure hose to the quick connect on the Legris shutoff valve.
5	Connect the other end of the Legris shutoff valve to the pump controller and secure hose with cable whip restraint. While making connections, note the direction of flow on the valve.
6	Connect the dedicated coil pressure hose to the pump controller and the other end to the well head assembly.

Pressurizing the system

Perform the following steps to pressurize the system:

Step	Action
1	Ensure that the "T" screw on the pressure regulator is loose, do not unthread all the way out.
2	Tighten the vent valve by hand.
3	Close the pump controller valve.
4	Crack (gently open) the Nitrogen gas cylinder tank valve, listen for leaks, then open all of the way.
5	Adjust the regulator "T" screw to read 100 psi.
6	Leak test all of the fittings, quick connects, and hose connections.
7	Open the Legris shutoff valve.

Operating pump at well sites, continued

Operate the vacuum pump

Perform the following steps to operate the Monoflex IVP Controller:

Step	Action
1	Ensure all tubing and gas cylinder connections are secure and functional.
2	Open the shutoff Legris valve connected to the AIR INLET and note the reading on the SUPPLY PRESSURE GAGE. Note: A minimum of 60 psi is required to operate the controller. The maximum working pressure of the controller is 125 psi and 150 psi for the safety valve.
3	Set the PUMP PRESSURE REGULATOR: • pull up the locking collar on the base of the knob • turn the knob • press the locking collar down to lock once the proper pumping pressure is set
4	Determine proper pump pressure: • multiply the vertical distance to the pump by 0.45 psi (0.03 bar) • add 10 to 20 psi (0.7 – 1.4 bar) to that amount *Example:* Sample to be evacuated at 100 ft (30.5m) 100' x 0.45= 45 psi of lift + 10 PSI= 55 psi total pressure needed.
5	Cycle the pump. (Timers will need adjustment to maximize the pumping rate. Reference Timer Adjustments in this section.) As the pump is cycling and the VACUUM ASSIST SWITCH is in the "ON" position, the PUMP PRESSURE GAUGE will read all the below depending on the step in the sampling process: • the pump pressure manually set, • zero, or • vacuum When the PUMP PRESSURE GAUGE reads "pressure" the pump is pushing the water to the surface. When the gauge reads "vacuum" or zero, the pump chamber is filling with water, or "venting".

Operating pump at well sites, continued

Timer adjustments

Pump pressure timer: Controls the amount of time the pump is allowed to push the water to the surface. Too little time will not allow the pump to empty completely, too much time is unnecessary because the pump has been emptied.

Pump vent timer: Controls the amount of time the pump is allowed to vent, or fill the sample chamber. Too little time will not allow the pump to fill completely, too much time is unnecessary because the pump is full.

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be submitted as records to the Records Coordinator:

- Analytical request forms
- Field forms
- Groundwater sampling log
- Well purging worksheets

All hydrological field data will be stored with the Records Coordinator.

EQUIPMENT AND SUPPLIES CHECKLIST

Equipment for purging wells:

- water level measurement tape
- flow measuring equipment
- nitrogen cylinders
- fluid level measurement record forms
- field log book
- calculator
- thermometer
- specific conductance meter (and extra cup)
- pH meter; electrode and solutions
- standard reference solutions for calibrating specific conductance and pH meters
- Kimwipes
- nitrile gloves
- safety glasses

Equipment and supplies checklist, continued

Equipment for sampling wells:

- Chain-of Custody / Request for Analysis form
- sample containers with preservative, as appropriate
- wide-mouth amber glass bottles with Teflon™-lined caps amber glass vials with Teflon™ septa (precleaned)
- 250 - ml sterile bottle (precleaned)
- wide-mouth polyethelene bottles (precleaned)
- ball-point pen (indelible dark ink)
- felt-tip marker pen (indelible dark ink)
- 1-14 pH indicator paper
- nitrile gloves
- Kimwipes
- safety glasses with side shield
- temperature probe
- deionized water
- Teflon™ tape
- blue ice or equivalent
- insulated coolers
- padding for packaging of samples
- zip lock bags
- sample labels
- custody seals or custody tape
- other equipment specified in EPA Methods, as needed
- filtering equipment

Groundwater Sampling Log

Project:	Site:	Well No:	Date:
Well Depth:	Screen Length:	Well Diameter:	Casing Type:
Sampling Device:		Tubing Type:	Water Level:
Measuring Point:	Other Info:		
Sampling Personnel:			

Time	pH	Temp	Cond	Dis.O_2	Turb.	Water Level	Discharge Rate	Notes

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Well Purging Worksheet

Initial casing volume calculation

Well depth (ft)	
- Depth to water (ft)	
= Height of water (ft)	
× Factor (gal/ft)	
= Casing volume (gal)	
× 3 = Total purge volume (gal)	
÷ Discharge rate (gpm)	
= Purge time (min)	

Intermediate casing volume and remaining purge time calculation

Previous discharge rate (gpm)	
+ Present discharge rate (gpm)	
× Elapsed purge time (minutes)	
× ½ = Present purge volume (gal)	
Total purge volume (gal)	
- Present purge volume (gal)	
÷ Present discharge rate (gpm)	
= Remaining purge time (min)	

Intermediate casing volume and remaining purge time calculation

Previous discharge rate (gpm)	
+ Present discharge rate (gpm)	
× Elapsed purge time (minutes)	
× ½ = Present purge volume (gal)	
Total purge volume (gal)	
- Present purge volume (gal)	
÷ Present discharge rate (gpm)	
= Remaining purge time (min)	

Total purge volume

Total purge volume (gal)	
Total number of casing volumes purged	

Pressure System Diagram