file / superseded

Oregon

John A. Kitzhaber, M.D., Governor

Water Resources Department
Commerce Building
158 12th Street NE
Salem, OR 97301-4172
(503) 378-3739
FAX (503) 378-8130
www.wrd.state.or.us

March 5, 2002

City of Salem, Sofia Hobet
1410 20th St. SE, Bldg #2
Salem, OR 97302-1200

RE: Approval of Request to Renew ASR Limited License #001

Dear Sofia:

On January 8, 2002, the Water Resources Department received your request dated January 3, 2002 to renew the captioned license for five years. The Department obtained assistance from Dennis Nelson of Oregon Public Health Services and Jack Arendt of Oregon Department of Environmental Quality to evaluate your request. The request was also open for public comment between January 22 and February 21.

Here is some background on ASR Limited License #001. The license was issued on March 6, 1997 with a provision for expiration on March 6, 2002. Subsequently, you requested and obtained a minor adjustment to that license. The adjustment became effective on June 16, 1998 and served to delete condition 8 of the original license language, replacing it with the revised text language and tables in your request. The current license, that is subject to renewal, is attached.

After review of your recent request, comments from other agencies and my staff, and the authority of condition (1) in the license, I approve your request. This renewal allows the adjusted limited license to remain in effect until expiration on March 6, 2007.

Sincerely,

Wright Ferrel for

Paul R. Cleary
Director

cc: Dennis Nelson, Oregon Public Health Services
Jack Arndt, DEQ
Joe Glicker, Montgomery Watson

Enclosure

This is a final order in other than contested case. Pursuant to ORS 536.075 and OAR 137-004-080 and OAR 690-01-005 you may either petition the Director for reconsideration of this order or petition for judicial review of this order. As provided in ORS 536.075, this order is subject to judicial review under ORS 183.484. Any petition for judicial review of the order must be filed within the 60 day time period specified by ORS 183.484(2).

Oregon

WATER
RESOURCES
DEPARTMENT

June 17, 1998

Paul Eckley, P.E.
Public Works Dept., Rm 325
City of Salem
555 Liberty St. SE
Salem, OR 97301-3503

RE: Approval of Minor Adjustment to ASR Limited License #001

Dear Paul:

On April 29, 1998, we received your request to modify the captioned license. The specifics of your request are found in the memorandum of February 1, 1998 from Kathryn Mallon of Montgomery Watson to Chris Hutchison. The Department obtained assistance from Dennis Nelson of the Oregon Health Division to evaluate your request. Based on his comments, the Department requested that you revise attachment 1 of your request to include 1,3-dichloropropene. You submitted a revised attachment 1 for consideration on June 9, 1998.

After review of your request, comments from the Oregon Health Division and our staff, and the authority of condition (4)(A)(iii) in the license, I approve your request. This approval removes the language of condition 8 in the original license dated March 6, 1997 and replaces it with the revised text language and tables in your request (copy attached) and incorporated herein.

The modified ASR Limited License #001 consists of this letter, the original license with noted deletions, and your request. I am including Dennis Nelson's comments on your original request for informational purposes.

Sincerely,

Martha O. Pagel
Director

cc: Dennis Nelson, Oregon Health Division
Jack Arndt, DEQ
Joe Glicker, Montgomery Watson
File ASR LL #001

Commerce Building
158 12th Street NE
Salem, OR 97310-0210
(503) 378-3739
FAX (503) 378-8130

File
ASR-1

AQUIFER STORAGE and RECOVERY (ASR) LIMITED LICENSE #1

The Oregon Water Resources Commission issues this limited license for ASR TESTING to:

City of Salem, c/o Paul Eckley
Public Works Dept.
555 Liberty St. SE
Salem, OR 97301

Telephone: (503) 588-6211

The licensee may divert up to 26 CFS from the North Santiam River, a tributary of the Willamette River, using authorization of water right Certificate 12033.

The point of diversion is located in SW 1/4 NE 1/4, Section 13, T9S, R1W, W.M.

The licensee may store up to one billion gallons in a basalt aquifer using 15 injection wells. The licensee may recover for MUNICIPAL USE a combined withdrawal of up to 13,800 gallons per minute of stored water through the same 15 wells. The maximum storage duration is the duration of this limited license.

The ASR wells for injection and recovery are authorized as follows:

Well No.	Capacity (gpm)	Well Location within T8S/R3W WM.
ASR #1	1000	Section 10, NW 1/4 SE 1/4
ASR #2	1800	Section 10, NW 1/4 SE 1/4
ASR #3	2000	Section 9, NW 1/4 SE 1/4
ASR #4	2000	Section 9, NW 1/4 SE 1/4
ASR #5	2000	Section 10, NW 1/4 SE 1/4
ASR #6	2000	Section 10, NW 1/4 SE 1/4
ASR #7	2000	Section 10, NW 1/4 SE 1/4
ASR #8	2000	Section 10, NW 1/4 SE 1/4
ASR #9	2000	Section 9, NW 1/4 NE 1/4
ASR #10	2000	Section 10, NE 1/4 SW 1/4
ASR #11	2000	Section 10, NW 1/4 NW 1/4
ASR #12	2000	Section 10, NW 1/4 NW 1/4
ASR #13	2000	Section 10, SE 1/4 NW 1/4
ASR #14	2000	Section 10, SE 1/4 SW 1/4
ASR #15	2000	Section 10, SE 1/4 SW 1/4

In the event the wells listed above cannot produce the estimated quantities or cannot be built, the licensee may develop wells at the following optional locations to bring about the total authorized production rate:

Opt #1	2000	Section 9, NW 1/4 SE 1/4
Opt #2	2000	Section 9, NE 1/4 SE 1/4
Opt #3	2000	Section 9, SE 1/4 SE 1/4

The duration of this limited license is five years. This time was the requested limited license duration and is authorized notwithstanding the licensee's indication that the remainder of the ASR project could be completed by July 1999. This limited license expires on March 6, 2002.

Except as it conflicts with provisions of this limited license, the licensee is authorized to pursue the project schedule, monitoring, and other features noted in the ASR test plan. Details of that ASR testing plan are provided in Sections 3 and 4 of the application document entitled:

City of Salem
Department of Public Works
Aquifer Storage and Recovery
Draft Implementation Plan.
June 1996

This limited license is issued with the following conditions:

1) License Renewal. The limited license may be renewed if the licensee demonstrates to the Director's satisfaction that further testing is necessary and that the licensee complied with the terms of the limited license.

2) Notice Prior to Injection and Recovery. The licensee shall give notice, in writing, to the watermaster annually not less than 15 days in advance of either initiating any injection under the limited license or recovering stored water. The licensee shall give verbal notice to the watermaster within 2 days of initiating recovery of stored water for emergency demand. The injection notice shall include the limited license number, the location of the injection source water diversion, the quantity of water to be diverted from that source, the time of injection, and the place of injection. The recovery notice shall include the limited license number, the location of the recovery well(s), the time of recovery, and the quantity of water to be recovered.

3) Record of Use. The permittee shall maintain a record of injection and recovery, including the total number of hours of injection and recovery and the total metered quantity injected and recovered. The record of use may be reviewed by Department staff upon request.

4) Modification/Revocation. The Department shall notify the licensee in writing and allow the licensee to respond when considering the following actions:

(A) The Director may modify the ASR limited license for any of the following reasons:

(i) to reflect changes in Oregon Health Division (HD) and Oregon Department of Environmental Quality (DEQ) water quality or treatment standards;

(ii) to address needed technological changes as requested by DEQ or HD to minimize constituents regulated under OAR 333-61-030 (ORS 448.131 and .273) or OAR 340-40 (ORS 468B.165);

(iii) upon written request from the applicant for minor adjustments to the authorization in the limited license.

(For purposes of this license, a well location change to an adjacent 1/4 1/4 section is a minor adjustment.)

(B) The Director may revoke or modify the ASR limited license for any of the following reasons:

(i) to prevent or mitigate injury to other water rights, minimum perennial streamflows or aquifer water quality; or

(ii) to address any other unintended, injurious effects of the ASR activity.

(C) The Department may offer an additional public comment opportunity consistent with the notice and comment provisions of OAR 690-350-020 prior to modifying the limited license.

5) Priority/Protection. This limited license does not receive a priority date and is not protected under ORS 540.045. The diversion of water for this ASR testing under the authority of Certificate 12033 retains the priority date and protection of that water right.

6) Compliance with Other Laws. The injection of acceptable water into the aquifer under this limited license shall comply with all applicable local, state or federal laws.

7) Water Quality Conditions:

(A) The licensee shall minimize, to the extent technically feasible, practical and cost-effective, the concentration of constituents in the injection source water that are not naturally present in the aquifer;

(B) Except as otherwise provided in (C) of this condition, if the injection source water contains constituents regulated under OAR 333-61-030 (ORS 448.131 and .273) or OAR 340-40 (ORS 468B.165) that are detected at greater than 50 percent of the established levels (MCLs or MMLs in the cited rules), the licensee shall employ technically feasible, practical and cost-effective methods to minimize concentrations of such constituents in the injection source water;

(C) Constituents that have a secondary contaminant level or constituents that are associated with disinfection of the water may be injected into the aquifer up to the standards established under OAR 333-61-030 (ORS 448.131 and .273);

(D) The Department may, based upon valid scientific data, further limit certain constituents in the injection source water if the Department finds that those constituents will interfere with or pose a threat to the maintenance of the water resources of the state for present or future beneficial uses;

(E) The licensee shall be in compliance with treatment requirements and performance standards for source waters identified in OAR 333-61-032;

(F) If during the course of ASR testing, a constituent which is regulated under OAR 333-61-030 (ORS 448.131 and .273) or OAR 340-40 (ORS 468B.165) is detected above the 50% level prescribed in condition (7)(B) or the 100% level prescribed in condition (7)(C), the licensee shall stop injection activities and notify the Department;

(G) The licensee shall minimize to the satisfaction of HD the use of water from the infiltration gallery at the North Santiam River as a source of injection water.

8) Water Quality Sampling.

(A) Injection Water. Each year prior to initiating injection, the licensee shall sample and analyze injection water for the constituents regulated under OAR 333-61-030 (ORS 448.131 and .273) or OAR 340-40 (ORS 468B.165) as well as those on Table 3-1 of the ASR testing plan dated June 1996.

(B) New Wells. As each new ASR well is brought on-line, the licensee shall sample receiving aquifer water at the well prior to any storage at the well. In addition to constituents on Table 3-1 of the ASR testing plan dated June 1996, the licensee shall sample for the constituents regulated under OAR 333-61-030 (ORS 448.131 and .273) or OAR 340-40 (ORS 468B.165). 6/16/98

(C) Background for Wells in Service. The licensee shall analyze these wells as described in the plan for constituents on Table 3-2 and the constituents on Table 3-1 of the ASR testing plan dated June 1996. deleted

(D) Withdrawal of Stored Water. The licensee shall analyze water withdrawn from storage for the constituents regulated under OAR 333-61-030 (ORS 448.131 and .273) or OAR 340-40 (ORS 468B.165) and the constituents on Table 3-1. Sampling points shall be in accordance with protocol established between the City of Salem and the HD.

9) Water Level Monitoring.

(A) The licensee shall monitor water levels in wells in a manner described on page 3-10 in the ASR testing plan dated June 1996. Monitoring shall occur at ASR wells, ASR monitoring wells and, to the extent possible, at the Tiedeman, Arlene, and Friendship wells.

(B) The licensee shall measure static water levels, if possible, in the following wells as referenced on Plate 1 of the application's September 1995 report entitled Technical Memorandum on Hydrogeology for Aquifer Storage and Recovery Pilot Project:

Report ID	Well Log ID
2da or 2dc	MARI 11348 or MARI 11349
3ad	MARI 11356
3da(cb)	MARI 11357

4cb	MARI 11360
11ac	MARI 11705/11697
11bd	MARI 11715
16a	MARI 11999
33ad	MARI 8155

10) Streamflow Monitoring. The licensee shall monitor streamflows biweekly in July, August, and September on Croissan, Clark, and Pringle Creeks. This monitoring shall seek to detect base flow which may be the result of leakage of stored water. Conditions may preclude some monitoring events since certain flows may be strongly influenced by recent rains.

11) Recovery. The availability of stored water for recovery is based on the following factors:

(A) Available stored water is determined on a well-field/aquifer basis. The licensee may recover up to 95% of the quantity injected under this limited license during the year that the water was injected. After that year, the availability of stored water shall be further diminished each year such that the licensee may only recover up to 95% of any year-to-year storage carryover. (Data collected by the licensee may be useful in consideration of modifications to this recovery provision under the limited license.)

(B) Any water withdrawn from an ASR well identified in this limited license shall first be debited against the quantity available in the aquifer by virtue of ASR storage. When the ASR storage is depleted in the aquifer, any water withdrawn from an ASR well shall be considered a draft of natural ground water.

(C) The licensee may not recover any stored water when static water levels at ASR wells become lower than the pre-injection baseline annual low static water level elevation. It is currently assumed that this elevation is 189 feet msl. However, the Department will approve a different value for the pre-injection baseline annual low static water level elevation if the licensee provides data and analysis during the license period which supports a different value than the currently assumed value.

(D) The availability of stored water is a running account which is subject to determination at any time.

12) Reporting. Except as otherwise noted, the licensee shall provide the Department a written report of the results of ASR testing for each year by February 15th of the following year. The first report shall be due in 1998 and include results from 1997. The report shall detail the several kinds of data collected during the year (including the water quality results in condition 8), analyze those data to show the ASR project impacts on the aquifer, indicate the testing/development progress made under the terms of the limited license, and account for the injection of stored water, withdrawals of stored and natural water, and the new-year carryover storage at each well.

13) Protection for Existing Users. In the event of conflicts with existing appropriators, the licensee shall conduct all testing so as to mitigate the injurious effects. In addition, the licensee shall cooperate with the efforts of the Department to protect existing water rights and the water quality of existing users that rely upon the receiving aquifer and the injection source water;

14) Use of Recovered Water. The licensee shall use any recovered water for municipal purposes as described in water right certificate 12033;

15) Periodic Meetings. The licensee shall alert the Ground Water/Hydrology Section of the Department of the meetings of the city's technical advisory committee of the ASR project in order that Department staff may attend and track the periodic progress of the testing project.

16) Additional Conditions on an Informal Basis. The Department may suggest additional conditions to the licensee. Provided that those conditions are agreed to and undertaken by the licensee, the Department may forego formal changes to this license. This informal process does not extend to condition reductions. These additional conditions may be part of any license renewal or permit.

17) Publicity. The licensee shall maintain a public information program about the ASR project which may include press releases, neighborhood meetings, brochures, or other activities. This program shall include information on potential project impacts and how to report possible impacts to the city.

18) Other Measures. The licensee shall take any additional measures appropriate to address the ASR-related issues of landslide activation, streamflow enhancements, aquifer boundary determination, aquifer storage efficiency, and water quality protection so that these issues can be addressed during review of the ASR permit application.

19) Carryover Storage. At the end of testing under this limited license, the licensee shall provide an accounting to the Department of the residual stored water based on the methods of determination given in this license. The Department shall consider this residual for carryover to a permanent ASR permit based on information which discloses the aquifer's ability to retain stored water.

This license is issued with proper conditions upon finding that:

i) The proposed ASR testing will not impair or be detrimental to the public interest;

ii) The proposed ASR testing will produce information that will adequately describe the water quality and quantity response in the aquifer and at nearby wells and springs due to ASR activities; and

iii) The proposed use will not expand and use under an existing water right.

This license shall be in effect beginning March 6, 1997, and shall expire March 6, 2002.

WITNESS my hand this 6 day of March, 1997.

Martha O. Pagel, Director
Water Resources Department

CITY OF Salem
AT YOUR SERVICE

April 22, 1998

Donn Miller
Oregon Water Resources Department
Commerce Building
158 12th Street NE
Salem OR 97310-0210

SUBJECT: **MINOR ADJUSTMENT TO ASR LIMITED LICENSE #01**

Dear Donn:

The City of Salem's Aquifer Storage and Recovery (ASR) Limited License #01 has a provision for modifying the license "upon written request from the applicant for minor adjustments to the authorization in the limited license." This letter is requesting such a minor adjustment for water quality monitoring for the ASR system. We have discussed these changes over the last few months with you and Dennis Nelson of the Oregon Health Division.

The enclosed memo from Montgomery Watson spells out the proposed changes in both tabular and text format. We believe the proposed changes fall under the "minor adjustment" clause of the limited license.

Once you have had a chance to review this request, we would be happy to meet with Dennis and you to discuss the proposed adjustment, if you feel the meeting is necessary. We would like the adjustment to be in effect by June 1, 1998.

Sincerely,

Paul E. Eckley
Chief Utilities Engineer

PLE:DS\P:\PERSONAL\PWHALF\COR98\LICENS-1.422
Enclosure: Revised Monitoring Plan, February 1, 1998
cc: Joe Glicker, Montgomery Watson Engineering
Frank Mauldin, Public Works Director
Floyd Collins, Assistant Public Works Director
Chris Hutchison, P.E., Project Engineer
Jim West, Water Superintendent

ADA Accommodations Will Be Provided Upon Request

MEMORANDUM

MONTGOMERY WATSON

To:	Chris Hutchison	**Date:**	February 1, 1998
From:	Kathryn Mallon	**Reference:**	1065014.023502
Subject:	Revised Monitoring Plan		

The following is the proposed text revision to the monitoring requirements of the existing Limited License. The revised text identifies the required sampling frequency for each well and identifies a revised list of monitoring analytes (Tables 3-1A and Tables 3-2A) based on a review of OAR codes and correspondence with the Oregon Health Division.

- Attachment 1 to this document contains the constituents in Tables 3-1A and 3-2A. The attachment demonstrates the derivation of all analytes included in both Tables 3-1A and 3-2A based on analytes included in OAR codes for drinking water, groundwater and aquifer storage and recovery. Analytes which are regulated under the OAR codes for drinking water but are not included in Tables 3-1A and Tables 3-2A include asbestos, dioxin strontium-90 and tritium. The City wishes to seek monitoring waivers for these three compounds due to a lack of vulnerability and the high cost of analysis; particularly since multiple wells are being sampled on multiple occasions.
- Attachment 2 is excerpted from the Limited License and shows the current monitoring requirements.
- Attachment 3 is excerpted from OAR 690-350-0010 identifying monitoring requirements for Aquifer Storage and Recovery facilities.
- Attachment 4 is a copy of a letter from Dennis Nelson of the Oregon Health Division, Drinking Water Program which clarifies monitoring requirements for the ASR project.

Revised Text to Limited License (Water Quality Sampling Section):

Added 6/16/98

Injection Water. Each year, prior to initiating injection in any well or group of wells, the licensee shall analyze a single injection water sample for the constituents included in Table 3-1A. No more than one sample of injection water will be analyzed during a calendar year.

New Wells. As each new ASR well is brought on-line, the licensee shall sample the receiving aquifer water at the well prior to any storage at the well. The sample shall be analyzed for the compounds listed in Table 3-1A. For each new well, a single sample will be collected immediately after well construction and preferably at the time of pump testing.

Background for Wells Prior to Injection. Approximately one month prior to injection to a well, the licensee shall analyze a single sample from the well for the constituents included in Table 3-1A. [Note: The one month time period is needed in order to obtain laboratory results prior to initiating injection.] In the case of a new well which has not received injection water yet, this sample is required in addition to the sample described above for New Wells. Sampling will be conducted prior to the first scheduled withdrawal of the calendar year and no more than a single background sample prior to injection will be collected from a single well in the calendar year.

Added 6/16/98

Background for Wells Prior to Withdrawal. Approximately one month prior to withdrawal from a well, the licensee shall analyze a single sample from the well for the constituents included in Table 3-1A. [Note: The one month time period is needed in order to obtain laboratory results prior to initiating withdrawal.]

Withdrawal of Stored Water. The licensee shall analyze water withdrawn from storage for the constituents included in Table 3-1A. The sample will be collected during the initial 48 hours of withdrawal from the well which is placed in service for withdrawal.

Background for Wells in Service. The licensee shall analyze wells which are operational but which are not being used for injection or withdrawal, annually for general physical parameters and inorganic constituents as identified in Table 3-2A. The objective of the sampling is to evaluate spatial and temporal variances in water quality in ASR wells which are not otherwise being sampled.

cc: Garry Wohlgemuth
Joe Glicker
Kathy Willis

ATTACHMENT 1

TACHMENT 1 (Revised 6/9/98)
LEM ASR WELL SAMPLING PROGRAM
alytical Compound Method and Source List

Parameter	EPA Method	OAR 333-061-0030 SDWA	OAR 690-340-040 Groundwater	OAR 690-350-0010 ASR[1]	Table 3-2A Revised Final February-98	Table 3-1 Draft Plan June-96	Table 3-1A Revised Final February-98
nventional Parameters							
onductivity	120.1				X	X	X
H	150.1	S	X	GWQ	X	X	X
emperature				GWQ	X	X	X
otal Dissolved Solids	160.1	S	X	GWQ & R	X	X	X
urbidity	180.1	P	X	R	X	X	X
issolved Oxygen					X	X	X
xygen Reduction Potential				GWQ	X	X	X
hloride	300	S	X	GWQ & R	X	X	X
litrate	300	P	X	R		X	X
litrite	300	P		R		X	X
otal nitrate and nitrite	300	P		R		X	X
ulfate	300	S	X	GWQ & R	X	X	X
luoride (free)	340.2	P	X	R		X	X
otal Alkalinity	403			GWQ	X	X	X
arbonate Alkalinity	403			GWQ	X	X	X
ydroxide Alkalinity	403			GWQ	X	X	X
icarbonate Alkalinity	403			GWQ	X	X	X
arbon Dioxide	SM 406-B			GWQ	X	X	X
otal Phosphate	424-BE					X	X
xide	345.1					X	Delete
olor		S	X	R			Add
orrosivity		S		R			X[4]
dor		S	X	R			As needed
oaming agents (MBAS)		S	X	R			Add
crobiological							
tandard Plate Count	SM 907-A				X	X	X
otal Coliform	MMO-MUG	P	X	R	X	X	X
ecal Coliform	MMO-MUG	P	X	R	X	X	X
tals and Ions							
luminum		S		R			Add
ntimony	200.8	P		R		X	X
rsenic	200.8	P	X	R		X	X
sbestos	100.2	P		R		X	Waiver
arium	200.8	P	X	R		X	X
eryllium	200.8	P		R		X	X
admium	200.8	P	X	R		X	X
alcium	CFR 200.7	S		GWQ & R	X	X	X
hromium	200.8	P	X	R		X	X
opper	200.8	P	X	R		X	X
yanide		P		R		X	X
on	CFR 200.7	S	X	GWQ & R	X	X	X
ead	200.8	P	X	R		X	X
lagnesium	CFR 200.7	S		GWQ & R	X	X	X
langanese	200.8	S	X	GWQ & R	X	X	X

TACHMENT 1 (Revised 6/9/98)
LEM ASR WELL SAMPLING PROGRAM
alytical Compound Method and Source List

Parameter	EPA Method	OAR 333-061-0030 SDWA	OAR 690-340-040 Groundwater	OAR 690-350-0010 ASR[1]	Table 3-2A Revised Final February-98	Table 3-1 Draft Plan June-96	Table 3-1A Revised Final February-98
fercury	245.1	P	X	R		X	X
lickel	200.8	P		R		X	X
otassium	CFR 200.7			GWQ	X	X	X
elenium	200.8	P	X	R		X	X
ilica (SiO2)	CFR 200.7			GWQ	X	X	X
ilver	272.2	S	X	R		X	X
odium	CFR 200.7			GWQ	X	X	X
hallium	200.8	P		R			Add
inc	CFR 200.7	S	X	R		X	X
otal Hardness	SM 314-A	S		GWQ & R	X	X	X
dionuclides							
ross Alpha	9310	P	X	R		X	X
ross Beta	9310	P	X	R		X	X
adon (Rn-222)	913					X	X
adium 226		P		R			2
adium 228		P		R			2
odine-131		P	X	R			3
trontium-90		P	X	R			Waiver
ritium		P	X	R			Waiver
Jranium							
infection By-Products							
otal Haloacetic Acids	SM 6251.B						Add
otal Trihalomethanes	524.2	P	X	R		X	X
tractable Organics							
BCP	504	P		R		X	X
DB (Ethylene dibromide)	504	P		R		X	X
lachlor	508	P		R		X	X
ldrin	508	U		R		X	X
roclor 1242	508	P		R		X	X
roclor 1248	508	P		R		X	X
roclor 1254	508	P		R		X	X
roclor 1260	508	P		R		X	X
hlordane	508	P		R		X	X
ieldrin	508	U		R		X	X
ndrin	508	P	X	R		X	X
leptachlor	508	P		R		X	X
leptachlor epoxide	508	P		R		X	X
lexachlorobenzene	508	P		R		X	X
indane (gamma-BHC)	508	P	X	R		X	X
lethoxychlor	508	P	X	R		X	X
olychlorinated Biphenyls	508	P		R		X	X
ropachlor	508	U		R			Add
oxaphene	508	P	X	R		X	X
,4,5-TP (Silvex)	515.1	P	X	R		X	X
,4-D	515.1	P	X	R		X	X
alapon	515.1	P		R		X	X

TACHMENT 1 (Revised 6/9/98)
LEM ASR WELL SAMPLING PROGRAM
lytical Compound Method and Source List

Parameter	EPA Method	OAR 333-061-0030 SDWA	OAR 690-340-040 Groundwater	OAR 690-350-0010 ASR[1]	Table 3-2A Revised Final February-98	Table 3-1 Draft Plan June-96	Table 3-1A Revised Final February-98
camba	515.1	U		R			Add
noseb	515.1	P		R		X	X
ntachlorophenol	515.1	P		R		X	X
cloram	515.1	P		R		X	X
l,1,2-Tetrachloroethane	524.2	U		R		X	X
l,1-Trichloroethane	524.2	P	X	R		X	X
l,2,2-Tetrachloroethane	524.2	U		R		X	X
l,2-Trichloroethane	524.2	P		R		X	X
l-Dichloroethane	524.2	U		R		X	X
l-Dichloroethene	524.2	P	X	R		X	X
l-Dichloropropene	524.2	U		R		X	X
2,3-Trichlorobenzene	524.2					X	Delete
2,3-Trichloropropane	524.2	U		R		X	X
2,4-Trichlorobenzene	524.2	P		R		X	X
2,4-Trimethylbenzene	524.2					X	Delete
2-Dibromoethane	524.2					X	Delete
2-Dichlorobenzene	524.2	P		R		X	X
2-Dichloroethane	524,2	P	X	R		X	X
2-Dichloropropane	524.2	P		R		X	X
3,5-Trimethylbenzene	524.2					X	Delete
3-Dichlorobenzene	524.2	U		R		X	X
3-Dichloropropane	524.2	U		R		X	X
3-Dichloropropene	524.2	U		R			Add
4-Dichlorobenzene	524.2	P	X	R		X	X
4-Dichloropropane	524.2	U		R		X	X
Chlorotoluene	524.2	U		R		X	X
Chlorotoluene	524.2	U		R		X	X
sopropyltoluene	524.2					X	Delete
nzene	524.2	P	X	R		X	X
omobenzene	524.2	U		R		X	X
omochloromethane	524.2					X	Delete
omodichloromethane	524.2	P		R		X	X
omoform	524.2	P		R		X	X
omomethane	524.2	U		R		X	X
rbon tetrachloride	524.2	P	X	R		X	X
lorobenzene	524.2	P		R		X	X
loroethane	524.2	U		R		X	X
loroform	524.2	P		R		X	X
loromethane	524.2	U		R		X	X
-1,2-Dichloroethene	524.2	P		R		X	X
-1,3-Dichloropropene	524.2					X	Delete
romochloromethane	524.2	P		R		X	X
romomethane	524.2	U		R		X	X
chlorodifluoromethane	524.2					X	Delete
chloromethane (Methylene chloride)	524.2	P		R		X	X
ylbenzene	524.2	P		R		X	X
xachlorobutadiene	524.2					X	Delete
propylbenzene	524.2					X	Delete

TACHMENT 1 (Revised 6/9/98)
LEM ASR WELL SAMPLING PROGRAM
alytical Compound Method and Source List

Parameter	EPA Method	OAR 333-061-0030 SDWA	OAR 690-340-040 Groundwater	OAR 690-350-0010 ASR[1]	Table 3-2A Revised Final February-98	Table 3-1 Draft Plan June-96	Table 3-1A Revised Final February-98
,p-Xylene	524.2	P		R		X	X
-Butylbenzene	524.2					X	Delete
-Propylbenzene	524.2					X	Delete
aphthalene	524.2					X	Delete
-Xylene	524.2	P		R		X	X
c-Butylbenzene	524.2					X	Delete
tyrene	524.2	P		R		X	X
rt-Butylbenzene	524.2					X	Delete
etrachloroethene (PCE)	524.2	P		R		X	X
oluene	524.2	P		R		X	X
ans-1,2-Dichloroethene	524.2	P		R		X	X
ans-1,3-Dichloropropene	524.2					X	Delete
richloroethene (TCE)	524.2	P	X	R		X	X
richlorofluoromethane	524.2					X	Delete
inyl chloride	524.2	P	X	R		X	X
trazine	525.2	P		R		X	X
enzo(a)pyrene	525.2	P		R		X	X
utachlor	525.2	U		R			Add
i(2-ethylhexyl)adipate	525.2	P		R		X	X
i(2-ethylhexyl)phthalate	525.2	P		R		X	X
exachlorocyclopentadiene	525.2	P		R		X	X
fetolachlor	525.2	U		R			Add
fetribuzin	525.2	U		R			Add
imazine	525.2	P		R		X	X
-Hydroxycarbofuran	531.1	U		R			Add
ldicarb	531.1	U		R			Add
ldicarb sulfone	531.1	U		R			Add
ldicarb sulfoxide'	531.1	U		R			Add
arbaryl	531.1	U		R			Add
arbofuran	531.1	P		R		X	X
fethomyl	531.1	U		R			Add
xamyl (Vydate)	531.1	P		R		X	X
lyphosate	547	P		R		X	X
ndothall	548	P		R		X	X
iquat	549	P		R		X	X
ioxin (2,3,7,8-TCDD)	1613	P		R		X	Waiver
ioxin (Total TCDD)	1613					X	Waiver

cludes all compounds in OAR 333-061 and 340-040 plus 15 common ion constituents and water quality parameters.
nly required if gross alpha > 5 pCi/L. Therefore, not included in monitoring program.
nly required if nuclear plant is nearby and monitoring is requested by state. Therefore, not included in monitoring program.
alculated value based on parameters included in monitoring program.
/Q - General water quality parameter required although not necessarily regulated under OAR 333-061.
Included because compound is listed in OAR 333-061.
Secondary Standard
Primary Standard
Unregulated Contaminant

TABLE 3-1A (Revised 6/9/98)
CITY OF SALEM
ASR IMPLEMENTATION PLAN
WATER QUALITY MONITORING PROGRAM

Conventional Parameters
- Conductivity
- pH
- *Temperature*
- Total Dissolved Solids
- Turbidity
- *Turbidity*
- *Dissolved Oxygen*
- *Oxygen Reduction Potential*
- Chloride
- Nitrate
- Nitrite
- Total nitrate and nitrite
- Sulfate
- Fluoride
- Total Alkalinity
  - Carbonate Alkalinity
  - Hydroxide Alkalinity
  - Bicarbonate Alkalinity
  - Carbon Dioxide
- Total Phosphate
- Color
- Odor (As needed)
- Foaming agents (MBAS)

Microbiological
- Standard Plate Count
- Total Coliform
- Fecal Coliform

Italics indicates field measurement

Metals and Ions
- Aluminum
- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Calcium
- Chromium
- Copper
- Cyanide
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Nickel
- Potassium
- Selenium
- Silica (SiO2)
- Silver
- Sodium
- Thallium
- Total Hardness
- Zinc

Radionuclides
- Gross Alpha
- Gross Beta
- Radon (Rn-222)

Disinfection By-Products
- Total Haloacetic Acids
- Total Trihalomethanes

TABLE 3-1A (Revised 6/9/98)
CITY OF SALEM
ASR IMPLEMENTATION PLAN
WATER QUALITY MONITORING PROGRAM
(Continued)

Extractable Organics

DBCP
EDB (Ethylene dibromide)
Alachlor
Aldrin
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Chlordane
Dieldrin
Endrin
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Lindane (gamma-BHC)
Methoxychlor
Polychlorinated Biphenyls
Propachlor
Toxaphene
2,4,5-TP (Silvex)
2,4-D
Dalapon
Dicamba
Dinoseb
Pentachlorophenol
Picloram
1,1,1,2-Tetrachloroethane
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,1-Dichloropropene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
1,3-Dichlorobenzene
1,3-Dichloropropene
1,3-Dichloropropane
1,4-Dichlorobenzene
2,2-Dichloropropane
2-Chlorotoluene
4-Chlorotoluene
Benzene
Bromobenzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
cis-1,2-Dichloroethene
Dibromochloromethane
Dibromomethane
Dichloromethane (Methylene chloride)
Ethylbenzene
m,p-Xylene
o-Xylene
Styrene
Tetrachloroethene (PCE)
Toluene
trans-1,2-Dichloroethene
Trichloroethene (TCE)
Vinyl chloride
Atrazine
Benzo(a)pyrene
Butachlor
Di(2-ethylhexyl)adipate
Di(2-ethylhexyl)phthalate
Hexachlorocyclopentadiene
Metolachlor
Metribuzin
Simazine
3-Hydroxycarbofuran

TABLE 3-1A (Revised 6/9/98)
CITY OF SALEM
ASR IMPLEMENTATION PLAN
WATER QUALITY MONITORING PROGRAM
(Continued)

Aldicarb
Aldicarb sulfone
Aldicarb sulfoxide'
Carbaryl
Carbofuran
Methomyl
Oxamyl (Vydate)
Glyphosate
Endothall
Diquat

Oregon
John A. Kitzhaber, M.D., Governor

RECEIVED
MAY 22 1998
WATER RESOURCES DEPT.
SALEM, OREGON

Department of Human Resources
Health Division
800 NE Oregon Street # 21
Portland, OR 97232-2162
(503) 731-4030 Emergency
(503) 731-4010
FAX (503) 731-4077
TDD- Nonvoice (503) 731-4031

Date: May 19, 1998

To: Donn Miller, Water Resources Department

From: Dennis Nelson, Drinking Water Program

Subject: Salem's ASR Limited License

I have had the opportunity to review the April 22, 1998 memo sent to you by Paul Eckley in which the utility proposes a minor adjustment to their ASR limited license. Specifically, they request a waiver from monitoring for asbestos, dioxin, strontium-90 and tritium and propose slightly modified language with respect to monitoring of injection water, new wells, background for wells prior to injection, background for wells prior to withdrawal, withdrawal of stored water, and background for wells in service. The Health Division is in agreement with the proposed modifications as qualified below.

Asbestos: The Health Division is only requiring monitoring for asbestos for those systems that are either in a geologic terrain where natural forms of asbestos may occur and/or if the water system has asbestos cement distribution lines. The Salem area is outside the geologic terrains targeted for asbestos monitoring and to our knowledge, the water being used for injection in this project will not be exposed to AC pipe. It is our understanding, however, that the City does have some areas in their system where AC pipe does exist. The waiver for asbestos monitoring in conjunction with the ASR activities granted above does not release the City from asbestos monitoring that may be required from within that part of the distribution system.

Dioxin: The Health Division only requires dioxin monitoring for surface water systems and groundwater systems that are in hydraulic connection with surface water that are down stream from potential dioxin sources, e.g., pulp and paper manufacturing, wood treatment plants, municipal and industrial waste incineration facilities, etc. This is not a concern for the Salem ASR project and we would agree with the waiver of dioxin monitoring with respect to the ASR project.

Strontium-90 and Tritium: The ASR rules stipulate that the drinking water standards be met for source, ambient aquifer and extracted waters. Strontium-90 and tritium analyses are only required for surface water sources for community water systems serving more than 100,000 (OAR 333-061-0036 (6)(b)). OHD does not have the authority under our primacy agreement with the EPA to grant a waiver from that monitoring requirement. However, as indicated above, monitoring for strontium-90 and tritium is not required for groundwater sources. Monitoring requirements for surface water sources for gross beta radioactivity, strontium-90 and tritium is once every four years. Salem last performed such an analysis on the North Santiam in December of 1995 with no detection. Monitoring for man-made radioactivity is therefore current and additional testing for these constituents is not required until 1999. Given that there are no sources of man-made

radioactivity in the area of proposed ASR operations, that the water to be extracted is a mixture of surface water for which monitoring is current and groundwater for which monitoring is not required, and that monitoring will be accomplished for gross beta emissions, we would agree that for this year the extracted water need not be monitored for strontium-90 and tritium. The Health Division will in the near future, however, be considering more precisely how the extracted water should be considered under existing drinking water regulations. The City should understand that, as a result of those discussions, monitoring for strontium-90 and tritium may be required in the future.

Frequency of Monitoring. We agree with the monitoring schedule proposed, although as discussed during previous meetings, we believe that a more frequent monitoring (e.g., quarterly) for common ions for area wells may prove useful to the City in evaluating the operation of the injection-withdrawal process.

As a final point, when I reviewed the analytes listed in Attachment 1 and Table 3-1A of Salem's memo, I did not see 1,3-dichloropropene, for which monitoring is required under OHD rules 333-061-0036 (3)(e)

c: Dave Leland

ATTACHMENT 1
SALEM ASR WELL SAMPLING PROGRAM
Analytical Compound Method and Source List

Parameter	EPA Method	OAR 333-061-0030 SDWA	OAR 690-340-040 Groundwater	OAR 690-350-0010 ASR[1]	Table 3-2A Revised Final February-98	Table 3-1 Draft Plan June-96	Table 3-1A Revised Final February-98
Conventional Parameters							
Conductivity	120.1				X	X	X
pH	150.1	S	X	GWQ	X	X	X
Temperature				GWQ	X	X	X
Total Dissolved Solids	160.1	S	X	GWQ & R	X	X	X
Turbidity	180.1	P	X	R	X	X	X
Dissolved Oxygen					X	X	X
Oxygen Reduction Potential				GWQ	X	X	X
Chloride	300	S	X	GWQ & R	X	X	X
Nitrate	300	P	X	R		X	X
Nitrite	300	P		R		X	X
Total nitrate and nitrite	300	P		R		X	X
Sulfate	300	S	X	GWQ & R	X	X	X
Fluoride (free)	340.2	P	X	R		X	X
Total Alkalinity	403			GWQ	X	X	X
Carbonate Alkalinity	403			GWQ	X	X	X
Hydroxide Alkalinity	403			GWQ	X	X	X
Bicarbonate Alkalinity	403			GWQ	X	X	X
Carbon Dioxide	SM 406-B			GWQ	X	X	X
Total Phosphate	424-BE					X	X
Iodide	345.1					X	Delete
Color		S	X	R			Add
Corrosivity		S		R			X[4]
Odor		S	X	R			As needed
Foaming agents (MBAS)		S	X	R			Add
Microbiological							
Standard Plate Count	SM 907-A				X	X	X
Total Coliform	MMO-MUG	P	X	R	X	X	X
Fecal Coliform	MMO-MUG	P	X	R	X	X	X
Metals and Ions							
Aluminum		S		R			Add
Antimony	200.8	P		R		X	X
Arsenic	200.8	P	X	R		X	X
Asbestos	100.2	P		R		X	Waiver
Barium	200.8	P	X	R		X	X
Beryllium	200.8	P		R		X	X
Cadmium	200.8	P	X	R		X	X
Calcium	CFR 200.7	S		GWQ & R	X	X	X
Chromium	200.8	P	X	R		X	X
Copper	200.8	P	X	R		X	X
Cyanide		P		R		X	X
Iron	CFR 200.7	S	X	GWQ & R	X	X	X
Lead	200.8	P	X	R		X	X
Magnesium	CFR 200.7	S		GWQ & R	X	X	X
Manganese	200.8	S	X	GWQ & R	X	X	X

ATTACHMENT 1
SALEM ASR WELL SAMPLING PROGRAM
Analytical Compound Method and Source List

Parameter	EPA Method	OAR 333-061-0030 SDWA	OAR 690-340-040 Groundwater	OAR 690-350-0010 ASR[1]	Table 3-2A Revised Final February-98	Table 3-1 Draft Plan June-96	Table 3-1A Revised Final February-98
Mercury	245.1	P	X	R		X	X
Nickel	200.8	P		R		X	X
Potassium	CFR 200.7			GWQ	X	X	X
Selenium	200.8	P	X	R		X	X
Silica (SiO2)	CFR 200.7			GWQ	X	X	X
Silver	272.2	S	X	R		X	X
Sodium	CFR 200.7			GWQ	X	X	X
Thallium	200.8	P		R			Add
Zinc	CFR 200.7	S	X	R		X	X
Total Hardness	SM 314-A	S		GWQ & R	X	X	X
Radionuclides							
Gross Alpha	9310	P	X	R		X	X
Gross Beta	9310	P	X	R		X	X
Radon (Rn-222)	913					X	X
Radium 226		P		R			2
Radium 228		P		R			2
Iodine-131		P	X	R			3
Strontium-90		P	X	R			Waiver
Tritium		P	X	R			Waiver
Uranium							
Disinfection By-Products							
Total Haloacetic Acids	SM 6251.B						Add
Total Trihalomethanes	524.2	P	X	R		X	X
Extractable Organics							
DBCP	504	P		R		X	X
EDB (Ethylene dibromide)	504	P		R		X	X
Alachlor	508	P		R		X	X
Aldrin	508	U		R		X	X
Aroclor 1242	508	P		R		X	X
Aroclor 1248	508	P		R		X	X
Aroclor 1254	508	P		R		X	X
Aroclor 1260	508	P		R		X	X
Chlordane	508	P		R		X	X
Dieldrin	508	U		R		X	X
Endrin	508	P	X	R		X	X
Heptachlor	508	P		R		X	X
Heptachlor epoxide	508	P		R		X	X
Hexachlorobenzene	508	P		R		X	X
Lindane (gamma-BHC)	508	P	X	R		X	X
Methoxychlor	508	P	X	R		X	X
Polychlorinated Biphenyls	508	P		R		X	X
Propachlor	508	U		R			Add
Toxaphene	508	P	X	R		X	X
2,4,5-TP (Silvex)	515.1	P	X	R		X	X
2,4-D	515.1	P	X	R		X	X
Dalapon	515.1	P		R		X	X

ATTACHMENT 1
SALEM ASR WELL SAMPLING PROGRAM
Analytical Compound Method and Source List

Parameter	EPA Method	OAR 333-061-0030 SDWA	OAR 690-340-040 Groundwater	OAR 690-350-0010 ASR[1]	Table 3-2A Revised Final February-98	Table 3-1 Draft Plan June-96	Table 3-1A Revised Final February-98
Dicamba	515.1	U		R			Add
Dinoseb	515.1	P		R		X	X
Pentachlorophenol	515.1	P		R		X	X
Picloram	515.1	P		R		X	X
1,1,1,2-Tetrachloroethane	524.2	U		R		X	X
1,1,1-Trichloroethane	524.2	P	X	R		X	X
1,1,2,2-Tetrachloroethane	524.2	U		R		X	X
1,1,2-Trichloroethane	524.2	P		R		X	X
1,1-Dichloroethane	524.2	U		R		X	X
1,1-Dichloroethene	524.2	P	X	R		X	X
1,1-Dichloropropene	524.2	U		R		X	X
1,2,3-Trichlorobenzene	524.2					X	Delete
1,2,3-Trichloropropane	524.2	U		R		X	X
1,2,4-Trichlorobenzene	524.2	P		R		X	X
1,2,4-Trimethylbenzene	524.2					X	Delete
1,2-Dibromoethane	524.2					X	Delete
1,2-Dichlorobenzene	524.2	P		R		X	X
1,2-Dichloroethane	524.2	P	X	R		X	X
1,2-Dichloropropane	524.2	P		R		X	X
1,3,5-Trimethylbenzene	524.2					X	Delete
1,3-Dichlorobenzene	524.2	U		R		X	X
1,3-Dichloropropane	524.2	U		R		X	X
1,4-Dichlorobenzene	524.2	P	X	R		X	X
2,2-Dichloropropane	524.2	U		R		X	X
2-Chlorotoluene	524.2	U		R		X	X
4-Chlorotoluene	524.2	U		R		X	X
4-Isopropyltoluene	524.2					X	Delete
Benzene	524.2	P	X	R		X	X
Bromobenzene	524.2	U		R		X	X
Bromochloromethane	524.2					X	Delete
Bromodichloromethane	524.2	P		R		X	X
Bromoform	524.2	P		R		X	X
Bromomethane	524.2	U		R		X	X
Carbon tetrachloride	524.2	P	X	R		X	X
Chlorobenzene	524.2	P		R		X	X
Chloroethane	524.2	U		R		X	X
Chloroform	524.2	P		R		X	X
Chloromethane	524.2	U		R		X	X
cis-1,2-Dichloroethene	524.2	P		R		X	X
cis-1,3-Dichloropropene	524.2					X	Delete
Dibromochloromethane	524.2	P		R		X	X
Dibromomethane	524.2	U		R		X	X
Dichlorodifluoromethane	524.2					X	Delete
Dichloromethane (Methylene chloride)	524.2	P		R		X	X
Ethylbenzene	524.2	P		R		X	X
Hexachlorobutadiene	524.2					X	Delete
Isopropylbenzene	524.2					X	Delete
m,p-Xylene	524.2	P		R		X	X

ATTACHMENT 1
SALEM ASR WELL SAMPLING PROGRAM
Analytical Compound Method and Source List

Parameter	EPA Method	OAR 333-061-0030 SDWA	OAR 690-340-040 Groundwater	OAR 690-350-0010 ASR[1]	Table 3-2A Revised Final February-98	Table 3-1 Draft Plan June-96	Table 3-1A Revised Final February-98
n-Butylbenzene	524.2					X	Delete
n-Propylbenzene	524.2					X	Delete
Naphthalene	524.2					X	Delete
o-Xylene	524.2	P		R		X	X
sec-Butylbenzene	524.2					X	Delete
Styrene	524.2	P		R		X	X
tert-Butylbenzene	524.2					X	Delete
Tetrachloroethene (PCE)	524.2	P		R		X	X
Toluene	524.2	P		R		X	X
trans-1,2-Dichloroethene	524.2	P		R		X	X
trans-1,3-Dichloropropene	524.2					X	Delete
Trichloroethene (TCE)	524.2	P	X	R		X	X
Trichlorofluoromethane	524.2					X	Delete
Vinyl chloride	524.2	P	X	R		X	X
Atrazine	525.2	P		R		X	X
Benzo(a)pyrene	525.2	P		R		X	X
Butachlor	525.2	U		R			Add
Di(2-ethylhexyl)adipate	525.2	P		R		X	X
Di(2-ethylhexyl)phthalate	525.2	P		R		X	X
Hexachlorocyclopentadiene	525.2	P		R		X	X
Metolachlor	525.2	U		R			Add
Metribuzin	525.2	U		R			Add
Simazine	525.2	P		R		X	X
3-Hydroxycarbofuran	531.1	U		R			Add
Aldicarb	531.1	U		R			Add
Aldicarb sulfone	531.1	U		R			Add
Aldicarb sulfoxide'	531.1	U		R			Add
Carbaryl	531.1	U		R			Add
Carbofuran	531.1	P		R		X	X
Methomyl	531.1	U		R			Add
Oxamyl (Vydate)	531.1	P		R		X	X
Glyphosate	547	P		R		X	X
Endothall	548	P		R		X	X
Diquat	549	P		R		X	X
Dioxin (2,3,7,8-TCDD)	1613	P		R		X	Waiver
Dioxin (Total TCDD)	1613					X	Waiver

1 Includes all compounds in OAR 333-061 and 340-040 plus 15 common ion constituents and water quality parameters.
2 Only required if gross alpha > 5 pCi/L. Therefore, not included in monitoring program.
3 Only required if nuclear plant is nearby and monitoring is requested by state. Therefore, not included in monitoring program.
4 Calculated value based on parameters included in monitoring program.
GWQ - General water quality parameter required although not necessarily regulated under OAR 333-061.
R - Included because compound is listed in OAR 333-061.
S - Secondary Standard
P - Primary Standard
U - Unregulated Contaminant