



Phase II and V Chemical Monitoring Guidance

The federal Phase II rule was adopted by the Health Division (OHD) in July and monitoring by public water systems began in January. The federal rule allows a great deal of flexibility in the selection of sampling sites and the manner in which samples are collected. This flexibility, combined with our limited staffing, make it impractical for the Drinking Water Program to direct each water system manager individually on sample site selection. The purpose of this guidance is to identify all sampling alternatives under the rule and to present our assessment of the merits of each. System managers and their contract laboratories should work together using this guidance to develop and implement a sampling plan that meets rule requirements. System managers then report test results to OHD with a clear description of how and where each sample was collected. A list of additional references is included at the end of this article.

Background

Monitoring for Phase II and Phase V regulated and unregulated chemicals began in January. Monitoring requirements for all contaminants apply to community and nontransient noncommunity public water systems and the monitoring for nitrate and nitrite applies to all public water systems including noncommunity systems. Monitoring is phased in by system size (population served), with one-third of the community and nontransient noncommunity systems to begin in each of the next three years according to this schedule:

System Population	Initial Sampling
> 300	Jan. 1, 1993
100-299	Jan. 1, 1994
< 100	Jan. 1, 1995

Note: All systems begin monitoring for nitrate Jan. 1, 1993.

For systems which have fewer than 150 service connections, monitoring for regulated Phase II contaminants is required according to the above schedule and monitoring for unregulated Phase II and unregulated Phase V contaminants is not required. Monitoring for regulated Phase V contaminants will not be required until the next compliance period beginning in January 1996 for systems with fewer than 150 service connections.

Because of the complexity and flexibility of these rules, it is not possible in this article to list the specific monitoring requirements for each water system. Initial monitoring requirements for some chemicals can be reduced through four means:

- 1) grandfathering of previous test results;
- 2) waivers for pesticide use and susceptibility;
- 3) area-wide use waivers allowed by the Health Division; and
- 4) the effect of the Chafee amendment on systems

which serve less than 3,300 population.

Initial monitoring requirements can be increased by positive detections of chemicals, changes in source vulnerability and adding additional sources.

Initial Monitoring Summary

The following tables list the "standard" initial monitoring requirements for all Phase II/V contaminants for community, nontransient noncommunity and transient noncommunity water systems as described in the federal rule.

Grandfathering Old Test Data

Initial monitoring requirements can be reduced by requesting grandfathering of water sample test data. Grandfathering applies to all community, nontransient noncommunity and noncommunity water systems, but will have the greatest impact on those systems which serve more than 3,300 people (due to the Chafee amendment). Grandfathering applies to all inorganics (except nitrate, nitrite and arsenic), pesticides and volatile organics listed in Phase II and Phase V.

However, grandfathering is not automatic. The tests performed must be near equivalent to the tests required in Phase II and Phase V and no result can exceed the MCL of any contaminant. For some contaminants, more than one existing analysis is required before any

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Simplified Chemical Monitoring Tables

Community* water systems; compliance period 1/93-12/95

Chemicals	Surface	Ground
Inorganics	Yearly	One
Sodium	Yearly	One
Nitrate (testing starts 1/93)	Quarterly	Yearly
Nitrite	One	One
Asbestos AC pipe Source	One Yearly	One One
Synthetic organics	4 quarter	4 quarters
Unregulated SOCs	4 quarters	4 quarters
Volatile organics	4 quarters	4 quarters
Unregulated VOCs	4 quarters	One
Trihalomethanes	Quarterly	Quarterly
Radiological	Every 4 yrs.	Every 4 yrs.
Lead and copper rule	Semiannually	Semiannually

* This table describes the monitoring you must do. Waivers, reductions, vulnerability or detections will affect sampling requirements. You will find details on number, location and timing of samples in the rule book.

Beginning monitoring: You must begin between Jan. 93 and Dec. 93 if your population is greater than 299; between Jan. 94 and Dec. 94 if your population is 100-299; and between Jan. 95 and Dec. 95 if your population is 25-99.

Beginning lead & copper monitoring: You must start by Jan. 92 if your population is 50,000 or over; by July 92 if your population is 3,330 or over; and by July 93 if your population is 25 or over.

Trihalomethanes: Only systems with a population of 10,000 or more need to monitor trihalomethanes.

Unregulated chemicals: Systems with fewer than 150 connections are not required to test for unregulated synthetic and volatile organics if a waiver is requested in writing.

Testing for SOCs, unregulated SOCs, VOCs and unregulated VOCs: Systems having a population smaller than 3,300 may take one sample for SOCs, unregulated SOCs, VOCs and unregulated VOCs to satisfy monitoring requirements. If there are detections of any chemicals further sampling will be required. Sample must be collected before Oct. 1993.

Testing for Endrin: Endrin sample (SOC testing) must be taken when endrin contamination is likeliest.

4 Quarters: test on a quarterly schedule for one year for a total of four tests.

Nontransient noncommunity* water systems; compliance period 1/93-12/95

Chemicals	Surface	Ground
Inorganics	Yearly	One
Sodium	Yearly	One
Nitrate (testing starts 1/93)	Quarterly	Yearly
Nitrite	One	One
Asbestos AC pipe Source	One Yearly	One One
Synthetic organics	4 quarters	4 quarters
Unregulated SOCs	4 quarters	4 quarters
Volatile organics	4 quarters	4 quarters
Lead and copper rule	Semiannually	Semiannually

* This table describes the monitoring you must do. Waivers, reductions, vulnerability or detections will affect sampling requirements. You will find details on number, location and timing of samples in the rule book.

Beginning monitoring: You must begin between Jan. 93 and Dec. 93 if your population is greater than 299; between Jan. 94 and Dec. 94 if your population is 100-299; and between Jan. 95 and Dec. 95 if your population is 25-99.

Beginning lead & copper monitoring: You must start by Jan. 92 if your population is 50,000 or over; by July 92 if your population is 3,330 or over; and by July 93 if your population is 25 or over.

Unregulated chemicals: Systems with fewer than 150 connections are not required to test for unregulated synthetic and volatile organics if a waiver is requested in writing.

Testing for SOCs, unregulated SOCs, VOCs: Systems having a population smaller than 3,300 may take 1 sample for SOCs, unregulated SOCs, VOCs and unregulated VOCs to satisfy monitoring requirements. If there are detections of any chemicals, further sampling will be required. Sample must be collected before Oct. 1993.

Testing for Endrin: Endrin sample (SOC testing) must be taken when endrin contamination is likeliest.

4 quarters: test on a quarterly schedule for one year for a total of 4 tests.

Noncommunity* water systems

Chemicals	Sample
Inorganics (antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, thallium)	Once
Lead	Once
Nitrate (testing starts 1/93)	Yearly
Nitrite (testing starts 1/93)	One
Turbidity	Surface One reading every 4 Hours ¹
Coliform bacteria	Ground Average daily population served ≤1,000 >1,000 Monthly sample Quarterly sample Sample Collect between 1st quarter . Jan. 1 and Mar. 31 2nd quarter Apr. 1 and Jun. 30 3rd quarter . Jul. 1 and Sept. 30 4th quarter . Oct. 1 and Dec. 31

* This table reflects base line monitoring. Waivers, reductions or detections will affect sampling requirements.

¹Slow sand filter can reduce to one reading per day

monitoring reduction can be granted. Also, the water system must request grandfathering in writing to the Health Division. The system does not have to submit any test data which has been sent previously to the Health Division. Requests for grandfathering for specific contaminants will be accepted though Feb. 15, 1993.

Noncommunity systems existing prior to Jan. 1, 1992, are required to test only for antimony, beryllium, cyanide, nickel and thallium in addition to nitrate and nitrite. Noncommunity systems that have conducted tests before Jan. 1, 1993, for arsenic, barium, cadmium, chromium, fluoride, mercury and selenium will not have to monitor for these.

Use and Susceptibility Waivers

Since the Chafee amendment has effectively reduced the sampling requirements for most systems, the primary purpose for obtaining a waiver, reducing initial monitoring cost, has been eliminated (see below for additional waiver benefits). For systems which serve 3,300 people or more, the Chafee amendment does not apply and waivers can still reduce initial monitoring costs. Obtaining a waiver means reduced monitoring, not its elimination.

To date, 20 water systems serving 3,300 or more people have submitted applications for waivers from Phase II/V monitoring to the Health Division. These applications will be reviewed first so initial monitoring cost can be reduced if possible. Thirty-four systems serving fewer than 3,300 people have also submitted applications for

waivers. These will also be reviewed for monitoring reductions but with less priority since the Chafee amendment will apply to them.

The Health Division strongly recommends that small systems consider preparing a waiver application. Although there may not be immediate cost savings, there are many other benefits, including:

- 1) The application will enhance understanding of where your water comes from and how it can become contaminated. The use waiver is a good way to find out what chemicals may threaten your water supply and pinpoint areas of concern. The susceptibility waiver is an excellent study of how prone your source is to contamination and how construction of a well may impact present and future water quality.
- 2) The waiver document, when completed, can be used in the future when additional chemicals are required to be tested, saving initial monitoring costs.
- 3) The waiver document has significant importance to the application and implementation of a Wellhead Protection program in your area.
- 4) Waiver application preparation will put you in a working relationship with chemical users in your area and increase their knowledge of risks to the water supply.

Area-wide Waivers for Dioxin and Asbestos

The Health Division has set in place area-wide use waivers for dioxin and source asbestos monitoring. Waivers will be granted based on the location of the water supply source.

Only a few systems in Oregon will be required to test for dioxin. Because the primary source of this contamination is pulp and paper mills, only systems downstream from mills are significantly vulnerable. The Health Division will contact systems required to test for dioxin; others will not be required to test.

For source asbestos, systems in the following two areas (by county) must submit a topographic map to the Health Division showing the location of the water system sources:

Area I	Area II
Curry Co.	Grant Co.
Josephine Co.	Baker Co.
Coos Co.	
Douglas Co.	
Jackson Co.	

If a water source falls within a geologic formation which has been identified with asbestos in either of these areas, testing for source asbestos will be required. However, the formations which require testing make up only a small portion of these areas, so the fact that a system source lies within these counties does not automatically mean that monitoring for source asbestos will be required. Systems whose sources are located outside these

areas will not be required to test for source asbestos. Contact the Division for copies of a map showing the areas.

Distribution system asbestos monitoring is required for systems which have asbestos-cement (AC) or transite pipe in the distribution system. The sample is to be taken in the distribution system where such pipe is located. If your system does not contain AC or transite pipe in the distribution system, you must contact the Health Division in writing before distribution system asbestos testing can be waived.

Effect of Chafee Amendment on Initial Monitoring Requirements

The Chafee amendment was recently incorporated by Congress into EPA's 1993 appropriation (see October PIPELINE). The Health Division has adopted the Phase II monitoring reduction language of this legislation along with the Lead and Copper rule. The Chafee amendment limits the monitoring for Phase II volatile organics and pesticides to one sample for each sampling point if there are no detections (detections require quarterly monitoring). This reduction applies to all community and nontransient noncommunity systems that serve a population of from 300 to 3,300 and they must have begun monitoring in January. It also applies to smaller community and nontransient noncommunity water systems that wish to begin monitoring for Phase II chemicals before October 1993. Because of the Safe Drinking Water Act reauthorization scheduled for 1993, changes to the current monitoring requirements are uncertain. Therefore, the Health Division recommends that all affected water systems which wish to take advantage of the monitoring reduction conduct their Phase II monitoring during 1993.

Lab Scheduling and Capacity

Many of the Phase II organic chemicals require special laboratory equipment and testing techniques which are extremely sensitive. Therefore, not all labs are certified for testing all contaminants. It is possible that as few as one or two labs might be certified for testing specific contaminants. Many labs, however, arrange to have analyses performed by other labs for chemicals for which the contracting lab is not certified. Therefore, the Health Division recommends that water systems contact their regular lab and find out what services it can provide and if arrangements can be made through it with other labs to complete test requirements for all chemicals.

Labs would be overwhelmed if all 1,300 community and nontransient noncommunity water systems in Oregon requested testing for Phase II chemicals in January. The certified labs will have to prioritize their work so that

those systems which must begin monitoring during the first quarter (January-March) are tested first. All other systems which want to begin testing for Phase II contaminants to take advantage of the Chafee amendment should call their lab and arrange for testing at the lab's convenience.

Selecting the Appropriate Sampling Site

The Phase II rule describes the site where the samples are to be taken, the entry point to the distribution system and the types of samples. Actually, there are many sample sites and ways to sample which are acceptable under Phase II. The test results, however, may not necessarily be fully representative of the water people are actually drinking and some sample sites which can be used are more protective of public health than others. Before discussing the various locations and ways to sample, it is necessary to define some terms:

Entry Point Sample: Taken at the entry point to the distribution system. This point is after any treatment but prior to the first connection. If two sources are joined by a common line prior to entering the distribution system, the entry point is located on the common line prior to the first connection and after treatment.

Source Sample: Taken at each individual source. If a system has only one source or has sources which do not have a common line prior to entering the distribution system, the entry point sample is the same as the source sample.

Combined Sample: Taken at the entry point which is representative of more than one individual source. All sources must be operating and sampling must occur during normal operating conditions. If treatment is applied, the sample must be taken after it.

Composite Sample: Taken by the water system or systems and combined prior to analysis by the laboratory for equal sample representation. Compositing can be done only by a certified lab and can be tested only to the limits of the equipment and level of detection that is required. Therefore, compositing may not apply to all chemical test methods. Multiple samples from one water system or from different systems may be composited.

The Health Division has identified many ways in which drinking water can be sampled for Phase II and Phase V chemicals and ranked them from 'most protective' to 'least protective' of public health. A discussion of each category follows. To use this table, consider a water system with multiple sources which have a common entry point.

Sampling Hierarchy, Phase II/V VOCs/SOCS

Sample location	Type	Initial Frequency*
<i>Category I: most protective</i>		
Source	Source	4 quarters

Source	Source	2 or 3 quarters
Source	Source	1 quarter
<i>Category II: more protective</i>		
Source	Composite	4 quarters
Source	Composite	2 or 3 quarters
Source	Composite	1 quarter
<i>Category III: less protective</i>		
Entry point	Combined	4 quarters
Entry point	Combined	2 or 3 quarters
Entry point	Combined	1 quarter
<i>Category IV: least protective</i>		
Source sample	Multiple system composite	4 quarters
Source sample	Multiple system composite	1 quarter
Entry point	Combined and composited (multiple system)	4 quarters
Entry point	Combined and composited (multiple system)	1 quarter
*Sample frequency varies from full monitoring requirements (four quarters) which is most protective of public health, to partial monitoring requirements due to waivers (two or three quarters), to full monitoring reductions (one quarter) due to waivers or the effects of the Chafee amendment which is least protective of public health.		
The pros and cons of these sampling strategies are:		

Category I: Considered by the Health Division to be the most protective of public health. Each source is sampled individually after treatment and tested individually for each chemical. This provides the most information on water quality of any of the categories. However, systems with multiple sources will find individual source sampling very expensive.

Category II: Also considered by the Health Division to be protective of public health. Sources are still sampled individually after treatment but compositing of up to five samples is controlled by the lab so that each source is represented equally. There is a cost saving over category I for systems with more than one source. However, if a detection occurs, each source which was represented in the composite must be sampled individually. Also, contaminants occurring in low concentrations in a single well may not be detected in a composite sample. Not all labs may offer compositing as a service and not all chemicals may be composited using available analytical methods. Please check with your lab if compositing is being considered.

Category III: Not as protective of public health as categories I or II. All sources must be included in the entry point sample under normal operating conditions to accurately reflect the water that people are actually drinking. If pumping varies between sources, water quality also varies at the entry point; more than one sample may be needed to accurately reflect water quality. A chemical problem with one source may not be detected if water from other major sources dilute the sample to a point below the detection limit. For systems with more than

one source, there is a cost saving over categories I and II. Any detections, however, would require follow-up individual source monitoring. If the sources are being treated individually or jointly, the sample must be taken after treatment.

Category IV: Least protective of all the sampling schemes. In this category, systems submit samples to the lab for joint compositing with samples from other systems. This method is acceptable (up to five samples can be composited by the lab) for systems which serve fewer than 3,300 people. Any detections would require each system to resample each source individually. Testing in category IV is the least expensive of all testing if there is no detection. Waivers granted by the Health Division would not allow joint compositing of samples between systems because these samples are not representative of water that people actually drink. Again, not all labs may offer compositing as a service and not all chemicals may be compositable due to the limitations of the lab test methods. The Health Division does not recommend this approach.

Each water system should evaluate these categories as they relate to its sources. Each must consider health protection, how each source is used, the cost of monitoring and the effect of the Chafee amendment. Systems should contact their labs to find out what services they can provide.

Water system personnel are responsible for becoming familiar with Phase II monitoring requirements. Each should review the regulations which were adopted by the Health Division last July. Available summaries of the Phase II regulation are listed below and are available from the Health Division:

1. F.W. Pontius, "Phase II Organic and Inorganic Contaminant Regulations," *Journal of the American Water Works Association*, vol. 83, no. 8 (August 1991): pp. 20-22 and 77-79.
2. USEPA, "Draft Consolidated Summary of Phases II, IIB, & 5," technical report (November 1992).

Lead and Copper Rule Adopted

by *Chris L. Hughes*

The Lead and Copper Rule was adopted by the Health Division on December 7. The rule for Oregon is essentially the same as the federal. Two differences are worth mentioning, one pertaining to lead service lines and the other to corrosion treatment studies.

Because removal of lead service lines and connections was mandated in Oregon earlier, none of the federal requirements pertaining to them was adopted; only the definition of a lead service line was adopted.

After a water system has violated the action level for lead or copper and is required to begin corrosion control studies, the rules list three chemical alternatives which must be studied for optimization of corrosion control. In addition to those techniques, the Health Division may allow other chemical and non-chemical treatment alternatives as well. The requirements are that any additional treatment approaches considered must be evaluated by the system by conducting appropriate studies and analyses to be approved by the Health Division. These studies must be equivalent in scope to those required for the three chemical treatment alternatives.

There were three public hearings on the rule held around the state: Pendleton, Oct. 20; Medford, Oct. 22; and Portland, Oct. 27. Forty-five persons attended the hearings, with oral and written comments taken from two individuals. Most of these comments, including the two major changes above, have been incorporated into the new rules.

Wellhead Protection Update

By *Dennis Nelson*

In an effort to protect drinking water supplied by public water systems from groundwater sources, the Department of Environmental Quality has submitted legislation to establish a Wellhead Protection program in Oregon. The proposal would establish a mandatory program for all schools regulated as public water systems and community and nontransient noncommunity systems serving a population of 300 or more. A voluntary program will be established for all other systems.

The program includes delineation of the wellhead protection area (WHPA), inventory of potential sources of contamination and establishment of a source management plan designed to protect groundwater within the WHPA. The proposal is a joint effort by DEQ, Water Resources Department and Oregon Health Division. The plan would give WRD the responsibility to review and approve the WHPA delineation for those systems in the mandatory program. The DEQ will develop guidelines for both the inventory and management phases. OHD will develop the contingency plan element, implement the inventory phase and provide technical assistance for WHPA delineation to systems in the voluntary program.

Under the program, each system would be allowed three years to delineate the WHPA, one year to complete the source inventory and two years to develop the

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Wellhead *(Continued from page 5)*

management plan. DEQ proposes to phase in systems



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Application to Mail at
 Second-Class
 Postage Rates
 is Pending
 at Portland OR

David E. Leland, Manager 503 / 731-4010

Training Calendar

AWWA/PNPCA Eastern Oregon

Date Course; sponsor; location
 Mar. 15-19 Short school; AWWA/PNPCA; Baker City
 Mar. 19 Water distribution and treatment exams 8am-noon; OHD; Baker City
 Apr. Excavation safety; AWWA/PNPCA; Boardman
 Clackamas Community College must have 12 enrollees to offer a cross connection tester or inspector course in eastern Oregon. Courses without dates are tentative; for information or to be put on the AWWA/PNPCA Eastern Oregon Region's mailing list, contact Bob Patterson, OHD, 276-8006.

Cross connection

Mar. 15-18 Device testers course (CCC); Newport
 Mar. 19 Device testers course (CCC); Newport
 Apr. 19-22 Inspectors course (COCC); Bend
 Apr. 19-22 Inspectors course (CCC); Oregon City
 Apr. 23 Inspectors update; Bend and Oregon City

Lead and copper workshops sponsored by OAWU/OHD:

Feb. 16 Tillamook Co. fairgrounds
 Mar. 3 Springfield Red Lion, I-5, Gateway exit

Apr. 14 Reedsport city council chambers, 451 Winchester
 May 26 Baker City council chambers, 1655 1st St.

All seminars are 8-noon except Apr. 14 which ends at 11am. CEUs will be given. Attendees are requested to bring their copy of the lead and copper guidance document.

Water System Training courses

Drinking Water Section, OHD; contact Claudia Stiff, 731-4317

Date County / other location
 Feb. 19 Keizer, 930 Chemawa Rd. (behind Police Dept.)
 March Jackson/Josephine
 April Multnomah/Clackamas/Washington
 May Wasco/Sherman/Hood River
 June Deschutes/Crook/Jefferson
 July Douglas/Lane
 August Lincoln
 September Pendleton/Klamath Falls
 October Polk/Yamhill
 November Tillamook/Clatsop/Columbia

Other

Apr. 6 Hydrant and valve (OAWU); Pendleton

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Please send requests for article topics or manuscripts of your articles to John Gram, editor (503 / 731-4010).

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over a 10-12 year period as a function of population. If the legislation is adopted as proposed, systems with a population greater than 15,000 would have to complete the delineation phase first. Small systems (pop. 300-750) and most schools would complete the program after the year 2000. It is, of course, possible that the details of the program will be modified during legislative consideration.

The bill, HB2149, was introduced and assigned to the Natural Resources Committee. For more information, contact Rick Kepler, DEQ, at 229-6804 or Dennis Nelson, OHD, at 731-4010.