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IN REPLY REFER TO:

NATIONAL WATER QUALITY LABORATORY TECHNICAL MEMORANDUM 1995.09

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To: Assistant Chief Hydrologist Technical Support
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Chief, Office of Water Quality
Assistant Chief, Office of Water Quality
Acting ACH for NAWQA
Area Hydrologists
District Chiefs
Regional Water-Quality Specialists
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Chief, Yucca Mountain HIP
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Chief, Branch of Technical Development and Quality Systems
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From: Peter F. Rogerson, Chief
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Subject: Discontinuation Of Automatic Swapping

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Revision: None

INTRODUCTION

Since at least 1980, the National Water Quality Laboratory (NWQL) has routinely substituted a requested analytical method with an alternate method. This practice, referred to as "swapping," can be triggered by a number of circumstances. Typical reasons for swapping are as follows:

(1) automatic swapping from a Flame Atomic Absorption (FAA) method to the Inductively Coupled Plasma (ICP) method to maximize efficiency; (2) swapping from ICP to FAA because conductivity is too high (>6,000 µS/cm at 25°C); (3) swapping from low-level analytical methods to routine-level analytical methods because analyte concentrations are too high for the analytical range of the low-

level method; and (4) swapping to reduce chemical interferences because reliable analytical results could not be obtained by the original analytical method. In all cases, the precision and accuracy of the method being swapped to must be equal-to or better-than the precision and accuracy in the originally requested method. Swapping between methods is a common occurrence, affecting between 5,000 and 10,000 samples every year. Although data quality and processing efficiency were the primary factors for instituting the swapping practice, swapping has long been a source of confusion for district personnel. To eliminate confusion, beginning October 1, 1995, the NWQL will no longer automatically swap analytical requests unless chemical interferences or method limitations make the initially requested method unreliable. As automatic swapping from FAA to ICP is discontinued, a number of schedules also will be changed to provide NWQL customers with the more efficient ICP analysis. This NWQL Technical Memorandum explains the changes being implemented as the practice of automatic swapping is discontinued.

PURPOSE AND SCOPE

This technical memorandum addresses issues related to the practice of automatically swapping FAA methods to ICP methods. Affected inorganic schedules and planned changes are listed; a comparison of method reporting limits for both analytical methods is also provided. This memorandum only addresses those district-owned and NWQL schedules that are likely to have been affected by automatic swapping.

WHAT IS SWAPPING?

History

Records indicate that swapping has been practiced at the NWQL since at least 1980. Recently published information on swapping is available in reports by Timme (1994, p. 22) and Pratt (1994, p. 14). Swapping was originally implemented to maximize analytical efficiency at the NWQL and typically involved changing several requests for FAA analyses to the more efficient multi-element ICP method. However, in some cases, customers may not have been aware that a method was swapped. Additionally, the process was complicated by cases where FAA methods may have been preferred because of cooperator requirements; in those cases, swapping was only avoided if the NWQL was notified to take special steps to ensure swapping did not occur.

Criteria

Automatic swapping is initiated by a computer program in the NWQL's Laboratory Information Management System (LIMS) computer which scans analytical requests and changes some of those requests if certain criteria are met. Analytical requests are swapped from the FAA method to the ICP method when the following conditions are met: (1) specific conductance is less than 2000 µS/cm at 25°C; (2) three or more trace metals or major cations are requested; and (3) analysis is not requested by a Graphite Furnace Atomic Absorption (GFAA) method. Methods are not swapped when the initial request is for a method with a lower reporting limit than that of the coinciding ICP method; nor are methods swapped for samples whose specific conductance is greater than 2,000 µS/cm at 25°C. Recent changes at the NWQL and upcoming new method development and implementation make it necessary to discontinue the swapping.

PLANNED CHANGES

In general, analytical schedules are being changed by replacing the analytical requests for analysis by FAA methods with either the ICP 20-element scan (Schedule 1043) or the ICP 6-element scan (Schedule 146) (Timme, 1994, p. 39) methods. These changes duplicate the action taken by the NWQL swapping program which has been in use for the past several years. Consequently, the method actually used and the precision and accuracy of the analytical results district personnel receive from the NWQL will remain the same. Additionally, during the next year, the NWQL will be implementing technology transfers for several of the older methods that are now in use. Specifically, emphasis will be placed on performing more analyses using the ICP method and phasing out those analyses which use the less efficient Flame AA and Direct Current Plasma (DCP) methods. Eventually, the NWQL plans on determining most major cations and trace metals using either the ICP, Inductively Coupled Plasma/Mass Spectrometry (ICP/MS), or GFAA methods. Changes to the schedules outlined in this memorandum are consistent with the phasing out of the older Flame AA and DCP methods and will improve overall efficiency at the NWQL. Changes to district- and NWQL-owned schedules will go into effect October 1, 1995. Table 1 lists information on the existing schedules and the planned changes to those schedules. Table 2 provides detailed information regarding reporting limit differences for the analytes which will be affected by the change in methods.

Attachments

Cited References

1. Timme, Patricia J., National Water Quality Laboratory 1994 Services Catalog, Open-File Report 94-304, 103p.

2. Pratt, Linda K., 1994, Using Analytical Services at the National Water Quality Laboratory, Open-File Report 94-26, 15p.

Effect on database: None

Supersedes: None

Key Words: Inductively Coupled Plasma (ICP), Flame Atomic Absorption (FAA), Swapping Cations, Trace Metals, Analytical Methods

Distribution: See above plus the continua USGS.labnews & .waterquality; WRD Secretaries; Field and Project Offices

TABLE 1-PLANNED CHANGES TO SCHEDULES COMMONLY AFFECTED BY THE SWAPPING PROGRAM

Sch#, Schedule number; Owner, User_Code for district or project; FY, fiscal year; ICP,Inductively Coupled Plasma; BQA, Branch of Technical Development and Quality Systems;NWQL, National Water Quality Laboratory; XC, Quality Management Program; QC, QualityControl

Sch #	Owner	FY-94 Usage	Planned Action
525	04	27	Replace methods for filtered Ba, Ca, Mg, Mn, Na, Zn, and Fe with ICP methods
630	04	10	Replace methods for filtered Ba, Ca, Mg, Mn, Na, Zn, and Fe with ICP methods
775	04	40	Replace methods for filtered Ca, Mg, and Na with ICP methods
141	08	24	Replace methods for filtered Ca, Mg, Na, and Sr with ICP methods
156	08	2	Replace methods for filtered Ca, Mg, and Na with ICP methods
896	17	3	Replace methods for filtered Ba, Ca, Li, Mg, Mn, Na, Sr, Zn, Be, and Fe with ICP methods
890	24	15	Replace methods for filtered Ca, Mg, Na, and Fe with ICP methods
180	32	56	Replace methods for filtered Ca, Li, Mg, and Na with ICP methods
866	32	11	Replace methods for filtered Ca, Mg, Na, and Fe with ICP methods
397	36	79	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
823	37	183	Replace methods for filtered Ca, Mg, and Na with ICP methods
185	38	36	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
406	38	28	Replace methods for filtered Ca, Mg, Mn, Na, Zn, Cd, and Fe with ICP methods
603	38	17	Replace methods for filtered Ca, Li, Mg, Mn, Na, Sr, and Fe with ICP methods
874	38	48	Replace methods for filtered Ca, Mg, and Na with ICP methods
882	44	9	Replace methods for filtered Ca, Mg, and Na with ICP

			methods
205	45	4	Replace methods for filtered Ca, Li, Mg, Mn, Na, Sr, Zn, and Fe with ICP methods
1003	48	91	Replace methods for filtered Ca, Mg, and Na with ICP methods
1022	48	783	Replace methods for filtered Ca, Mg, and Na with ICP methods
469	53	4	Replace methods for filtered Ca, Mg, and Fe with ICP meth ods
392	55	6	Replace methods for filtered Ca, Mg, Na, and Fe with ICP methods
77	56	20	Replace methods for filtered Ca, Mg, and Na with ICP methods
117	94	349	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
1025	94	127	Replace methods for filtered Ca, Mg, Na, and Fe with ICP methods
69	BQA	75	Quality Services Schedule, No Change
429	HF	98	Replace methods for filtered Ba, Mg, Na, and Zn with ICP methods
177	NQ	83	Replace methods for filtered Ba, Ca, Li, Mg, Mn, Na, Sr, and Fe with ICP methods
1904	NQ	443	Replace methods for filtered Ca, Mg, and Na with ICP methods
1923	NQ	587	Replace methods for filtered Ca, Mg, and Na with ICP methods
1	NWQL	198	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
11	NWQL	175	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
12	NWQL	55	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
13	NWQL	56	Replace methods for filtered Ca, Mg, Na, and Fe with ICP methods
42	NWQL	882	Replace methods for filtered Ca, Mg, and Na with ICP methods
166	NWQL	12	Replace methods for filtered Ca, Mg, Na, and Fe with ICP methods
203	NWQL	14	Replace methods for filtered Ca, Mg, and Na with ICP methods
223	NWQL	30	Replace methods for filtered

			Ca, Mg, Mn, Na, and Fe with ICP methods
361	NWQL	201	Replace methods for filtered Ca, Mg, and Na with ICP methods
512	NWQL	2	Replace methods for filtered Ca, Mg, Na, and Sr with ICP methods
546	NWQL	115	Replace methods for filtered Ca, Mg, and Na with ICP methods
573	NWQL	18	Replace methods for filtered Ca, Mg, and Na with ICP methods
591	NWQL	224	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
646	NWQL	8	Replace methods for filtered Ba, Ca, Mg, Mn, Na, Zn, Co, Cu, and Fe with ICP methods
704	NWQL	41	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
708	NWQL	1	Replace methods for filtered Ca, Mg, and Na with ICP methods
818	NWQL	1	Replace methods for filtered Ca, Mg, and Na with ICP methods
825	NWQL	90	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
934	NWQL	8	Replace methods for filtered Ca, Mg, Na, and Sr with ICP methods
1006	NWQL	7	Replace methods for filtered Ca, Mg, and Na with ICP methods
1008	NWQL	4	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
1021	NWQL	5	Replace methods for filtered Ca, Mg, and Na with ICP methods
1024	NWQL	144	Replace methods for filtered Ca, Mg, Mn, Na, and Fe with ICP methods
1023	UT	334	Replace methods for filtered Ca, Mg, and Na with ICP methods
278	XC	153	QC Schedule, No Change
904	XC	92	QC Schedule, No Change
918	XC	131	QC Schedule, No Change
121	ZK	20	Replace methods for filtered Ca, Mg, Mn, Na, Sr, and Fe with ICP methods

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TABLE 2-ANALYTE REPORTING LIMIT INFORMATION FOR FAA AND ICP METHODS

FAA, Flame Atomic Absorption; MRL, Method Reporting Limit; ICP, Inductively Coupled Plasma

Analyte	FAA Labcode	Watstore Code	MRL	ICP Labcode	Watstore Code	MRL
Barium, filtered	7	01005B	100 µg/L	641	01005C	1 µg/L
Beryllium, filtered	170	01010A	10 µg/L	655	01010B	0.5 µg/L
Cadmium, filtered	126	01025A	10 µg/L	673	01025D	1 µg/L
Calcium, filtered	12	00915C	0.1 mg/L	659	00915D	0.02 mg/L
Cobalt, filtered	148	01035A	50 µg/L	644	01035C	3 µg/L
Copper, filtered	151	01040A	10 µg/L	657	01040C	10 µg/L
Iron, filtered	172	01046C	10 µg/L	645	01046D	3 µg/L
Lead, filtered	191	01049A	100 µg/L	646	01049C	10 µg/L
Lithium, filtered	39	01130A	10 µg/L	664	01130B	4 µg/L
Magnesium, filtered	40	00925B	0.1 mg/L	663	00925C	0.01 mg/L
Manganese, filtered	42	01056A	10 µg/L	648	01056C	1 µg/L
Nickel, filtered	197	01065A	100 µg/L	721	01065E	10 µg/L
Sodium, filtered	59	00930B	0.1 mg/L	675	00930C	0.2 mg/L
Strontium, filtered	62	01080A	10 µg/L	652	01080B	0.5 µg/L
Zinc, filtered	67	01090A	10 µg/L	671	01090B	3 µg/L