



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
LBS90130

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF
ROBERTA WAGNER 304-558-0067

VENDOR

*906122935 262-241-7900
 SEAL ANALYTICAL INC
 MEQUON TECHNOLOGY CENTER
 10520 C BAEHR RD
 MEQUON WI 53092

SHIP TO

HEALTH AND HUMAN RESOURCES
 ENVIRONMENTAL CHEMISTRY LAB
 4710 CHIMNEY DRIVE
 CHARLESTON, WV
 25302 304-558-3530

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
04/22/2009				

BID OPENING DATE: 05/20/2009 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	JB		493-08		
<p>ONE AUTOMATED DISCRETE ANALYZER INSTRUMENT</p> <p>REQUEST FOR QUOTATION</p> <p>TO PROVIDE AN AUTOMATED DISCRETE ANALYZER INSTRUMENT TO ANALYZER FOR NITRATE+NITRITE NITROGEN AND NITRITE NITROGEN IONS IN DRINKING WATER TO FULFILL REQUIREMENTS OF US EPA REGULATIONS FOR COMPLIANCE MONITORING OF PUBLIC WATER SYSTEMS AND OF PRIVATE WELLS. PER THE ATTACHED SPECIFICATIONS.</p> <p>THIS INSTRUMENT IS TO BE INSTALLED FOR USE BY THE ENVIRONMENTAL CHEMISTRY LABORATORY LOCATED AT 4710 CHIMNEY DRIVE, SUITE G, CHARLESTON, WV 25302.</p> <p>PROOF OF WORKER'S COMPENSATION INSURANCE IS A REQUIREMENT OF THIS CONTRACT.</p> <p>CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE COMMODITIES AND/OR SERVICES SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM TO THE SPECIFICATIONS OF THE BID AND CONTRACT HEREIN.</p> <p>BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THIS CONTRACT IS AUTOMATICALLY NULL AND VOID, AND IS TERMINATED WITHOUT FURTHER ORDER.</p> <p>INQUIRIES:</p>						

RECEIVED

2009 MAY 19 A 10:17

PURCHASING DIVISION
STATE OF WV

SEE REVERSE SIDE FOR TERMS AND CONDITIONS			
SIGNATURE	TELEPHONE	DATE	
<i>Shirley D. Smith</i>	262-241-7900	05/15/09	
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE	
PRESIDENT	81-0565037		

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



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<p>WRITTEN QUESTIONS SHALL BE ACCEPTED THROUGH CLOSE OF BUSINESS ON 5/4/2009. QUESTIONS MAY BE SENT VIA USPS, FAX, COURIER, OR E-MAIL. IN ORDER TO ASSURE NO VENDOR RECEIVES AN UNFAIR ADVANTAGE, NO SUBSTANTIVE QUESTIONS WILL BE ANSWERED ORALLY. IF POSSIBLE, E-MAIL QUESTIONS ARE PREFERRED. ADDRESS INQUIRIES TO:</p> <p>ROBERTA WAGNER DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25311</p> <p>FAX: 304-558-4115 E-MAIL: RWAGNER@WVADMIN.GOV</p> <p>THE MODEL/BRAND/SPECIFICATIONS NAMED HEREIN ESTABLISH THE ACCEPTABLE LEVEL OF QUALITY ONLY AND ARE NOT INTENDED TO REFLECT A PREFERENCE OR FAVOR ANY PARTICULAR BRAND OR VENDOR. VENDORS WHO ARE BIDDING ALTERNATES SHOULD SO STATE AND INCLUDE PERTINENT LITERATURE AND SPECIFICATIONS. FAILURE TO PROVIDE INFORMATION FOR ANY ALTERNATES MAY BE GROUNDS FOR REJECTION OF THE BID. THE STATE RESERVES THE RIGHT TO WAIVE MINOR IRREGULARITIES IN BIDS OR SPECIFICATIONS IN ACCORDANCE WITH SECTION 148-1-4(F) OF THE WEST VIRGINIA LEGISLATIVE RULES AND REGULATIONS.</p>						

NOTICE

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
<i>Smart...</i>	262-241-7900	05/15/09
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE
PRESIDENT	81-0565037	

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04/22/2009				

BID OPENING DATE: 05/20/2009 BID OPENING TIME: 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>A SIGNED BID MUST BE SUBMITTED TO:</p> <p>DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION BUILDING 15 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25305-0130</p> <p>NOTE: A CONVENIENCE COPY WOULD BE APPRECIATED.</p> <p>THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:</p> <p>SEALED BID</p> <p>BUYER:-----ROBERTA WAGNER/FILE 22-----</p> <p>RFQ. NO.:-----LBS90130-----</p> <p>BID OPENING DATE:----- 5/20/2009-----</p> <p>BID OPENING TIME:-----1:30 PM-----</p> <p>PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID:</p> <p>----- 262-241-7970 -----</p> <p>CONTACT PERSON (PLEASE PRINT CLEARLY):</p> <p>----- STUART SMITH -----</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS			
SIGNATURE <i>Stuart Smith</i>	TELEPHONE 262-241-7900	DATE 05/15/09	
TITLE PRESIDENT	FEIN 81-0565037	ADDRESS CHANGES TO BE NOTED ABOVE	

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DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
04/22/2009				

BID OPENING DATE: **05/20/2009** BID OPENING TIME: **01:30PM**

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
***** THIS IS THE END OF RFQ LBS90130 ***** TOTAL:						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Stuart A. Ormrod</i>	TELEPHONE 262-241-7900	DATE 05/15/09
TITLE PRESIDENT	FEIN 81-0565037	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

RFQ COST SHEET

Bidders shall provide a cost for the following:

Automated Discrete Analyzer System

\$ 43,953.00

On-site Training (3 days at installation of equipment)

\$ INCLUDED

First Year Extended Warranty

\$ 3,900.00

Total Cost \$ 47,853.00

The award will be made to the vendor with the lowest overall total cost of the equipment which meets all requested specifications and requirements. Payment will be made in arrears.



Vendor Signature

05/15/09
Date

AGREEMENT ADDENDUM

In the event of conflict between this addendum and the agreement, this addendum shall control:

1. **DISPUTES** - Any references in the agreement to arbitration or to the jurisdiction of any court are hereby deleted. Disputes arising out of the agreement shall be presented to the West Virginia Court of Claims.
2. **HOLD HARMLESS** - Any clause requiring the Agency to indemnify or hold harmless any party is hereby deleted in its entirety.
3. **GOVERNING LAW** - The agreement shall be governed by the laws of the State of West Virginia. This provision replaces any references to any other State's governing law.
4. **TAXES** - Provisions in the agreement requiring the Agency to pay taxes are deleted. As a State entity, the Agency is exempt from Federal, State, and local taxes and will not pay taxes for any Vendor including individuals, nor will the Agency file any tax returns or reports on behalf of Vendor or any other party.
5. **PAYMENT** - Any references to prepayment are deleted. Payment will be in arrears.
6. **INTEREST** - Should the agreement include a provision for interest on late payments, the Agency agrees to pay the maximum legal rate under West Virginia law. All other references to interest or late charges are deleted.
7. **RECOUPMENT** - Any language in the agreement waiving the Agency's right to set-off, counterclaim, recoupment, or other defense is hereby deleted.
8. **FISCAL YEAR FUNDING** - Service performed under the agreement may be continued in succeeding fiscal years for the term of the agreement, contingent upon funds being appropriated by the Legislature or otherwise being available for this service. In the event funds are not appropriated or otherwise available for this service, the agreement shall terminate without penalty on June 30. After that date, the agreement becomes of no effect and is null and void. However, the Agency agrees to use its best efforts to have the amounts contemplated under the agreement included in its budget. Non-appropriation or non-funding shall not be considered an event of default.
9. **STATUTE OF LIMITATION** - Any clauses limiting the time in which the Agency may bring suit against the Vendor, lessor, individual, or any other party are deleted.
10. **SIMILAR SERVICES** - Any provisions limiting the Agency's right to obtain similar services or equipment in the event of default or non-funding during the term of the agreement are hereby deleted.
11. **ATTORNEY FEES** - The Agency recognizes an obligation to pay attorney's fees or costs only when assessed by a court of competent jurisdiction. Any other provision is invalid and considered null and void.
12. **ASSIGNMENT** - Notwithstanding any clause to the contrary, the Agency reserves the right to assign the agreement to another State of West Virginia agency, board or commission upon thirty (30) days written notice to the Vendor and Vendor shall obtain the written consent of Agency prior to assigning the agreement.
13. **LIMITATION OF LIABILITY** - The Agency, as a State entity, cannot agree to assume the potential liability of a Vendor. Accordingly, any provision limiting the Vendor's liability for direct damages to a certain dollar amount or to the amount of the agreement is hereby deleted. Limitations on special, incidental or consequential damages are acceptable. In addition, any limitation is null and void to the extent that it precludes any action for injury to persons or for damages to personal property.
14. **RIGHT TO TERMINATE** - Agency shall have the right to terminate the agreement upon thirty (30) days written notice to Vendor. Agency agrees to pay Vendor for services rendered or goods received prior to the effective date of termination.
15. **TERMINATION CHARGES** - Any provision requiring the Agency to pay a fixed amount or liquidated damages upon termination of the agreement is hereby deleted. The Agency may only agree to reimburse a Vendor for actual costs incurred or losses sustained during the current fiscal year due to wrongful termination by the Agency prior to the end of any current agreement term.
16. **RENEWAL** - Any reference to automatic renewal is hereby deleted. The agreement may be renewed only upon mutual written agreement of the parties.
17. **INSURANCE** - Any provision requiring the Agency to insure equipment or property of any kind and name the Vendor as beneficiary or as an additional insured is hereby deleted.
18. **RIGHT TO NOTICE** - Any provision for repossession of equipment without notice is hereby deleted. However, the Agency does recognize a right of repossession with notice.
19. **ACCELERATION** - Any reference to acceleration of payments in the event of default or non-funding is hereby deleted.
20. **CONFIDENTIALITY**: -Any provision regarding confidentiality of the terms and conditions of the agreement is hereby deleted. State contracts are public records under the West Virginia Freedom of Information Act.
21. **AMENDMENTS** - All amendments, modifications, alterations or changes to the agreement shall be in writing and signed by both parties. No amendment, modification, alteration or change may be made to this addendum without the express written approval of the Purchasing Division and the Attorney General.

ACCEPTED BY:

STATE OF WEST VIRGINIA

Spending Unit: _____

Signed: _____

Title: _____

Date: _____

VENDOR

Company Name: SEAL ANALYTICAL, INC.

Signed: [Signature]

Title: PRESIDENT

Date: 05/15/09

ATTACHMENT
P.O.# LB390130

This agreement constitutes the entire agreement between the parties, and there are no other terms and conditions applicable to the licenses granted hereunder.

Agreed

Stuart D. Quinn 05/15/09

Signature : Date

PRESIDENT
Title

SEAL ANALYTICAL, INC.
Company Name

Signature Date

Title

Agency/Division

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

VENDOR OWING A DEBT TO THE STATE:

West Virginia Code §5A-3-10a provides that: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

PUBLIC IMPROVEMENT CONTRACTS & DRUG-FREE WORKPLACE ACT:

If this is a solicitation for a public improvement construction contract, the vendor, by its signature below, affirms that it has a written plan for a drug-free workplace policy in compliance with Article 1D, Chapter 21 of the *West Virginia Code*. The vendor **must** make said affirmation with its bid submission. Further, public improvement construction contract may not be awarded to a vendor who does not have a written plan for a drug-free workplace policy in compliance with Article 1D, Chapter 21 of the *West Virginia Code* and who has not submitted that plan to the appropriate contracting authority in timely fashion. For a vendor who is a subcontractor, compliance with Section 5, Article 1D, Chapter 21 of the *West Virginia Code* may take place before their work on the public improvement is begun.

ANTITRUST:

In submitting a bid to any agency for the state of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the state of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the state of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the state of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership or person or entity submitting a bid for the same materials, supplies, equipment or services and is in all respects fair and without collusion or fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

LICENSING: APPLICATION FOR EXEMPTION FROM CERTIFICATE OF AUTHORITY
Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agencies or political subdivision. Furthermore, the vendor must provide all necessary releases to obtain information to enable the Director or spending unit to verify that the vendor is licensed and in good standing with the above entities. *HAS BEEN SUBMITTED*

CONFIDENTIALITY:

The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf>.

Under penalty of law for false swearing (*West Virginia Code* §61-5-3), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

Vendor's Name: SEAL ANALYTICAL, INC.
Authorized Signature: *Scott A. Quinn* Date: 05/15/09



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BID OPENING DATE	BID OPENING TIME 01:30PM			
05/20/2009				

LINE	QUANTITY	UOP	CAT NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>ADDENDUM NO. 1</p> <p>1. QUESTIONS AND ANSWERS ARE ATTACHED.</p> <p>2. ADDENDUM ACKNOWLEDGEMENT IS ATTACHED. THIS DOCUMENT SHOULD BE SIGNED AND RETURNED WITH YOUR BID. FAILURE TO SIGN AND RETURN MAY RESULT IN DISQUALIFICATION OF YOUR BID.</p> <p>EXHIBIT 10</p> <p>REQUISITION NO.: LBS90130</p> <p>ADDENDUM ACKNOWLEDGEMENT</p> <p>I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.</p> <p>ADDENDUM NO.'S:</p> <p>NO. 1 .. X</p> <p>NO. 2</p> <p>NO. 3</p> <p>NO. 4</p> <p>NO. 5</p> <p>I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF BIDS.</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

TELEPHONE 262-241-7900 DATE 05/15/09

RESIDENT 81-0565037 ADDRESS CHANGES TO BE NOTED ABOVE

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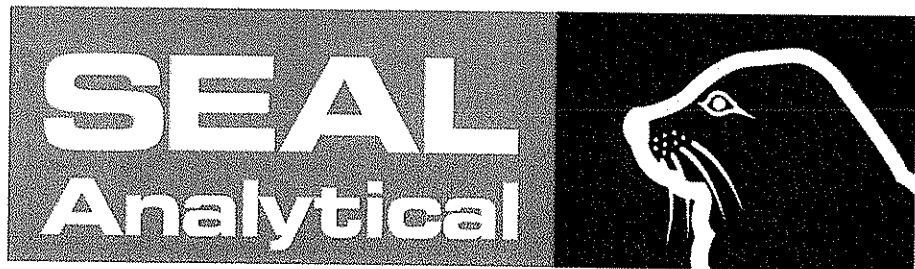
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<p>VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.</p> <p style="text-align: center;">  SIGNATURE ..SEAL ANALYTICAL INC. COMPANY ..05/15/09..... DATE </p> <p>REV. 11/96</p> <p style="text-align: center;">END OF ADDENDUM NO. 1</p>						

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**STATE OF WEST VIRGINIA
RFQ LBS90130
Automated Discrete Analyzer**

RESPONSE TO BID SPECIFICATIONS

Submittals with Bid:

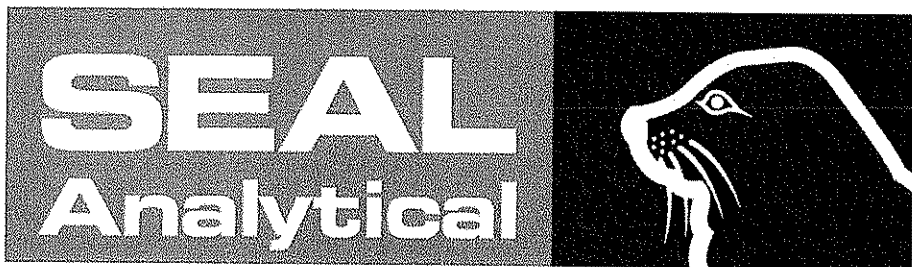
1. AQ2+ brochure
2. SEAL Analytical Who's Who and Qualifications of Technical Staff
3. SEAL Service and Support Contract
4. SEAL Analytical reference list. More references available, if requested.
5. SEAL Environmental Methods List
6. Front pages from SEAL methods per Request for Quotation
7. EPA letters of approval for specified methods
8. Two Column Comparisons for specified methods
9. Certificate of Insurance

The quoted AQ2+ Discrete Analyzer from SEAL Analytical meets or exceeds all the listed specifications.

Additional Notes:

INSTRUMENT SPECIFICATIONS

As the manufacturer of the original Technicon AutoAnalyzer II, we can confirm that there are certain critical parts no longer being manufactured as new.



WARRANTY REQUIREMENTS

1. We provide a telephone/email/fax service desk at our Milwaukee facility from 9:00 AM to 5:00 PM as part of our standard service to our customers. All service calls are logged and an in-house Engineer or Chemist will trouble-shoot the problem by telephone. Our statistics show that over 80% of user questions are diagnosed and corrected by telephone and/or email intervention, without a site visit being necessary. If this does not resolve the problem, a field based Technical Specialist is assigned to visit the site.
2. Technical Support Service Contracts: A full range of customer support contracts are available. (Please see attached.) It is our aim to supply a fully-installed system and provide the application, software and engineering back up to ensure the highest performance from your new analytical system.
3. Maintenance Service: An annual preventative maintenance service visit is provided with a purchased standard service contract or the preventative maintenance visit can be purchased separately. This preventative maintenance service would include replacement of all the standard PM parts: all the tubing in the instrument, along with all the syringe components, sampler and aspiration probes, probe flusher and lamp. As part of the PM, temperature and voltage checks are then performed. Finally, the dilutor accuracy and detector precision are checked.
4. On site emergency service (including travel expenses, labor and parts) is included as part of the standard warranty during the first year of use. One annual emergency visit is included as part of our premium support and service contract for year two and thereafter. For those customers with a basic support and service contract, or without a contract, the on site emergency service fee is negotiated on a case by case basis (base fees: \$400/day travel expenses plus air fare & \$150/hr labor). In some cases, it is most advantageous for the AQ2+ to be returned to our facility for repair. A loaner stock of AQ2+ analyzers, along with a parts and consumables inventory, is maintained at the Milwaukee site.
5. Our typical response time for a Specialist to reach a site would be within 24 working hours. All support staff are our own employees, and not contract labor, and therefore would be dispatched from the Milwaukee site.

SEAL Analytical, Inc.
Mequon Technology Center
10520-C Baehr Rd.
Mequon, WI 53092
Phone: 262-241-7900
Fax: 262-241-7970
Email: sales@seal-us.com
www.seal-analytical.com



Price Quotation for:

Date: 05/18/09 Valid Until: 07/18/09
Quote No: JEK-090518-RW

State of West Virginia
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Purchasing Division
2019 Washington St., East
Charleston, WV 25311

Phone: (304) 558-0067
Fax: (304) 558-4115
Email: rwagner@wvadmin.gov

For the Attention of: Roberta Wagner



AQ2+ Automated Multi-Chemistry Analyzer to include:

▪ AQ2+ Chemistry Unit, 120V/60Hz (for up to 7 filter wavelengths)	
▪ Operating Software	
▪ Start-up accessories kit to include - Lamp assembly, Peristaltic tubing, Syringe piston w/ glass body, Reaction segments, Sample cups, Reagent containers	
▪ 2x57 position sample trays	
▪ Operators', S/W & Methods, Manuals	
▪ Nitrate Cadmium Reduction Hardware (includes cadmium coil)	\$47,500
▪ 3 Days Install/Training	included
▪ 12 month Warranty (parts & labor)	included
▪ Freight and Handling	\$ 800
U.S. List Price	\$48,300
Less Governmental Discount – 9%	\$ 4,347
Discounted OFFER Price	\$43,953

Terms: 30% payable within 7 days of placement of order
70% upon delivery, payable within 30 days
Subject to credit approval

Delivery: 4 weeks after receipt of order

Freight: FOB Destination.



WHAT IS NOT INCLUDED? - OPTIONS

Hi Spec Computer: includes 17" flat panel monitor and laser printer

Unit PRICE \$ 1600

Please note that the PC may be purchased by your company; however, you must meet our minimum specifications:

2.8 GHz (or above) Pentium 4 PC with: CD-RW Drive for reading software and back-up of data

512 MB RAM

40 GB Hard Disk

2 Spare USB Ports

Parallel Printer Port

Keyboard, Mouse (PS2 connection)

Flat Panel Display Monitor (capable of 128x1024 resolution at 32 bit color)

High Speed Laser Printer (6ppm)

Windows XP Home or Professional Software Package

100 Position Sample Tray includes one bag of 2000 sample cups

Unit PRICE \$ 450

APC Back-UPS 900VA

Unit PRICE \$ 320

SEAL Analytical will not assume responsibility for damage caused to instrument from power outages or power surges in the laboratory.

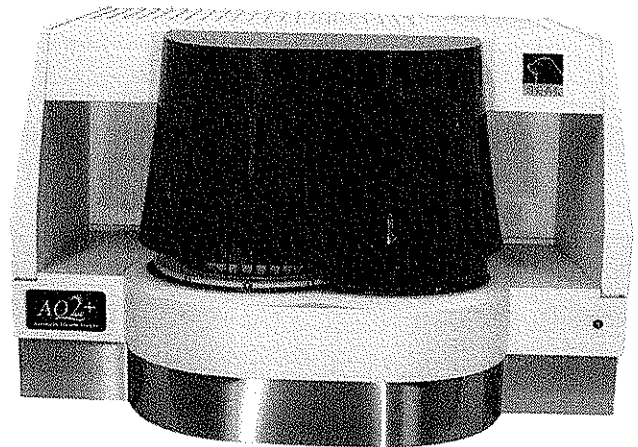


Summary

AQ2 Automated Multi-Chemistry Discrete Analyzer

The **AQ2 Analyzer** is a **bench top Analyzer** that has been developed to meet the specific need for a modern, automated discrete analyzer in the environmental laboratory.

This analyzer has been developed to address the needs of laboratories that require high levels of **automation**, a wide range of chemistries, limits of detection that ensure **compliance with regulatory requirements** and the advantages of integration with **LIMS** systems. The AQ2 is a flexible system that meets these requirements and can be configured via the industry specific software to meet the operational needs of laboratories with a wide range of analytical and throughput levels.



Design & Functional Specifications

The design concept of the SEAL Analyzers is to enhance productivity of analytical services in busy laboratories by streamlining the workflow of samples and information through the total analytical process. Extensive experience in environmental laboratories has shown that the key to increasing productivity is the avoidance of multiple types of equipment and analytical procedures. In a laboratory where the routine range of colorimetric determinants requires the use of a range of instruments with restricted test menu, low throughput and multiple calibration/maintenance needs, the workflow involves several processes which are labor intensive, subject to potential error, and costly to operate. These include:

- The need to produce separate work-lists/load-lists for the different analyzers, with associated test order entry.
- The splitting of samples and maintaining integrity of identity of the sub-aliquots.
- Separate calibration, operation, and quality control regimens on multiple analyzers.
- Collating results from multiple analyzers for final reports, possibly with multiple interfaces to LIMS.



When these elements are rigorously costed, inclusive of personnel time, instrument maintenance costs, space requirements, duplicated consumables, I.T. costs, etc., it becomes clear that the overall cost of analysis per sample is greatly reduced by consolidating the workflow onto a single nutrients system. Thus, the design specification of the SEAL Analyzers was to develop a family of units based on a standard software platform, utilizing the same range of chemistries, which have the breadth of test menu, speed of throughput, and flexibility to process a workload that would otherwise require a combination of different contemporary analyzers and manual assay techniques.

Equally, it is a requirement that any analyzer selected meets the analytical performance criteria set out by the US EPA and other Standard bodies. Whereas, many contemporary analyzers in this market are required to operate at the extreme edge of their detection capability to meet these limits, the SEAL Analyzers routinely meet these criteria.

Finally, SEAL recognizes that the environment within which our systems operate is subject to change, whether from new technical demands, regulatory affairs, or changing practices of the Water & Environmental Industry. Therefore, we commit continuing resources to system development, including hardware enhancements, applications, software and chemistry methods.

Environmental Policy

SEAL is a manufacturer of high-quality automated analyzers and supplier of reagent systems for use in the Water, Soils and Environmental analysis sectors. The Company is aware that its products do have an impact on the environment in both the production and end-user stages of the product life cycle. The Company is therefore making every effort to determine the environmental impact of its operation and products and, where possible, implement a policy of reduction.

Specifically:

- Design new reagents and analyzers to take account of environmental issues such as waste production, power consumption, and low heat dissipation.
- Reformulate reagent systems to reduce harmful waste without affecting analytical performance.
- Provide full COSHH safety data on all products.
- Recycle, where practical, in-house produced waste.
- Minimize energy consumption within the factory and in the transport provided to employees.



Environmental Issues

- Discrete analysis by definition uses less than 10% of the reagents used by Continuous Flow systems.
- The Reaction Segments are manufactured from polystyrene. This material presents some issues for recycling but SEAL is currently investigating opportunities.

Warranty Statement

Please see below for our standard warranty statement.

AQ2 Training

The AQ2 system and software design has been strongly influenced through years of listening to SEAL users. As a result, the system is easy and intuitive to use and thus an on-site training course is conducted at installation.

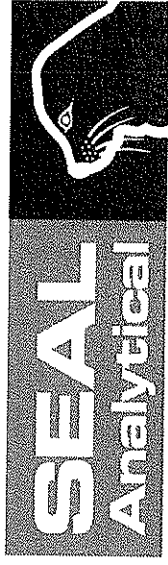
The training agenda covers the following aspects of the system:

- Introduction
- Hardware overview
- Principles of operation
- Daily routine
- System software
 - Test parameters
 - Reagent parameters
 - Standard definition
 - AQC definition
 - Scheduling
 - Routine running
 - Acceptance
 - Data storage routines
 - LIMS interface
- Analyzer routine maintenance
- Troubleshooting/corrective maintenance
- Method Applications



Warranty Policy:

- Subject to the conditions set out below, the Company warrants that the Goods will correspond with their specification at the time of delivery and will be free from defects in material and workmanship for a period of 12 months from the date of the initial use or 15 months from delivery, whichever is the first to expire.
- The above warranty given by the Company subject to the following conditions:
- The Company shall be under no liability in respect of any defect in the Goods arising from any drawings, design or specification supplied by the Buyer;
- The Company shall be under no liability in respect of any defect arising from fair wear and tear, willful damage, negligence, abnormal working conditions, failure to follow the Company's instruction (whether oral or in writing), misuse or alteration or repair of the Goods without the Company's approval;
- The Company shall be under no liability under the above warranty (or any other warranty, conditions of guarantee) if the total price of the Goods has not been paid by the due date of payment;
- The above warranty does not extend to parts, materials or equipment not manufactured by the Company, in respect of which the Buyer shall only be entitled to the benefit of any such warranty or guarantee as is given by the manufacturer to the Company.
- Any claim by the Buyer which is based on any defect in the quality or condition of the Goods or their failure to correspond with specification shall (whether or not delivery is refused by the Buyer) be notified by the Company within 7 days from the date of delivery (where the defect or failure was not apparent on reasonable inspection) within a reasonable time within discovery of the defect or failure. If delivery is not refused and the Buyer does not notify the Company accordingly, the Buyer shall not be entitled to reject the Goods and the Company shall have no liability for such defects or failure and the Buyer shall be bound to pay the price as if the Goods had been delivered in accordance with the Contract.
- Where any valid claim in respect of any of the Goods which is based on any defect in the quality of condition of the Goods or their failure to meet specification is notified to the Company in accordance with these Conditions, the Company shall be entitled to replace the Goods (or the part in question) free of charge, at the Company's sole discretion, refund to the Buyer the price of the Goods (or a proportionate part of the price), but the Company shall have no further liability to the Buyer.
- Except in respect of the death or personal injury caused by the Company's negligence, the Company shall not be liable to the Buyer by reason of any representation, or any implied warranty, condition or other term, or any duty at common law, or under the express terms of the Contract, for any consequential loss or damage (whether for loss of profit or otherwise), costs expenses or other claims for consequential compensation whatsoever (and whether caused by the negligence of the Company, its employees or agents or otherwise) which arise out of or in connection with the supply of Goods or their use resale by the Buyer except as expressly provided in these Terms.
- The Company shall not be liable to the Buyer or be deemed to be in breach of the Contract by reason of any delay in performing, or any failure to perform, any of the Company's obligations in relation to the Goods, if the delay or failure was due to any cause beyond the Company's reasonable control. Without prejudice to the generality of the foregoing, the following shall be regarded as causes beyond the Company's reasonable control; Act of God, explosion, flood, tempest, fire or accident; war or threat of war, sabotage, insurrection, civil disturbance or requisition, acts, requisition, regulations, bye laws, prohibition or measures of any kind of the part of any Governmental, Local Authority; import or export regulations or embargo's, strike, lock-outs or other industrial actions or trade disputes (whether involving employees of the Company or of a third party); difficulties in obtaining raw materials, labor, fuel, parts or machinery; power failure or breakdown in machinery.



ENVIRONMENTAL METHODS LIST – USEPA Rev 11

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

ANALYTE	METHOD DESCRIPTION	METHOD NUMBER	METHOD DETECTION LIMIT	EQUIVALENCE
ALKALINITY	Buffered methyl orange color reduction	EPA-100-A Rev. 2	3.5 mg CaCO ₃ /L (Range: 5 to 80 mg/L)	EPA 310.2
		EPA-101-A Rev. 2	8 mg CaCO ₃ /L (Range: 15 to 200 mg/L)	
		EPA-102-A Rev. 2	27 mg CaCO ₃ /L (Range: 44 to 550 mg/L)	
AMMONIA	Alkaline phenate method with hypochlorite and sodium nitroprusside (indophenol blue)	EPA-103-A Rev. 6	0.007 mg N/L (Range: 0.02 to 2.0 mg N/L)	EPA 350.1 Std. Methods 4500-NH ₃ G (19 th , 20 th)
		EPA-129-A Rev. 5	0.05 mg N/L (Range: 0.2 to 10 mg N/L)	
AMMONIA	Alkaline phenate method with hypochlorite and sodium nitroprusside (indophenol blue). This is a bracketish method.	EPA-104-A Rev. 3	0.02 mg N/L (Range: 0.05 to 2.0 mg N/L)	EPA 350.1 Std. Methods 4500-NH ₃ G (19 th , 20 th)
CHLORIDE	Mercuric thiocyanate reaction in the presence of ferric nitrate	EPA-105-A Rev. 4	0.3 mg/L (Range: 2 to 100 mg/L)	Std. Methods 4500-Cl E (18 th , 19 th , 20 th)
		EPA-124-A Rev. 4	0.4 mg/L (Range: 5 to 200 mg/L)	
CHROMIUM, Hexavalent	Colorimetric	EPA-108-A Rev. 1	0.001 mg/L (Range: 0.025 to 0.5 mg Cr(VI)/L)	EPA 218.4 Std. Methods 3500-Cr B (20 th)
		EPA-109-A Rev. 1	0.011 mg/L (Range: 0.3 to 5.0 mg Cr(VI)/L)	
COLOR	Platinum-cobalt standard comparison	EPA-140-A Rev. 1	2 Color Units (Range: 5 to 150 Color Units)	Std. Methods 2120 B (18 th , 19 th , 20 th)
CYANIDE	Amenable to chlorination (Manual distillation required)	EPA-107-A Rev. 5	0.0004 mg CN/L (Range: 0.002 to 0.3 mg CN/L)	EPA 335.1 Std. Methods 4500-CN G (18 th , 19 th , 20 th)
CYANIDE	Chloramine-T with pyridine barbituric acid color reaction (Manual distillation required)	EPA-107-A Rev. 5	0.0004 mg CN/L (Range: 0.002 to 0.3 mg CN/L)	EPA 335.2 Std. Methods 4500-CN E (18 th , 19 th , 20 th)
CYANIDE	Chloramine-T with pyridine barbituric acid color reaction (Manual distillation required)	EPA-130-A Rev. 3	0.0005 mg CN/L (Range: 0.003 to 0.25 mg CN/L)	EPA 335.4 Std. Methods 4500-CN E (18 th , 19 th , 20 th)
CYANIDE	Amenable to chlorination (Without distillation)	EPA-133-A Rev. 1	0.0004 mg CN/L (Range: 0.002 to 0.3 mg CN/L)	Std. Methods 4500-CN H (20 th)

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ENVIRONMENTAL METHODS LIST -- USEPA Rev 11

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

A02

ANALYTE	METHOD DESCRIPTION	METHOD NUMBER	METHOD DETECTION LIMIT	EQUIVALENCE
HARDNESS, Total	Calmagite indicator reaction	EPA-106-A Rev. 2	11 mg CaCO ₃ /L (Range: 25 to 400 mg/L)	EPA 130.1
NITROGEN, Total Kjeldahl (TKN)	Kjeldahl digests (Hg catalyst) are reacted with alkaline salicylate in the presence of hypochlorite and sodium nitroprusside (Digestion required)	EPA-125-A Rev. 5	0.03 mg N/L (Range: 0.1 to 4.0 mg N/L)	EPA 351.2, version 2 (1993)
		EPA-110-A Rev. 5	0.2 mg N/L (Range: 0.5 to 24 mg N/L)	
		EPA-111-A Rev. 4	0.035 mg N/L (Range: 0.1 to 4.0 mg N/L)	
NITROGEN, Total Kjeldahl (TKN)	Kjeldahl digests (Cu catalyst) are reacted with alkaline salicylate in the presence of hypochlorite and sodium nitroprusside (Digestion required)	EPA-136-A Rev. 3	0.15 mg N/L (Range: 0.4 to 24 mg N/L)	EPA 351.2, version 2 (1993)
		EPA-127-A Rev. 5	0.003 mg N/L (Range: 0.012 to 2.0 mg N/L)	EPA 353.2 Std. Methods 4500-NO ₃ F (18 th , 19 th , 20 th)
NITRATE + NITRITE	Cadmium coil reduction followed by sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	EPA-126-A Rev. 5	0.006 mg N/L (Range: 0.03 to 4.5 mg N/L)	
		EPA-114-A Rev. 6	0.03 mg N/L (Range: 0.25 to 15 mg N/L)	
NITRATE + NITRITE	Cadmium coil reduction followed by sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride (Imidazole buffer used)	EPA-132-A Rev. 1	0.004 mg N/L (Range: 0.012 to 2.0 mg N/L)	N/A
NITRITE	Sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	EPA-115-A Rev. 3	0.0025 mg N/L (Range: 0.015 to 1.2 mg N/L)	EPA 353.2 Std. Methods 4500-NO ₃ F (18 th , 19 th , 20 th)
		EPA-137-A Rev. 1	0.0006 mg N/L (Range: 0.002 to 0.2 mg N/L)	
NITRITE	Sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	EPA-116-A Rev. 3	0.0005 mg N/L (Range: 0.002 to 0.24 mg N/L)	EPA 354.1 Std. Methods 4500-NO ₂ B (18 th , 19 th , 20 th)
PHENOLICS	Sample distillates are reacted with alkaline ferricyanide and 4-aminoantipyrine (Manual distillation required)	EPA-117-A Rev. 4	0.003 mg/L (Range: 0.01 to 0.4 mg phenol/L)	EPA 420.4
PHOSPHATE, Ortho	Acidic molybdate/antimony with ascorbic acid reduction (phosphomolybdenum blue)	EPA-118-A Rev. 3	0.0015 mg P/L (Range: 0.005 to 1.0 mg P/L)	EPA 365.1 Std. Methods 4500-P F (18 th , 19 th , 20 th)
		EPA-128-A Rev. 5	0.005 mg P/L (Range: 0.32 to 20 mg P/L)	
PHOSPHORUS, Total (TP)	Acidic molybdate/antimony with ascorbic acid reduction (Manual persulfate digestion required)	EPA-119-A Rev. 5	0.002 mg P/L (Range: 0.01 to 1.0 mg P/L)	EPA 365.1 Std. Methods 4500-P B, F (18 th , 19 th , 20 th)
		EPA-134-A Rev. 2	0.007 mg P/L (Range: 0.063 to 5.0 mg P/L)	

ENVIRONMENTAL METHODS LIST – USEPA Rev 11

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B



ANALYTE	METHOD DESCRIPTION	METHOD NUMBER	METHOD DETECTION LIMIT	EQUIVALENCE
PHOSPHORUS, Total Kjeldahl (TKP)	Kjeldahl digests (Hg catalyst) are reacted with acidic molybdate/antimony with ascorbic acid reduction	EPA-120-A Rev. 4	0.007 mg P/L (Range: 0.04 to 3.2 mg P/L)	EPA 365.4
PHOSPHORUS, Total Kjeldahl (TKP)	Kjeldahl digests (Cu catalyst) are reacted with acidic molybdate/antimony with ascorbic acid reduction. Method range depends on digestion protocol	EPA-135-A Rev. 1	0.009 mg P/L (Range: 0.04 to 3.2 mg P/L)	N/A
		EPA-138-A	TBD mg P/L (Range: 0.05 to 3.0 mg P/L)	
SILICA (Reactive silica)	Acidic molybdate, no reduction (molybdo-silicic acid)	EPA-121-A Rev. 1	0.1 mg/L (Range: 0.25 to 25 mg/L)	Std. Methods 4500-SiO ₂ C (20 th)
SILICA (Reactive silica)	Acidic molybdate with ANSA reduction (silico-molybdenum blue)	EPA-122-A Rev. 5	0.025 mg/L (Range: 0.1 to 10 mg/L)	Std. Methods 4500-SiO ₂ D (20 th)
SULFATE	Barium chloride turbidimetric method	EPA-123-A Rev. 4	1.0 mg/L (Range: 5 to 40 mg/L)	ASTM D516-90, 02

SEAL Analytical is continually developing methods. Please note that others may exist. If you do not see your chosen method on this list, please consult your SEAL Analytical Technical Support Team at:

SEAL Analytical Ltd.
67 Victoria Rd.
Burgess Hill
Sussex RH15 9TR
United Kingdom
Tel: +44 (0) 1444 872600
Fax: +44 (0) 1444 871495

SEAL Analytical, Inc.
Mequon Technology Center
10520-C Baehr Rd.
Mequon, WI 53092
United States
Tel: +1 (262) 241 7900
Fax: +1 (262) 241 7970

SEAL Analytical GmbH
Werkstrasse 4
D-22844 Norderstedt
Germany
Tel: +49 40 522 02 100
Fax: +49 40 522 02 473

On the Worldwide Web at www.seal-analytical.com



NITRATE-N + NITRITE-N IN DRINKING AND SURFACE WATERS, AND DOMESTIC AND INDUSTRIAL WASTES

AQ2 METHOD NO: EPA-114-A Rev. 6

TYPE OF SAMPLE

This method is applicable to sewage, effluents, raw and drinking waters. This method is approved for the Clean Water Act for use in wastewater compliance monitoring under the National Pollutant Discharge Elimination System (NPDES) and for use in NPDWR (National Primary Drinking Water Regulations) compliance monitoring. The laboratory should consult the most recent Code of Federal Regulations for applicability and approval by the Clean Water and Safe Drinking Water Acts (40 CFR parts 136 and 141, respectively).

SUBSTANCE DETERMINED

Nitrate and nitrite ions

RANGE OF APPLICATION

0.25 – 15 mg N/L

LIMIT OF DETECTION BY USEPA PROCEDURE

MDL = 0.03 mg N/L

METHOD PRINCIPLE – USEPA METHOD 353.2

Nitrate is reduced by copperized cadmium to nitrite, which reacts with sulfanilamide to form a diazonium compound which, in dilute phosphoric acid, couples with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a reddish-purple azo dye. This is measured spectrophotometrically at 520 nm. Separate rather than combined nitrate/nitrite values are obtained by running the samples on sequential tests, i.e., first with, and then without the copperized cadmium reduction step.

INTERFERENCES

Since nitrate-nitrogen is dissolved, the sample may be pre-filtered. Low results may be obtained for samples that contain high concentrations of iron, copper or other metals. EDTA is added to the reagents to eliminate this interference. Samples that contain oil and grease may coat the copperized surface of the cadmium. This is eliminated by pre-extracting the sample with an organic solvent. If fouled, the cadmium is regenerated using an automated utility in AQ2 software. Residual chlorine can produce negative interference by decreasing reduction efficiency. Before analysis, samples should be checked and if required, dechlorinated with sodium thiosulfate.

REFERENCES

Oxidized Nitrogen in Waters 1981, HMSO. (Series *Methods for the Examination of Waters and Associated Materials*)
Methods for the Determination of Inorganic Substances in Environmental Samples, USEPA 600/R-93/100, August 1993: Method 353.2, Revision 2.0

SEAL Applications
Revision Date: March 3, 2006

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
WATER

MAY 19 2005

Jessica Ammerman
Technical Support Director
SEAL Analytical, Inc.
1492 W. Mequon Road
Mequon, WI 53092

Dear Ms. Ammerman:

The Statistics and Analytical Support Branch (SASB) and the Office of Ground Water and Drinking Water's Technical Support Center (OGWDW/TSC) have completed their technical review of the materials submitted to support approval of SEAL Method EPA-114-A [Revision Date, March 28, 2005] (ATP Case Nos. D04-0014 and N04-0014). This method was submitted as an alternate test procedure (ATP) to determine combined nitrate/nitrite or nitrate and nitrite singly for use in wastewater compliance monitoring under National Pollutant Discharge Elimination System (NPDES) regulations and in drinking water compliance monitoring under national primary drinking water regulations (NPDWR).

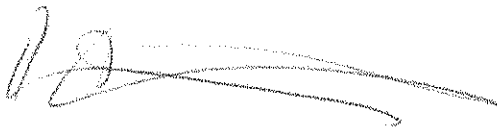
We are pleased to inform you that, in the judgement of our technical staff, SEAL Method EPA-114-A is an acceptable version of approved revisions of EPA Method 353.2. EPA Method 353.2 is listed at Title 40 of the Code of Federal Regulations (40 CFR) Part 136 for NPDES compliance monitoring¹ and 40 CFR Part 141 for NPDWR compliance monitoring. Seal Method EPA-114-A determines combined nitrate/nitrite or nitrate and nitrite singly by colorimetry using discreet analysis. A filtered sample is passed through a copperized-cadmium column to reduce nitrate to nitrite. The nitrite originally present in the sample plus reduced nitrate reacts with sulfanilamide under acidic conditions to form a diazonium compound. This compound is then coupled with N-(1-naphthyl) ethylenediamine dihydrochloride to form a reddish-purple azo dye that is measured using a colorimeter. Separate, rather than combined nitrate/nitrite results, are obtained by carrying out the procedure first with, and then without, the copper-cadmium reduction step (to measure nitrate/nitrite and nitrite respectively) and subtracting the result obtained for nitrite from the result obtained for combined nitrate/nitrite to obtain the result for nitrate. The procedures used are equivalent to those used in EPA-approved colorimetric methods

¹EPA Method 353.2 is not currently listed at 40 CFR 136 for determination of nitrate and nitrite singly. However, EPA has proposed adding EPA Method 353.2 to 40 CFR 136 for these analytes, and previously has recommended the use of EPA Method 353.2 for determination of nitrate and nitrite singly (by analyzing $\text{NO}_3^- + \text{NO}_2^-$, and subtracting NO_2^-) for this purpose. EPA's past recommendations extend to SEAL Method EPA-114-A.

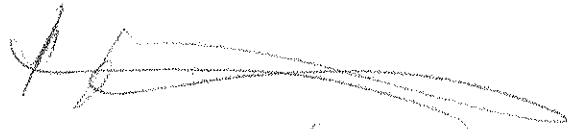
such as EPA Method 353.2. Accordingly, SEAL Method EPA-114-A [Revision Date, March 28, 2005] may be used in place of other NPDES and NPDWR-approved colorimetric methods for determination of combined nitrate/nitrite or nitrate and nitrite singly.

We greatly appreciate SEAL's interest in the development of environmental monitoring methods. If you have any questions regarding this ATP application, please contact William Telliard of SASB at telliard.william@epa.gov or at 202/566-1061 for wastewater or Herb Brass of OGWDW/TSC at brass.herb@epa.gov or at 513/569-7936 for drinking water at your convenience.

Sincerely,



William A. Telliard
Director of Analytical Methods
Engineering and Analysis Division (4303T)



Herb Brass, Ph.D.
Technical Support Center (MS-140)
Office of Ground Water and Drinking Water

cc:

USEPA Regional Administrators (all Regions)
Quality Assurance Managers (all Regions)
ATP Coordinators (all Regions)
Water Management Division Directors (all Regions)
Gregory J. Carroll, USEPA, OGWDW
Lillian Holmes, USEPA, OGWDW/TSC
Robin K. Oshiro, USEPA, EAD
Danielle Carter, CSC, SCC



NITRATE-N + NITRITE-N IN DRINKING AND SURFACE WATERS, AND DOMESTIC AND INDUSTRIAL WASTES

AQ2 METHOD NO: EPA-126-A Rev. 5

TYPE OF SAMPLE

This method is applicable to sewage, effluents, raw and drinking waters. This method is approved for the Clean Water Act for use in wastewater compliance monitoring under the National Pollutant Discharge Elimination System (NPDES) and for use in NPDWR (National Primary Drinking Water Regulations) compliance monitoring. The laboratory should consult the most recent Code of Federal Regulations for applicability and approval by the Clean Water and Safe Drinking Water Acts (40 CFR parts 136 and 141, respectively).

SUBSTANCE DETERMINED

Nitrate and nitrite ions

RANGE OF APPLICATION

0.03 – 4.5 mg N/L

LIMIT OF DETECTION BY USEPA PROCEDURE

MDL = 0.006 mg N/L

METHOD PRINCIPLE – USEPA METHOD 353.2

Nitrate is reduced by copperized cadmium to nitrite, which reacts with sulfanilamide to form a diazonium compound which, in dilute phosphoric acid, couples with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a reddish-purple azo dye. This is measured spectrophotometrically at 520 nm. Separate rather than combined nitrate/nitrite values are obtained by running the samples on sequential tests, i.e., first with, and then without the copperized cadmium reduction step.

INTERFERENCES

Since nitrate-nitrogen is dissolved, the sample may be pre-filtered. Low results may be obtained for samples that contain high concentrations of iron, copper or other metals. EDTA is added to the reagents to eliminate this interference. Samples that contain oil and grease may coat the copperized surface of the cadmium. This is eliminated by pre-extracting the sample with an organic solvent. If fouled, the cadmium is regenerated using an automated utility in AQ2 software. Residual chlorine can produce negative interference by decreasing reduction efficiency. Before analysis, samples should be checked and if required, dechlorinated with sodium thiosulfate.

REFERENCES

Oxidized Nitrogen in Waters 1981, HMSO. (Series *Methods for the Examination of Waters and Associated Materials*)
Methods for the Determination of Inorganic Substances in Environmental Samples, USEPA 600/R-93/100, 1993: Method 353.2, Revision 2.0.

SEAL Applications
Revision Date: March 3, 2006

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN - 7 2004

OFFICE OF
WATER

Laura Kohl
Technical Support Director
SEAL Analytical, Inc.
1492 W. Mequon Road
Mequon, WI 53092

Dear Ms. Kohl:

The Statistics and Analytical Support Branch (SASB) and the Office of Ground Water and Drinking Water's Technical Support Center (OGWDW/TSC) have completed their technical review of the materials submitted in support of the following applications for approval of alternate test procedures (ATPs) for use in compliance monitoring under National Pollutant Discharge Elimination System (NPDES) Regulations and National Primary Drinking Water Regulations (NPDWR):

Method Number [Revision Date]	Analytes	ATP Case No.s
2-013-1-L [October 2003]	nitrite (low range)	D02-0006, N02-0006
2-013-1-H [July 2003]	nitrite (high range)	D02-0007, N02-0007

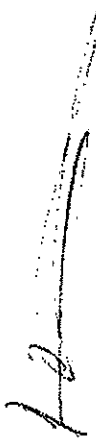
We are pleased to inform you that in the judgement of our technical staff the methods listed above are acceptable versions of EPA-approved methods listed at Title 40 of the *Code of Federal Regulations* (CFR) Parts 136 and 141 for determining nitrite in wastewater and drinking water, respectively. Both of the methods listed above determine nitrite by colorimetry using discreet analysis. Nitrite in a sample reacts with sulfanilamide under acidic conditions to form a diazonium compound. This compound is then coupled with N-(1-naphthyl) ethylenediamine dihydrochloride to form a reddish-purple azo dye which is measured using a colorimeter. The procedures of both methods are equivalent to those used in EPA-approved colorimetric methods such as Standard Method 4500-NO₂⁻ B [18th, 19th, and 20th Editions]. Accordingly, SEAL Methods 2-013-1-L and 2-013-1-H may be used in place of other NPDES and NPDWR-approved colorimetric methods for determination of nitrite.

We greatly appreciate Seal's interest in the development of environmental monitoring methods. If you have any questions regarding these ATP applications, please contact William Telliard of SASB (202/566-1061) or Herb Brass of OGWDW/TSC (513/569-7936) at your convenience.

Sincerely,



William A. Telliard
Director of Analytical Methods
Engineering and Analysis Division (4303T)



Herb Brass, Ph.D.
Technical Support Center (MS-140)
Office of Ground Water and Drinking Water

HRB
Herb Brass
(513) 569-7936

cc:
USEPA Regional Administrators (all Regions)
Quality Assurance Managers (all Regions)
ATP Coordinators (all Regions)
Water Management Division Directors (all Regions)
Gregory J. Carroll, USEPA, OGWDW
Lillian Holmes, USEPA, OGWDW/TSC
Robin K. Oshiro, USEPA, EAD
James Boiani, DynCorp, SCC



NITRATE-N + NITRITE-N IN DRINKING AND SURFACE WATERS, AND DOMESTIC AND INDUSTRIAL WASTES

AQ2 METHOD NO: EPA-127-A Rev. 5

TYPE OF SAMPLE

This method is applicable to sewage, effluents, raw and drinking waters. This method is approved for the Clean Water Act for use in wastewater compliance monitoring under the National Pollutant Discharge Elimination System (NPDES) and for use in NPDWR (National Primary Drinking Water Regulations) compliance monitoring. The laboratory should consult the most recent Code of Federal Regulations for applicability and approval by the Clean Water and Safe Drinking Water Acts (40 CFR parts 136 and 141, respectively).

SUBSTANCE DETERMINED

Nitrate and nitrite ions

RANGE OF APPLICATION

0.012 – 2.0 mg N/L

LIMIT OF DETECTION BY USEPA PROCEDURE

MDL = 0.003 mg N/L

METHOD PRINCIPLE – USEPA METHOD 353.2

Nitrate is reduced by copperized cadmium to nitrite, which reacts with sulfanilamide to form a diazonium compound which, in dilute phosphoric acid, couples with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a reddish-purple azo dye. This is measured spectrophotometrically at 520 nm. Separate rather than combined nitrate/nitrite values are obtained by running the samples on sequential tests, i.e., first with, and then without the copperized cadmium reduction step.

INTERFERENCES

Since nitrate-nitrogen is dissolved, the sample may be pre-filtered. Low results may be obtained for samples that contain high concentrations of iron, copper or other metals. EDTA is added to the reagents to eliminate this interference. Samples that contain oil and grease may coat the copperized surface of the cadmium. This is eliminated by pre-extracting the sample with an organic solvent. If fouled, the cadmium is regenerated using an automated utility in AQ2 software. Residual chlorine can produce negative interference by decreasing reduction efficiency. Before analysis, samples should be checked and if required, dechlorinated with sodium thiosulfate.

REFERENCES

Oxidized Nitrogen in Waters 1981, HMSO. (Series *Methods for the Examination of Waters and Associated Materials*)
Methods for the Determination of Inorganic Substances in Environmental Samples, USEPA 600/R-93/100, August 1993: Method 353.2, Revision 2.0.

SEAL Applications
Revision Date: March 3, 2006

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 17 2004

OFFICE OF
WATER

Jessica Ammerman
Technical Support Director
SEAL Analytical, Inc.
1492 W. Mequon Road
Mequon, WI 53092

Dear Ms. Ammerman:

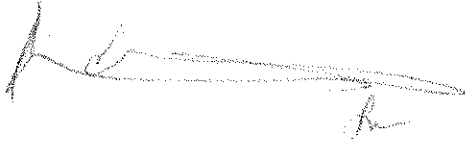
The Statistics and Analytical Support Branch (SASB) and the Office of Ground Water and Drinking Water's Technical Support Center (OGWDW/TSC) have completed their technical review of the materials submitted to support approval of SEAL Method EPA-127-A [Revision Date, September 2004]. This method was submitted as an alternate test procedure (ATP) to determine combined nitrate/nitrite or nitrate and nitrite singly for use in wastewater compliance monitoring under National Pollutant Discharge Elimination System (NPDES) regulations and in drinking water compliance monitoring under national primary drinking water regulations (NPDWR).

We are pleased to inform you that, in the judgement of our technical staff, SEAL Method EPA-127-A is an acceptable version of approved revisions of EPA Method 353.2. EPA Method 353.2 is listed at Title 40 of the Code of Federal Regulations (40 CFR) Part 136 for NPDES compliance monitoring* and 40 CFR Part 141 for NPDWR compliance monitoring. Seal Method EPA-127-A determines combined nitrate/nitrite or nitrate and nitrite singly by colorimetry using discreet analysis. A filtered sample is passed through a copperized-cadmium column to reduce nitrate to nitrite. The nitrite originally present in the sample plus reduced nitrate reacts with sulfanilamide under acidic conditions to form a diazonium compound. This compound is then coupled with N-(1-naphthyl) ethylenediamine dihydrochloride to form a reddish-purple azo dye that is measured using a colorimeter. Separate, rather than combined nitrate/nitrite results, are obtained by carrying out the procedure first with, and then without, the copper-cadmium reduction step (to measure nitrate/nitrite and nitrite respectively) and subtracting the result obtained for nitrite from the result obtained for combined nitrate/nitrite to obtain the result for nitrate. The procedures used are equivalent to those used in EPA-approved colorimetric methods such as EPA Method 353.2. Accordingly, SEAL Method EPA-127-A [Revision Date, September 2004] may be used in place of other NPDES and NPDWR-approved colorimetric methods for determination of combined nitrate/nitrite or nitrate and nitrite singly.

* EPA Method 353.2 is not currently listed at 40 CFR 136 for determination of nitrate and nitrite singly. However,

We greatly appreciate SEAL's interest in the development of environmental monitoring methods. If you have any questions regarding this ATP application (Case No.'s D04-007 and N04-007), please contact William Telliard of SASB (202/566-1061) for wastewater or Herb Brass of OGWDW/TSC (513/569-7936) for drinking water at your convenience.

Sincerely,



William A. Telliard
Director of Analytical Methods
Engineering and Analysis Division (4303T)



Herb Brass, Ph.D.
Technical Support Center (MS-140)
Office of Ground Water and Drinking Water

cc:

USEPA Regional Administrators (all Regions)
Quality Assurance Managers (all Regions)
ATP Coordinators (all Regions)
Water Management Division Directors (all Regions)
Gregory J. Carroll, USEPA, OGWDW
Lillian Holmes, USEPA, OGWDW/TSC
Robin K. Oshiro, USEPA, EAD
Danielle Carter, CSC, SCC

enclosure:

Seal Method: Determination of Nitrate/Nitrite in Drinking and Surface Waters, and Domestic and Industrial Wastes by Discrete Automated Colorimetry Using the Seal AQ2 Analyzer, September 2004.



Method Comparison Table for Nitrate + Nitrite (cadmium reduction), Rev. 2

	NITRATE + NITRITE (AA II) EPA Method 353.2 (March 1983)	AQ2 Nitrate + Nitrite (1 June 2005) Method No. EPA-126-A Rev 4
Scope and Application	Determination of nitrite singly or nitrite and nitrate combined in drinking, surface and saline waters, domestic and industrial wastes. The applicable range is 0.05 to 10.0 mg N/L.	Same. The applicable range is 0.03 to 4.5 mg N/L.
Summary of Method	Nitrate is reduced by copperized cadmium to nitrite which reacts with sulfanilamide to form a diazonium compound which, in dilute phosphoric acid, couples with N-(1-naphthyl) ethylenediamine dihydrochloride to form a reddish-purple azo dye. This is measured spectrophotometrically at 520 nm. Separate, rather than combined nitrate-nitrite values can be obtained by carrying out the procedure both with and without the copperized-cadmium reduction step.	Same
Interferences (Sample Pre-treatment)	Sample may be pre-filtered to remove particulates. Low results may be obtained for samples that contain high concentrations of iron, copper or other metals. EDTA is added to the reagents to eliminate this interference. Samples that contain oil and grease may coat the copperized surface of the cadmium. This is eliminated by pre-extracting the sample with an organic solvent. If fouled, the cadmium is regenerated using an automated utility in AQ2 software. Residual chlorine can produce negative interference by limiting reduction efficiency. Before analysis, samples should be checked and, if required, dechlorinated with sodium thiosulfate.	Same.
Reaction Conditions	Residence time in cadmium column is unspecified. Colorimetric residence time in open tubular reactor coil, room temperature, is unspecified.	Cadmium reduction time is 25 sec. Colorimetric reaction time is 420 sec, in static reaction well heated to 37°C

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Revision Date: August 1, 2005

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	NITRATE + NITRITE (AA II) EPA Method 353.2 (March 1983)	AQ2 Nitrate + Nitrite (1 June 2005) Method No. EPA-126-A Rev 4																																								
Equipment	<ul style="list-style-type: none"> Automated continuous flow analysis equipment designed to deliver and react sample and reagents in the required order and ratios. Copperized-cadmium reduction column, specific to the flow analyzer being used. 	<ul style="list-style-type: none"> SEAL AQ2 automated discrete analyzer configured to deliver and react sample and reagents in equivalent order and ratios as USEPA method 353.2. Open tubular copperized-cadmium reductor coil for use on the SEAL AQ2. 																																								
Reagents and Standards	<p>Ammonia chloride EDTA Buffer: 85 g NH₄Cl and 0.1 g Na₂EDTA per liter. Adjust pH to 8.5 using concentrated NH₄OH. 0.015% (v/v) Brij-35[®] surfactant to stabilize flow through the cadmium column.</p> <p>Sulfanilamide-NEDD Color Reagent: 100 mL concentrated H₃PO₄, 40 g sulfanilamide, 2 g N-(1-naphthyl) ethylenediamine dihydrochloride per liter.</p> <p>Standards (mg N/L): 0.0, 0.05, 0.1, 0.2, 0.5, 1.0, 2.0, 4.0, 6.0</p>	<p>Ammonia chloride EDTA Buffer: 134 g NH₄Cl and 0.3 g Na₂EDTA per liter. Adjust pH to 8.5 using concentrated NH₄OH. Add 0.02% (w/v) Triton X-100[®] to stabilize flow through the cadmium reductor coil.</p> <p>Sulfanilamide-NEDD Color Reagent: 38 mL concentrated H₃PO₄, 15 g sulfanilamide, 0.75 g N-(1-naphthyl) ethylenediamine dihydrochloride per liter.</p> <p>Standards: (mg N/L) 0, 0.03, 0.06, 0.135, 0.36, 0.45, 0.9, 2.25, 3.6, 4.5</p>																																								
Method Performance	<p>Precision – Inter-lab study: mg N/L</p> <table border="1"> <thead> <tr> <th>Mean</th> <th>%Recovery</th> <th>Std Dev</th> <th>% RSD</th> </tr> </thead> <tbody> <tr> <td>0.29</td> <td>5.8%</td> <td>0.012</td> <td>4.1%</td> </tr> <tr> <td>0.35</td> <td>118.1%</td> <td>0.092</td> <td>26.3%</td> </tr> <tr> <td>2.31</td> <td>104.5%</td> <td>0.318</td> <td>14.8%</td> </tr> <tr> <td>2.48</td> <td>97.3%</td> <td>0.176</td> <td>7.1%</td> </tr> </tbody> </table> <p>Single-Lab precision is estimated at 50% to 75% of Inter-Laboratory precision.</p> <p>Method Detection Limit: No data</p>	Mean	%Recovery	Std Dev	% RSD	0.29	5.8%	0.012	4.1%	0.35	118.1%	0.092	26.3%	2.31	104.5%	0.318	14.8%	2.48	97.3%	0.176	7.1%	<p>Precision, Single Lab: mg N/L</p> <table border="1"> <thead> <tr> <th>Known</th> <th>%Recovery</th> <th>Std Dev</th> <th>%RSD</th> </tr> </thead> <tbody> <tr> <td>0.073</td> <td>93.3</td> <td>0.0040</td> <td>5.9%</td> </tr> <tr> <td>0.090</td> <td>104.4</td> <td>0.0033</td> <td>1.5%</td> </tr> <tr> <td>0.90</td> <td>105.9</td> <td>0.013</td> <td>1.4%</td> </tr> <tr> <td>3.65</td> <td>96.5</td> <td>0.082</td> <td>2.3%</td> </tr> </tbody> </table> <p>Method Detection Limit: 0.006 mg N/L</p>	Known	%Recovery	Std Dev	%RSD	0.073	93.3	0.0040	5.9%	0.090	104.4	0.0033	1.5%	0.90	105.9	0.013	1.4%	3.65	96.5	0.082	2.3%
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Final Ratios of Reagents	<p>Reag. Conc. x Mixing Ratio = Rxn. Conc.</p> <p>Cadmium reduction (pH 8.5) NH₄Cl 85 g/L x 0.789 = 67 g/L</p> <p>Final colorimetric reaction NH₄Cl 67 g/L x 0.742 = 49.7 g/L</p> <p>H₃PO₄ 100 mL/L x 0.258 = 25.8 mL/L Sulfanilamide 40 g/L x 0.258 = 10.3 g/L NEDD 2 g/L x 0.258 = 0.52 g/L</p>	<p>Reag. Conc. x Mixing Ratio = Rxn. Conc.</p> <p>Cadmium reduction (pH 8.5) NH₄Cl 134 g/L x 0.50 = 67 g/L</p> <p>Final colorimetric reaction NH₄Cl 67 g/L x 0.30 = 20.2 g/L plus (134 g/L x 0.312) x 0.70 = 29.3 g/L 49.5 g/L</p> <p>H₃PO₄ 38 mL/L x 0.70 = 26.6 mL/L Sulfanilamide 15 g/L x 0.70 = 10.5 g/L NEDD 0.75 g/L x 0.70 = 0.53 g/L</p>																																								



NITRITE-N IN DRINKING AND SURFACE WATERS, AND DOMESTIC AND INDUSTRIAL WASTES

AQ2 METHOD NO: EPA-115-A Rev. 3

TYPE OF SAMPLE

This automated method is applicable to drinking, surface and saline waters, and industrial and domestic wastes. This method is approved for the Clean Water Act for use in wastewater compliance monitoring under the National Pollutant Discharge Elimination System (NPDES) and for use in NPDWR (National Primary Drinking Water Regulations) compliance monitoring. The laboratory should consult the most recent Code of Federal Regulations for applicability and approval by the Clean Water and Safe Drinking Water Acts (U.S. EPA, 40 CFR parts 136 and 141, respectively).

SUBSTANCE DETERMINED

Nitrite ion

RANGE OF APPLICATION

0.015 – 1.2 mg N/L

METHOD DETECTION LIMIT BY USEPA PROCEDURE

MDL = 0.0025 mg N/L

METHOD PRINCIPLE – USEPA METHOD 353.2

Nitrite ions react with sulfanilamide to form a diazonium compound which, in dilute phosphoric acid, couples with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a reddish-purple azo dye. The absorbance of this complex is measured spectrophotometrically at 520 nm.

INTERFERENCES

There are few significant interferences at concentrations less than 1000 times that of the nitrite. Presence of strong oxidants or reductants in the samples may affect the nitrite determination. Highly alkaline samples may give low results due to the shift in pH. For a full discussion of interferences, see the references below.

REFERENCES

Oxidized Nitrogen in Waters 1981, HMSO.
(In the series *Methods for the Examination of Waters and Associated Materials*)
Methods for Chemical Analysis of Waters and Wastes, USEPA, 1983: Method 353.2
Methods for the Determination of Inorganic Substances in Environmental Samples,
USEPA 600/R 93/100, 1993: Method 353.2, Revision 2.0.

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Revision Date: June 1, 2005

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Method Comparison Table for NITRITE, Rev 2

	NITRITE (AA II) EPA Method 353.2 (March 1983)	AQ2 NITRITE (1 June 2005) Method No. EPA-115-A Rev 3
Scope and Application	Determination of nitrite in surface and saline waters, domestic and industrial wastes. The applicable range is 0.05 – 10 mg N/L.	Same. The applicable range is 0.015 to 1.2 mg N/L.
Summary of Method	Nitrite reacts with sulfanilamide to form a diazonium compound which, in dilute phosphoric acid, couples with N-(1-naphthyl) ethylenediamine dihydrochloride to form a reddish-purple azo dye. The absorbance is measured at 520 nm.	Same
Interferences	Strong oxidants or reductants may degrade nitrite. Highly alkaline samples may impede color formation.	Same
Equipment	Automated continuous flow analysis equipment designed to deliver and react sample and reagents in the required order and ratios.	SEAL AQ2 automated discrete analyzer configured to deliver and react sample and reagents in equivalent order and ratios as USEPA method 353.2.
Reagent Preparation	<p>Ammonium Chloride Buffer: 85 g NH₃Cl and 0.1 g Na₂EDTA per Liter. Adjust to pH 8.5 concentrated NH₄OH.</p> <p>Sulfanilamide-NEDD Color Reagent: 100 mL concentrated H₃PO₄, 40 g sulfanilamide, 2 g N-(1-naphthyl) ethylenediamine dihydrochloride per liter.</p> <p>Standards (mg N/L): 0.0, 0.05, 0.1, 0.2, 0.5, 1.0, 2.0, 4.0, 6.0</p>	<p>Ammonium Chloride Buffer: 134 g NH₃Cl and 0.3 g Na₂EDTA per Liter. Adjust to pH 8.5 concentrated NH₄OH.</p> <p>Sulfanilamide-NEDD Color Reagent: 38 mL concentrated H₃PO₄, 15 g sulfanilamide, 0.75 g N-(1-naphthyl) ethylenediamine dihydrochloride per liter. pH 8.5 buffer added at 31.2% (v/v).</p> <p>Standards (mg N/L): 0, 0.015, 0.03, 0.06, 0.15, 0.3, 0.6, 0.96, 1.2</p>
Final Ratios of Reagents	<p>Reag. Conc. x Mixing Ratio = Rxn. Conc.</p> <p>Ammonium Chloride Buffer: NH₄Cl (85 g/L x 0.789) x 0.742 = 49.7 g/L</p> <p>Color Reagent: H₃PO₄ 100 mL/L x 0.258 = 25.8 mL/L Sulfanil- 40 g/L x 0.258 = 10.3 g/L amide NEDD 2 g/L x 0.258 = 0.52 g/L</p>	<p>Reag. Conc. x Mixing Ratio = Rxn. Conc.</p> <p>Ammonium Chloride Buffer: NH₄Cl 134 g/L x 0.134 = 18.0 g/L plus (134 g/L x 0.312) x 0.671 = 28.0 g/L 46.0 g/L</p> <p>Color Reagent: H₃PO₄ 38 mL/L x 0.671 = 25.5 mL/L Sulfanil- 15 g/L x 0.671 = 10.5 g/L amide NEDD 0.75 g/L x 0.671 = 0.50 g/L</p>

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Revision Date: August 1, 2005

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	NITRITE (AA II) EPA Method 353.2 (March 1983)	AQ2 NITRITE (1 June 2005) Method No. EPA-115-A Rev 3												
Reaction Conditions	Flow-through coiled reactor, room temperature, with unspecified residence time.	Static reaction well heated to 37°C, with incubation time 10 min.												
Method Performance	<u>Precision and accuracy data:</u> Not available <u>Method Detection Limit:</u> No data	<u>Precision, Single Lab (mg NO₂-N/L)</u> <table border="1"> <thead> <tr> <th>Known</th> <th>%Recovery</th> <th>Std. Dev.</th> <th>%RSD</th> </tr> </thead> <tbody> <tr> <td>0.025</td> <td>96.0</td> <td>0.0006</td> <td>2.5%</td> </tr> <tr> <td>0.60</td> <td>103.1</td> <td>0.0051</td> <td>0.8%</td> </tr> </tbody> </table> <u>Method Detection Limit:</u> 0.0025 mg NO ₂ -N/L	Known	%Recovery	Std. Dev.	%RSD	0.025	96.0	0.0006	2.5%	0.60	103.1	0.0051	0.8%
Known	%Recovery	Std. Dev.	%RSD											
0.025	96.0	0.0006	2.5%											
0.60	103.1	0.0051	0.8%											



NITRITE-N IN DRINKING AND SURFACE WATERS, AND DOMESTIC AND INDUSTRIAL WASTES

AQ2 METHOD NO: EPA-137-A Rev. 1

TYPE OF SAMPLE

This low-range method is applicable to drinking, surface and saline waters, and industrial and domestic wastes. This method is approved for the Clean Water Act for use in wastewater compliance monitoring under the National Pollutant Discharge Elimination System (NPDES) and for use in NPDWR (National Primary Drinking Water Regulations) compliance monitoring. The lab should consult the most recent Code of Federal Regulations for applicability and approval by the Clean Water and Safe Drinking Water Acts (40 CFR parts 136 and 141, respectively).

SUBSTANCE DETERMINED

Nitrite ion

RANGE OF APPLICATION

0.002 – 0.2 mg N/L

METHOD DETECTION LIMIT BY USEPA PROCEDURE

MDL = 0.0006 mg N/L

METHOD PRINCIPLE – USEPA METHOD 353.2

Nitrite ions react with sulfanilamide to form a diazonium compound which, in a phosphoric acid/dihydrogen phosphate buffer, couples with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a reddish-purple azo dye. The absorbance of this complex is measured at 520 nm. To achieve lower detection limits than USEPA method 353.2, this method employs 6-fold reduced quantity of color reagent. However, the same relative ratios among reactants are maintained

INTERFERENCES

There are few significant interferences at concentrations less than 1000 times that of the nitrite. Presence of strong oxidants or reductants in the samples may affect the nitrite determination. Highly alkaline samples may give low results due to the shift in pH. The phosphate buffer will compensate for total alkalinity at least 1500 mg CaCO₃/L. For a full discussion of interferences, see the references below.

REFERENCES

- Oxidized Nitrogen in Waters 1981, HMSO.
(In the series *Methods for the Examination of Waters and Associated Materials*)
Methods for Chemical Analysis of Waters and Wastes, USEPA, 1983: Method 353.2
Methods for the Determination of Inorganic Substances in Environmental Samples,
USEPA 600/R 93/100, 1993: Method 353.2, Revision 2.0.

SEAL Applications
Revision Date: February 13, 2006

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

Jessica Ammerman
jammerman@seal-us.com
Technical Support Director
SEAL Analytical
1492 Mequon Road
Mequon, WI 53092

03/14/2008

RE: ATP Case Nos. D06-0033 and D06-0034

Dear Ms. Ammerman:

Per the terms of the Alternate Test Procedure (ATP) program, the Office Ground Water and Drinking Water's Technical Support (OGWDW/TSC) has determined that SEAL Analytical AQ2 Method EPA-126-A [Revision 5] for the determination of nitrate and nitrite and SEAL AQ2 Method EPA-137-A [Revision 1] for the determination of nitrite are acceptable versions of EPA Method 353.2 [Revision 2.0]. Accordingly, SEAL AQ2 Method EPA-126-A [Revision 5] and SEAL AQ2 Method EPA-137-A [Revision 1] may be used for compliance monitoring performed under National Primary Drinking Water Regulations. SEAL AQ2 Method EPA-126-A [Revision 5] and SEAL AQ2 Method EPA-137-A [Revision 1] employ discreet analysis and rely on the same chemistry and determinative technique as those specified in EPA Method 353.2 [Revision 2.0] to determine nitrate and nitrite.

We appreciate your interest in the development of environmental monitoring methods. If you have any questions regarding the review of these alternate test procedures (ATP Case Nos. D06-0033 and D06-0034), please contact Steve Wendelken by e-mail at: wendelken.steve@epa.gov or by telephone at: 513-569-7491.

Sincerely,

A handwritten signature in black ink, appearing to read "Steve Wendelken".

Steven C. Wendelken, Ph.D.
ATP Coordinator
Office of Ground Water and Drinking Water
Technical Support Center (MS-140)
26 W. Martin Luther King Dr.
Cincinnati, Ohio 45219
Phone: (513) 569-7491
Fax: (513) 569-7837
wendelken.steve@epa.gov

cc:
ATP Coordinators (all Regions)
Quality Assurance Managers (all Regions)
Gregory J. Carroll, USEPA, OGWDW
Danielle Carter, CSC, SCC



Method Comparison Table for NITRITE, Rev 1

	NITRITE (AA II) EPA Method 353.2 (March 1983)	AQ2 NITRITE (13 February 2006) Method No. EPA-137-A Rev 1
Scope and Application	Determination of nitrite in surface and saline waters, domestic and industrial wastes. The applicable range is 0.05 – 10 mg N/L.	Same. The applicable range is 0.002 to 0.2 mg N/L.
Summary of Method	Nitrite reacts with sulfanilamide to form a diazonium compound which, in dilute phosphoric acid/ dihydrogen phosphate buffer, couples with N-(1-naphthyl) ethylenediamine dihydrochloride to form a reddish-purple azo dye. The absorbance is measured at 520 nm.	Same
Interferences	Strong oxidants or reductants may degrade nitrite. Highly alkaline samples may impede color formation.	Same. The acidic phosphate buffer in the reagent system (designed per EPA 353.2) will compensate for total alkalinity at least 1500 mg CaCO ₃ /L.
Equipment	Automated continuous flow analysis equipment designed to deliver and react sample and reagents in the required order and ratios.	SEAL AQ2 automated discrete analyzer configured to deliver and react sample and reagents in equivalent order and ratios as USEPA method 353.2.
Reagent Preparation	<p>Ammonium Chloride Buffer: 85 g NH₄Cl and 0.1 g Na₂EDTA per Liter. Adjust to pH 8.5 concentrated NH₄OH.</p> <p>Sulfanilamide-NEDD Color Reagent: 100 mL concentrated H₃PO₄, 40 g sulfanilamide, 2 g N-(1-naphthyl) ethylenediamine dihydrochloride per liter.</p> <p>Standards (mg N/L): 0.0, 0.05, 0.1, 0.2, 0.5, 1.0, 2.0, 4.0, 6.0, 10.0</p>	<p>Sulfanilamide-NEDD Reagent (combined): 4 g NaOH, 2 g Na₂EDTA, 100 mL concentrated H₃PO₄, 100 g NH₄Cl, 25 g sulfanilamide, 1.25 g N-(1-naphthyl) ethylenediamine dihydrochloride per liter.</p> <p>To achieve lower detection limits than USEPA method 353.2, this method employs 6-fold reduced quantity of color reagent.</p> <p>Standards (mg N/L): 0, 0.002, 0.006, 0.016, 0.050, 0.1, 0.15, 0.2</p>
Reaction Conditions	Flow-through coiled reactor, room temperature, with unspecified residence time.	Static reaction well heated to 37°C, with incubation time 10 min.

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	NITRITE (AA II) EPA Method 353.2 (March 1983)	AQ2 NITRITE (13 February 2006) Method No. EPA-137-A Rev 1																				
Final Reagent Concentration	<p>Reag. Conc. x Mixing Ratio = Rxn. Conc.</p> <p>Ammonium Chloride Buffer: NH_4Cl (85 g/L x 0.789) x 0.742 = 49.7 g/L Provides pH buffering in final reaction mixture</p> <p>Color Reagent:</p> H_3PO_4 100 mL/L x 0.258 = 25.8 mL/L Sulfanilamide 40 g/L x 0.258 = 10.3 g/L NEDD 2 g/L x 0.258 = 0.52 g/L	<p>Reag. Conc. x Mixing Ratio = Rxn. Conc.</p> <p>Color Reagent: NH_4Cl 100 g/L x 0.0654 = 6.54 g/L NaOH 4 g/L x 0.0654 = 0.262 g/L Addition of NaOH provides pH buffering.</p> H_3PO_4 100 mL/L x 0.0654 = 6.54 mL/L Sulfanilamide 25 g/L x 0.0654 = 1.63 g/L NEDD 1.25 g/L x 0.0654 = 0.082 g/L																				
Final Ratios of Reagents	H_3PO_4 / Sulfanilamide / NEDD: 2.5 mL/L / 1.0 g/L / 0.05 g/L NH_4Cl / Sulfanilamide: 4.8 g/L / 1.0 g/L	H_3PO_4 / Sulfanilamide / NEDD: 4.0 mL/L / 1.0 g/L / 0.05 g/L NH_4Cl / Sulfanilamide: 4.0 g/L / 1.0 g/L																				
Method Performance	<p>Precision and accuracy data: Not available</p> <p>Method Detection Limit: No data</p>	<p>Precision, Single Lab (mg NO₂-N/L)</p> <table border="1"> <thead> <tr> <th>Known</th> <th>%Recovery</th> <th>Std. Dev.</th> <th>%RSD</th> </tr> </thead> <tbody> <tr> <td>blank</td> <td>--</td> <td>0.0003</td> <td>--</td> </tr> <tr> <td>0.002</td> <td>--</td> <td>0.00025</td> <td>--</td> </tr> <tr> <td>0.01</td> <td>118.5</td> <td>0.0005</td> <td>3.9%</td> </tr> <tr> <td>0.2</td> <td>104.5</td> <td>0.0025</td> <td>1.2%</td> </tr> </tbody> </table> <p>Method Detection Limit: 0.0006 mg NO₂-N/L</p>	Known	%Recovery	Std. Dev.	%RSD	blank	--	0.0003	--	0.002	--	0.00025	--	0.01	118.5	0.0005	3.9%	0.2	104.5	0.0025	1.2%
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0.01	118.5	0.0005	3.9%																			
0.2	104.5	0.0025	1.2%																			



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
05/15/2009

PRODUCER 877-945-7378 Willis of North Carolina, Inc. 26 Century Blvd. P. O. Box 305191 Nashville, TN 37230-5191		THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.	
INSURED SEAL Analytical, Inc. 10520-C Baehr Road Mequon, WI 53092		INSURERS AFFORDING COVERAGE	NAIC#
		INSURER A: Zurich American Insurance Company	16535-004
		INSURER B: Federal Insurance Company	20281-001
		INSURER C: New Hampshire Insurance Company	23841-001
		INSURER D:	
		INSURER E:	

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR ADD'L LTR	INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YYYY)	POLICY EXPIRATION DATE (MM/DD/YYYY)	LIMITS
A		GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC	GLO337398105	12/1/2008	12/1/2009	EACH OCCURRENCE \$ 3,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 3,000,000 GENERAL AGGREGATE \$ 3,000,000 PRODUCTS - COMP/OP AGG \$ 3,000,000
B		AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS	73539129	11/30/2008	11/30/2009	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ AUTO ONLY - EA ACCIDENT \$ OTHER THAN AUTO ONLY: EAACC \$ AGG \$ EACH OCCURRENCE \$ AGGREGATE \$ \$ \$ \$
		GARAGE LIABILITY <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT \$ OTHER THAN AUTO ONLY: EAACC \$ AGG \$ EACH OCCURRENCE \$ AGGREGATE \$ \$ \$ \$
		EXCESS / UMBRELLA LIABILITY <input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS MADE <input type="checkbox"/> DEDUCTIBLE <input type="checkbox"/> RETENTION \$				EACH OCCURRENCE \$ AGGREGATE \$ \$ \$ \$
C		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under SPECIAL PROVISIONS below Y/N <input checked="" type="checkbox"/> N	1871827	1/1/2009	1/1/2010	<input checked="" type="checkbox"/> WC STATU-TORY LIMITS <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
		OTHER				

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS

CERTIFICATE HOLDER State of West Virginia Department of Administration Purchasing Division 2019 Washington Street, East Charleston, WV 25311	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL <u>30</u> DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES. AUTHORIZED REPRESENTATIVE <i>Julia Ann Lilly</i>
---	--

IMPORTANT

If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

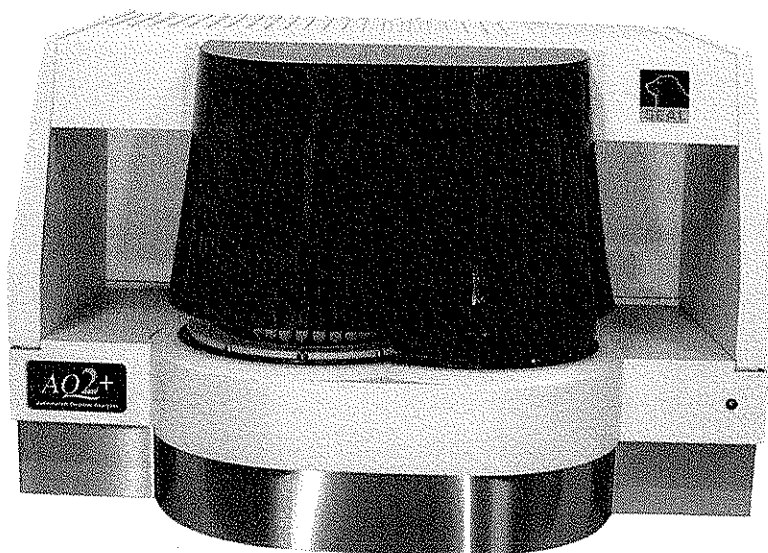
DISCLAIMER

This Certificate of Insurance does not constitute a contract between the issuing insurer(s), authorized representative or producer, and the certificate holder, nor does it affirmatively or negatively amend, extend or alter the coverage afforded by the policies listed thereon.

SEAL Analytical, Inc.
Mequon Technology Center
10520-C Baehr Rd.
Mequon, WI 53092
Tel: 262-241-7900
Fax: 262-241-7970
Website: www.seal-analytical.com



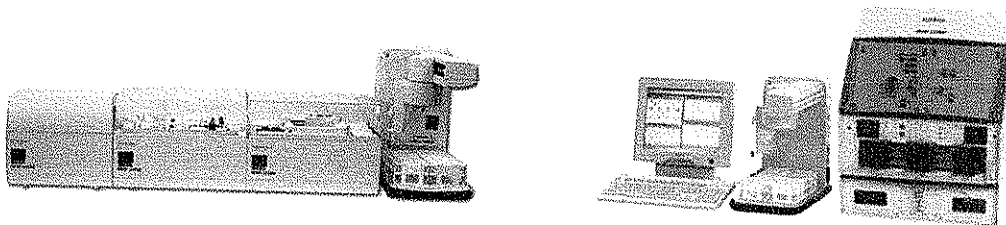
TECHNICAL SUPPORT AND SERVICE CONTRACT



AQ2 and AQ2+ Discrete Analyzer



You're in safe hands - with SEAL Analytical



SEAL Analytical supplies a range of quality analyzers using other technologies

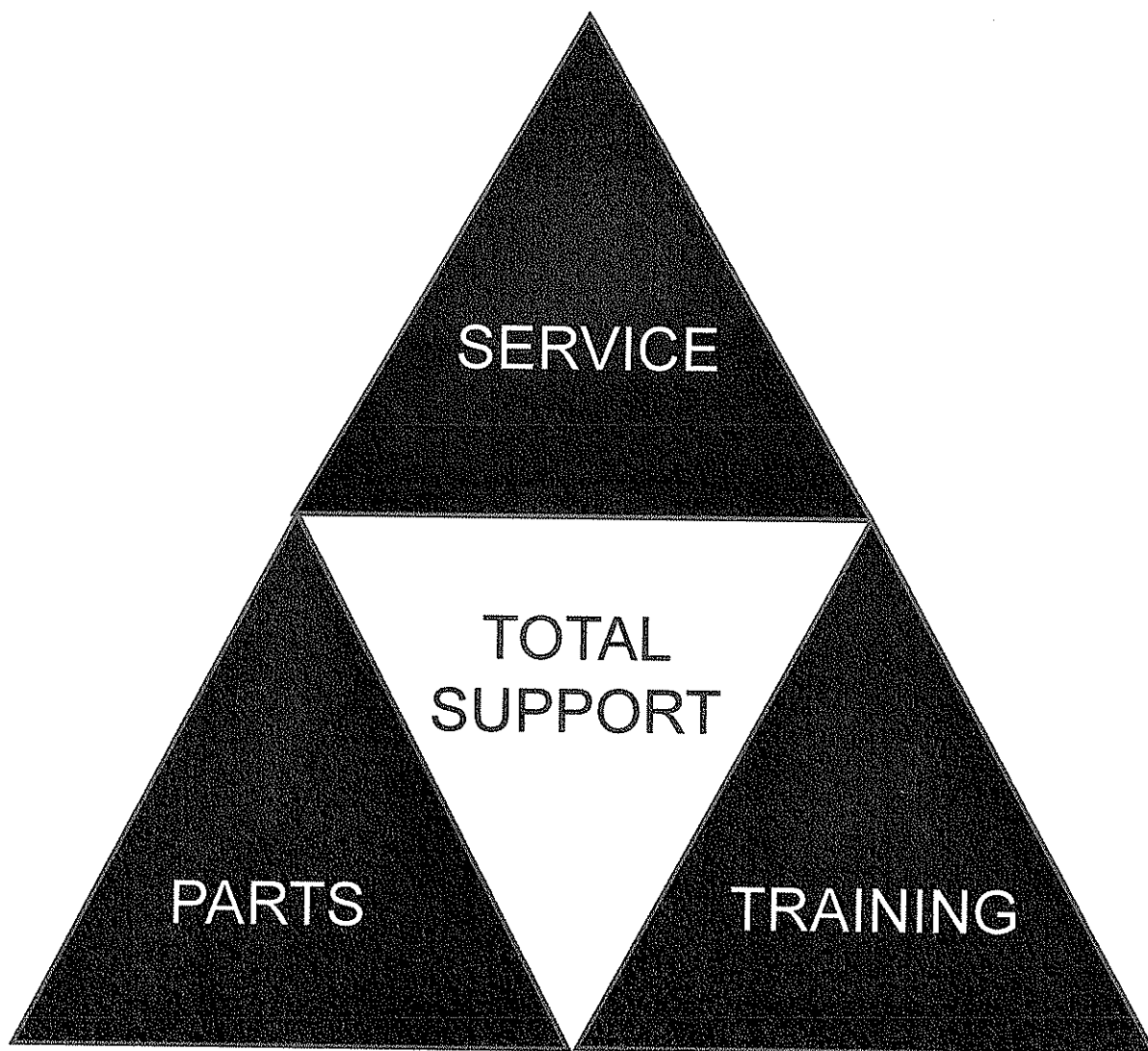
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AQ2-AQ2+ Contract Rev 6, 28Apr2008

SEAL Analytical, Inc.
Mequon Technology Center
10520-C Baehr Rd.
Mequon, WI 53092
Tel: 262-241-7900
Fax: 262-241-7970
Website: www.seal-analytical.com



ONE SOURCE





PRODUCTIVITY PLUS

MAXIMIZING YOUR UPTIME

SEAL Analytical's "Productivity Plus" program was designed to ensure your laboratory's productivity. It gives you the assurance that your analyzing instruments will operate properly and consistently.

Our ultimate goal is to build a long-term partnership in which you can be sure that your instruments will deliver reliable operation, year after year.

A FULL SUPPORT TEAM

We support "Productivity Plus" with a full Technical Support team. Just call us and our Technical Support team will talk through your problem with you, recommend the necessary part or solution, and schedule service if needed. In-house and on-site service and repairs are both available. Our team is there when you need them.

ACCESS TO A FULL INVENTORY OF GENUINE AQ2 AND AUTOANALYZER PARTS

As you need it... when you need it! We have access to over 3000 genuine, high quality AQ2 and AutoAnalyzer parts.

AN ARRAY OF AGREEMENTS – YOU CHOOSE

We offer an array of agreements to suit your support and maintenance requirements, which are designed to save you money as well as keep you operating smoothly. You may choose from one of our agreements or have one tailor-made to meet your requirements. The choice is yours.

FORMAL CUSTOMER TRAINING

SEAL Analytical offers training programs at your site or on our premises. Each program has been developed to help you optimize your productivity.

PRODUCTIVITY PLUS



THE TECHNICAL TEAM

President

- Stuart Smith

Applications Development Director

- Dr. Tim Bahowick

Technical Sales & Support Director

- Lalicia Potter

Technical Support Chemists

- Corrin Breitigam
- Katie Parkhurst
- Dr. Beth Ruddy

Technical Service Specialists

- Mark Kresa
- Sam Dorsey

Customer Service – Parts

- Paul Gundersen

Customer Service – Administration

- Jeanne Kimble
- Nancy Vallette

THE TECHNICAL TEAM



BASIC AGREEMENT

This is an entry-level agreement which offers you special privileges when you need service during the year. In exchange for your commitment to utilize our on-site service, we will extend to you the following benefits:

- One preventative maintenance visit annually (travel expenses, labor, and standard PM parts included)
- 10% discount on all service parts
- 10% discount on all consumable items
- 10% discount on training programs
- Updated method revisions free of charge

Base Annual Premium: \$3900

Note 1: Discounts are available for multiple systems on single or multiple sites.

Excludes PC, PC printer and manifolds

BASIC AGREEMENT



PREMIUM AGREEMENT

A SEAL Analytical Premium Agreement is the most comprehensive coverage SEAL offers to meet your service needs. The annual premium will enable you to budget for all your service requirements. In addition, you'll have the peace of mind that in an extreme situation we will be on-site as soon as possible, to better serve you. In exchange for your commitment to full service and support, we will extend to you the following benefits:

- One preventative maintenance visit annually (travel expenses, labor, and standard PM parts included)
- One 1-day emergency on-site visit annually (travel expenses and labor included, on-site within 3 business days)
- Unlimited phone and email support
- 20% discount on all service parts
- 20% discount on all consumable items
- 20% discount on training programs
- Free AQ2 software upgrades
- Updated method revisions free of charge

Base Annual Premium: \$5400

Note 1: Discounts are available for multiple systems on single or multiple sites.

Excludes PC, PC printer and manifolds

PREMIUM AGREEMENT



CUSTOMIZED AGREEMENT

Fax To: 262-241-7970

Attn: Lalicia Potter

Should the Basic or Premium Agreement not fulfil your needs, SEAL Analytical offers you the opportunity to create your own specific requirements. Just complete the following.

Name:.....
 Company:.....
 Address:.....

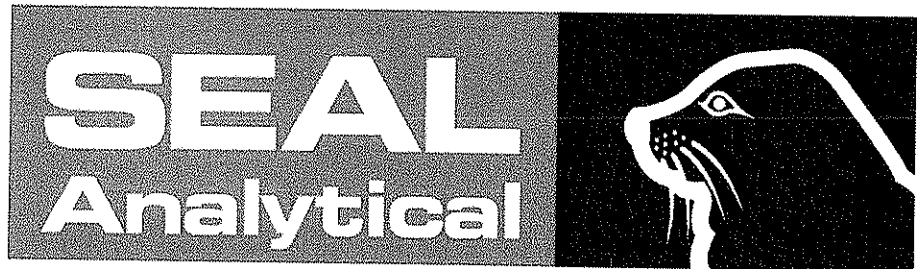
 Tel:..... Fax:.....
 Email:.....

I require the following to be included in the Service Support Scheme for my.....

	Please Select
Service parts at discount (Please specify %)
All service parts included
One preventative maintenance visit
More than one - state how many
One emergency visit
More than one - state how many
Unlimited telephone and email support
Consumables at discount (Please specify %)
Operator training at discount (Please specify %)
Access to applications library
Free software upgrades
Other (Please specify)

CUSTOMIZED AGREEMENT

SEAL Analytical, Inc.
Mequon Technology Center
10520-C Baehr Rd.
Mequon, WI 53092
Phone: 262-241-7900
Fax: 262-241-7970
Email: sales@seal-us.com
www.seal-analytical.com



References for SEAL Analytical, Inc.

1. Gainesville Regional Utilities

3901 SW 63rd Blvd.
Gainesville, FL 32608
Phone: (352) 393-6729

Contact: Ms. Sandy Barnes, Senior Laboratory Technician
Purchased AQ2 Multi-Chemistry Analyzer – 1/13/05

2. City of Newport News

NNW WQC Lab
3629 G.W. Memorial Hwy.
Yorktown, VA 23693
Phone: (757) 234-6723

Contact: Ms. Sherry Williams
Purchased AQ2 Multi-Chemistry Analyzer – 2/28/03

3. Las Vegas Valley Water District

1299 Burkholder Blvd.
Henderson, NV 89015
Phone: (702) 856-3520

Contact: Stan Van Wagenen, Lab Director
Purchased AQ2 Multi-Chemistry Analyzer – 05/10/04

4. Microbac Laboratories

3323 Gilmore Industrial Blvd.
Louisville, KY 40213
Phone: (502) 962-6400

Contact: John Miller
Purchased AQ2 Multi-Chemistry Analyzer – 05/26/05

5. Environmental Chemists

6602 Windmill Way
Wilmington, NC 28405
Phone: (910) 392-0223

Contact: Ray Porter
Purchased AQ2 Multi-Chemistry Analyzer – 04/16/08

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Fax: 262-241-7970
Email: sales@seal-us.com
www.seal-analytical.com



Qualifications and Experience of Technical Staff

Stuart Smith, President

- ⇒ Educational background in chemistry and electronics
- ⇒ Over 20 years experience in the industry, including over 10 years at Bran+Luebbe UK and SEAL Analytical UK
- ⇒ Phone: (262) 241-7900, ext. 214
- ⇒ Email: ssmith@seal-us.com

Tim Bahowick, Applications Director

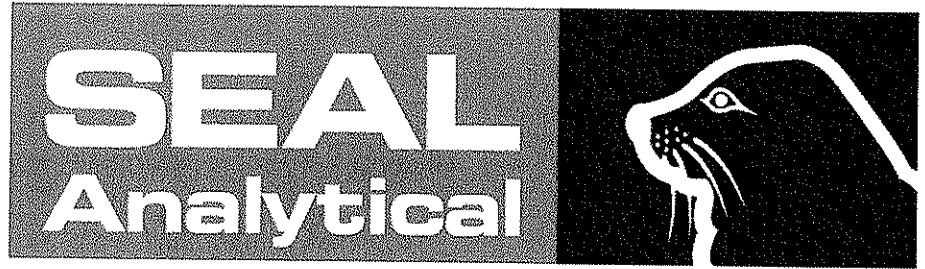
- ⇒ PhD in Chemistry
- ⇒ Over 13 years experience in the industry, including 6 years at Lachat Instruments and 7 years at SEAL Analytical, Inc.
- ⇒ Phone: (262) 241-7900, ext. 203
- ⇒ Email: tbahowick@seal-us.com

Lalicia Potter, Technical Sales & Support Director

- ⇒ Graduate of the University of Sydney, AU with Honors degree in chemistry
- ⇒ Over 15 years experience in the industry, including over 10 years at Bran+Luebbe Australia and Bran+Luebbe UK
- ⇒ Phone: (262) 241-7900 ext 215
- ⇒ Email: lpotter@seal-us.com

Corrin Breitigam, Technical Support Chemist

- ⇒ Masters of Science in Chemistry
- ⇒ Phone: (262) 241-7900, ext. 216
- ⇒ Email: cbreitigam@seal-us.com



Katie Parkhurst, Technical Support Chemist

- Bachelor of Science in Chemistry
- Phone: (262) 241-7900, ext. 211
- Email: kparkhurst@seal-us.com

Mark Kresa, Technical Support Service Technician

- Graduate of ITT Technical Institute
- Over 10 years experience in the industry, including over 5 years at Lachat Instruments and 5 years at Seal Analytical, Inc.
- Phone: (262) 241-7900, ext.213
- Email: mkresa@seal-us.com

Sam Dorsey, Technical Support Service Technician

- Graduate of Utah Valley State University in Electronics Technology
- Over 21 years experience in the industry, providing direct repair service and training to Bran+Luebbe customers
- Phone: (262) 241-7900, ext. 206
- Email: sdorsey@seal-us.com

Paul Gundersen, Customer Service Specialist

- Over 21 years experience in Inventory management and direct customer service
- Phone: (262) 241-7900, ext. 210
- Email: parts@seal-us.com

NOTE: All are direct employees of SEAL Analytical, Inc.



Jeff TeRonde
Controller



Stuart Smith
President



L Alicia Potter
Technical Sales Director



Corrin Breitigam
Technical Support Chemist

Who's Who SEAL USA



Timi Bahowick Ph.D
Technical Applications Director



Katie Parkhurst
Technical Support Chemist

Phone: 262-241-7900
Fax: 262-241-7970
Tech Support Phone: 262-241-5772



Mark Kresa
Technical Support Specialist

Website:

www.seal-analytical.com

Email addresses:

sales@seal-us.com
techsupport@seal-us.com
parts@seal-us.com



Paul Gundersen
Customer Service Specialist



Sam Dorsey
Technical Support Specialist



Jeanne Kimble
Senior Administrator



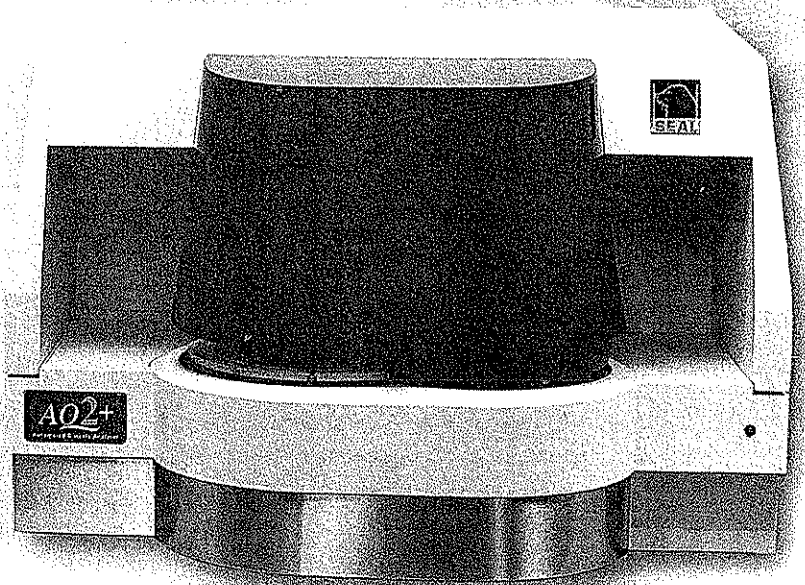
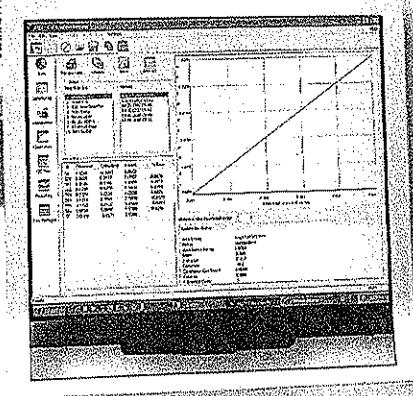
Nancy Vallette
Administrator



Mequon Technology Center, 10520-C Baehr Rd., Mequon, WI 53092



Advanced Discrete Analyzer



Highly Automated

Simple to Use

Lowest Reagent Consumption

Compact Design



The logo for the AQ2+ series, featuring the text "AQ2+" in a stylized, serif font with a plus sign, enclosed in a dark rectangular box with rounded corners.

AQ2+ Series...

is a flexible analyzer that uses the principle of discrete analysis where each test occurs in a separate or discrete reaction vessel.

AQ2+ is Ideal...

when many and varied tests are needed on different samples and/or individual results are needed in a short time.

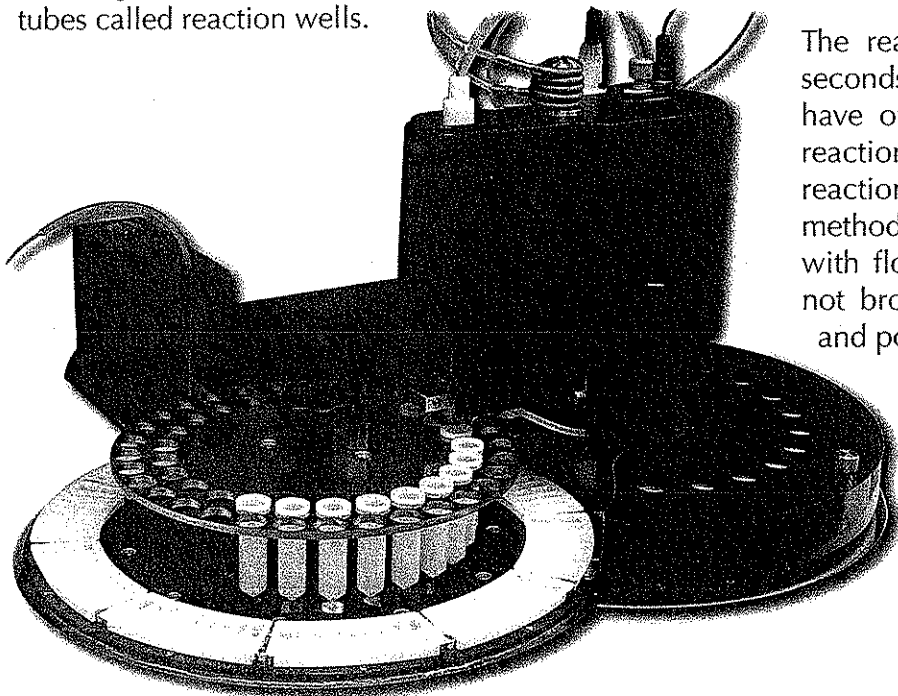
How does the AQ2+ work?

The AQ2+ employs a robust robotic sampling arm working in conjunction with a stepper motor-driven syringe that is responsible for aspirating, dispensing and mixing accurate and precise quantities of sample and reagent in miniaturized test tubes called reaction wells.

The sample and reagents are incubated in the reaction wells for a preprogrammed time. A single aliquot is then transferred into a glass optical cuvette. The absorbance is then read on the stationary reactant to ensure the best possible signal to noise ratio.

The reaction times are user programmable from seconds to minutes. The standard methods supplied have optimized reaction times which ensure the reaction is brought to completion. This complete reaction emulates the manual and segmented flow methods. This eliminates the problems encountered with flow injection analysis where the reaction is not brought to completion, decreasing sensitivity and potentially introducing kinetic effects.

Once the absorbance is read, the cuvette is thoroughly cleaned, eliminating any carry over or cross contamination.

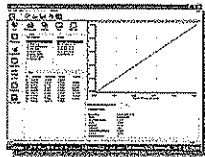


AQ2+ Advantages and Benefits

The AQ2+ Advanced Discrete Analyzer is a fully automated instrument designed specifically for the environmental market.



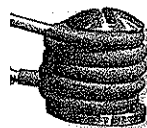
- 100% optical quality glass cuvette used for precise absorbance measurement
- Robust detection system utilizes stationary measurement cell
- 10 mm optimum path length



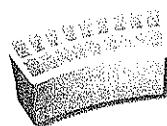
- Highly flexible software designed with user input
- QCPro™ Data Quality Assurance System – allows the user to specify QC types, limits and corrective actions upon a QC failure



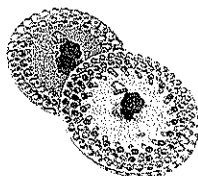
- Reagent wedges with on-board cooling – only 20-400 µL reagent used per test
- Automatic reagent level sensing verifies sufficient reagent volume
- Reagent expiration date tracked through software



- Integrated automated cadmium coil reduction for nitrate/nitrite determination
- In situ coil regeneration is fully automated through software



- Low cost, disposable wells used for each discrete reaction
- Constant heating and programmable reaction time ensure reaction reaches completion



- Both 57 and 100-position sample trays are available to accommodate sample load
- Sample trays are easily interchangeable

USEPA, ASTM, ISO

and other international regulatory compliant methods are available. Please visit www.seal-analytical.com or contact your local SEAL Analytical representative about your specific application.

METHODS INCLUDE:

Alkalinity	Phenolics
Ammonia	Phosphate, ortho
Chloride	Phosphorus, total
Cyanides	Silicate
Nitrate/Nitrite	Sulfate
Nitrite	Total Kjeldahl Nitrogen

Walk away operation

- including ability to run overnight

Segregated chemical waste and wash minimizes environmental impact

Only 500 – 600 µL of combined reagents and sample consumed per test

Add samples after a run has started

Automated standard preparation and dilution of over range samples

Will run up to 150 tests per hour

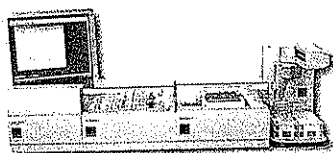
Tests programmable per sample to reduce analysis time

Comprehensive Support

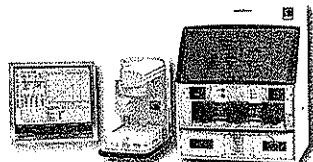
We offer comprehensive applications, technical, service and software support prior to and following installation and training. *These include...*

- Development of custom chemistries
- Adaptation of existing methods to specific requirements such as matrix, range or detection limit adjustments
- Guaranteed availability of *genuine* consumables and spare parts
- A selection of preventative maintenance and service contracts to meet your specific requirements
- Continuous in-house development of software to incorporate new requested features

Related Products



AutoAnalyzer 3 HR



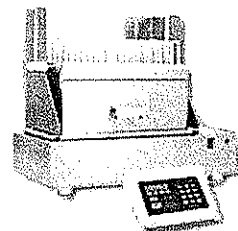
QuAAtro

The **AutoAnalyzer 3 HR** and **QuAAtro** are the latest generation segmented flow analyzers. Based on the robust, world class heritage of the original Technicon™ design, these instruments offer exceptional reliability, performance and ease of use for over 1000 available methods.

AAce software is a common platform for both instrument series and is intuitive and flexible.

Both instruments are especially suitable for ultra low level determinations, such as drinking water and in complex matrices such as seawater with varying salinity.

Segmented flow analyzers are complimentary to discrete analyzers and are particularly attractive to labs that routinely run many samples for the same analytes.



Block Digester BD 50s

Class leading design and performance digestion block. Where digestion is critical to instrument performance, SEAL has worked to provide this enhanced design specially suited to Total Kjeldahl Nitrogen (TKN) and Phosphorus (TKP) methods. For further information please see our detailed brochure.

SEAL Analytical is a global company with offices worldwide - contact us at:

SEAL Analytical Ltd.
67 Victoria Rd.
Burgess Hill
Sussex RH15 9TR
United Kingdom
Tel: +44 (0) 1444 872600
Fax: +44 (0) 1444 871495
Email: mail@seal-analytical.com

SEAL Analytical, Inc.
Mequon Technology Center
10520-C Baehr Rd.
Mequon, WI 53092
United States
Tel: +1 (262) 241 7900
Fax: +1 (262) 241 7970
Email: sales@seal-us.com

SEAL Analytical GmbH
Werkstrasse 4
D-22844 Norderstedt
Germany
Phone: +49 40 522 02 100
Fax: +49 40 522 02 473
Email: info.germany@seal-analytical.com



www.seal-analytical.com