



**Finance and Business Operations Division**  
**Procurement and Contracts Services Section**  
 Department of Executive Services

KNK-ES-0340      206-263-9400 Ph  
 3<sup>rd</sup> Floor      206-296-7676 Fax  
 401 5<sup>th</sup> Avenue      TTY Relay: 771  
 SEATTLE, WA 98104      [www.kingcounty.gov](http://www.kingcounty.gov)

**CONTRACTOR:**  
 POLYDYNE INC  
 ONE CHEMICAL PLANT RD

RICEBORO, GA 31323 United States  
 Fax: (800) 8802078

**BILL TO:**  
 KC DES FBOD ACCOUNTS PAYABLE  
 401 5TH AVE, CNK-ES-0320  
 SEATTLE, WA 98104

**SHIP TO:**  
 KC DNRP WTD WEST POINT TREATMENT  
 1400 DISCOVERY PK BLVD-WPM-NR-0100  
 SEATTLE, WA 98199

CONTRACT		
CONTRACT NO. 5856283	REVISION 0	PAGE 1 of 1
CREATION DATE 09-MAY-2016	BUYER LINDA MCKINLY	
DATE OF REVISION	BUYER	

CONTRACTOR NO	PAYMENT TERMS	FREIGHT TERMS	FOB	SHIP VIA	CONFIRM TO
2222	NET30DAYS	PREPAID AND ALLOW	DESTINATION	Seller Chooses	Telephone: (800) 848-7659

**DESCRIPTION**

**Term Purchase Agreement**

Furnish dewatering polymer as requested by authorized King County DNRP-Wastewater Treatment personnel, during the period May 16, 2016 through May 15, 2021, in accordance with King County ITB number 1096-16 and the responding bid of Polydyne, Inc, both incorporated by reference as if fully set forth herein.

**Pricing:**  
 Clarifloc WE-1514 (product family) - \$.66/LB (neat)

**Supplier Contact Information:**  
 Joe DesRochers  
 Technical Sales Representative  
 SNF Polydyne, Inc  
 PH: (1-360)-931-5566  
 Email: [jdesrochers@polydyneinc.com](mailto:jdesrochers@polydyneinc.com)

Estimated Annual Contract Value \$2,000,000

Authorized Signature

# Invitation to Bid



Department of Executive Services  
Finance and Business Operations Division  
**Procurement and Contract Services Section**  
206-263-9400 TTY Relay: 711

**ADVERTISED DATE: (WORK WAS ADVERTISED IN RFQ 1207-15-LSM)**

Invitation to Bid (ITB) Title: Dewatering Polymer

ITB Number: 1096-16-LSM

Due Date: April 5, 2016 no later than 2:00 p.m.

Buyer: Linda McKinly, [linda.mckinly@kingcounty.gov](mailto:linda.mckinly@kingcounty.gov), 206- 263-9701

Alternate Buyer: Julie Snider, [julie.snider@kingcounty.gov](mailto:julie.snider@kingcounty.gov), 206- 263-9291

Furnish Dewatering Polymer as requested by King County personnel in accordance with the attached instructions, requirements and specifications.

**TOTAL BID PRICE:** \$ 2,143,096.00

**NO PRE-BID CONFERENCE**

Sealed Bids are hereby solicited and will only be received by:  
King County Procurement Services Section  
Chinook Building, 3rd Floor  
401 Fifth Avenue  
Seattle, WA 98104  
Office Hours: 8:00 a.m. – 5:00 p.m.  
Monday - Friday

**BIDDERS SHALL COMPLETE AND SIGN THE FORM BELOW.**

We acknowledge that all Addenda have been examined as part of the Contract documents. The submittal is signed by an authorized representative of the Bidder accepting all terms and conditions contained in the bid and any addenda. We acknowledge that attaching our terms and conditions or modifying the ITB terms and conditions may result in our bid being rejected.

Company Name

Polydyne Inc.

Address

1 Chemical Plant Road

City/State /Postal Code

Riceboro, GA 31323

Signature

Print name and title

Mark Schlag, Vice-President

Email

[PolyBiddpt@snfhc.com](mailto:PolyBiddpt@snfhc.com)

Phone

912-880-2035

Fax

912-880-2078

SCS/DBE Certification Number

N/A

Upon request, this Invitation to Bid will be provided in alternative formats such as Braille, large print, audiocassette or computer disk for individuals with disabilities.

ORIGINAL

3-30-16

SCANNED

# Invitation to Bid Addendum # 1



King County

Department of Executive Services  
Finance and Business Operations Division  
**Procurement and Contract Services Section**  
206-263-9400 TTY: Relay: 711

ADDENDUM DATE: MARCH 30, 2016

MAR 30 2016

Invitation to Bid (ITB) Title: Dewatering Polymer

ITB Number: 1096-16-LSM

Revised Due Date: April 12, 2016 - 2:00 p.m.

Buyer: Linda McKinly, [linda.mckinly@kingcounty.gov](mailto:linda.mckinly@kingcounty.gov), 206- 263-9701

Alternate Buyer: Julie Snider, [julie.snider@kingcounty.gov](mailto:julie.snider@kingcounty.gov), 206- 263-9291

This addendum is issued to revise ITB 1096-16-LSM, emailed March 21, 2016, as follows:

1. The due date **is changed** to: Tuesday, April 12, 2016 no later than 2:00 p.m.

All other terms and conditions shall remain the same.

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Upon request, this Invitation to Bid Addendum will be provided in alternative formats such as Braille, large print, audiocassette or computer disk for individuals with disabilities.

## **SECTION 1 Instruction to Bidders**

### **1.1 Introduction**

The purpose of this Invitation to Bid is to establish a contract to provide goods or services on an as-needed basis. Any quantities listed herein are for bidding purposes only and represent King County's estimated annual requirements. The County will be neither obligated nor restricted to the quantities or locations indicated.

Bidders shall only submit pricing on their exact chemical as submitted and approved by King County during the test phase of RFQ 1207-15.

### **1.2 Bid Submittal Procedure**

The original and one (1) paper copy of this solicitation document as well as **one (1) version of this solicitation document in PDF on either a compact disk or flash drive** shall be completed, signed and submitted. Failure to return the solicitation document may result in disqualification of the Bidder. The original shall be noted or stamped "original". Bids and modifications thereof shall be enclosed in a sealed envelope, with the "Bid Opening Label" completed and affixed.

Bidders are encouraged to use recycled paper in the preparation of additional documents submitted with this solicitation, and shall use both sides of paper sheets where practicable.

Sealed bids shall contain all required attachments and information and be submitted to King County (hereinafter "County") no later than the date, time and place stated on the front of this ITB or as amended. The bidder shall show the title and number, the due date specified, and the name and address of the bidder on the face of the envelope. Bidders are cautioned that failure to comply may result in non-acceptance of the bid. The Bidder accepts all risks of late delivery of mailed bids or of mis-delivery regardless of fault. Bids properly and timely submitted will be publicly opened.

Bids will only be accepted from Contractors able to complete the delivery of goods or services described in the specifications. Joint ventures shall submit one bid for the team, with accompanying proof of the joint venture agreement.

If a company chooses not to submit a bid, the County requests the company advise the Buyer by email if they desire to remain listed for the subject of this ITB and state reason they did not submit a bid.

### **1.3 Electronic Commerce and Correspondence**

King County is committed to reducing costs and facilitating quicker communication to the community by using electronic means to convey information. As such, most Invitations to Bid, Requests for Proposal, and Requests for Qualifications as well as related exhibits, appendices, and issued addenda can be found on the King County Internet Web Site, located at <http://www.kingcounty.gov/procurement>. Current bidding opportunities and information are available by accessing the "Solicitations" tab in the left hand column.

King County Procurement Services features an Online Vendor Registration (OVR) program that permits vendors, consultants and contractors to register their business with the County. This OVR system allows interested parties to either directly register their firm by creating a unique User ID, or to visit the website as a guest. Information regarding bid documents will be available to all users; however, site visitors accessing the site as a guest will not be able to document their interest in a project or add their name to the document holder's list. They will receive no automatic notification of issued addenda. As such, the County encourages full registration in order to directly communicate with document holders regarding any issued addenda or other important information concerning the solicitation.

After submittals have been opened in public, the County will post a listing of the businesses submitting proposals, and later, any final award determination.

Full information on vendor registration is available at the website.

#### **1.4 Alterations to Document**

Any addition, limitation or provision made or attached to the bid may render it non-responsive and/or irregular and be cause for its rejection.

Bidders may be required to submit additional documents as part of the bid package. Any alteration of such documents by erasure or interlineations shall be explained or noted and initialed by the Bidder.

#### **1.5 Late Bids**

Bids, modifications of bids, and withdrawal of bids received at the office designated in the solicitation after the exact hour and date specified for receipt will not be considered.

#### **1.6 Cancellation of ITB or Postponement of Bid Opening**

The County reserves the right to cancel the ITB at any time.

The County may change the date and time for submitting bids prior to the date and time established for submittal.

#### **1.7 Addenda**

If at any time, the County changes, revises, deletes, clarifies, increases, or otherwise modifies the ITB, the County will issue a written Addendum to the ITB.

#### **1.8 Questions and Interpretation of the ITB**

No oral interpretations of the ITB will be made to any Bidder. All questions and any explanations must be requested in writing and directed to the Buyer no later than seven (7) days prior to the due date specified in the solicitation. Oral explanations or instructions are not binding. Any information modifying a solicitation will be furnished to all bidders by an addendum.

Days, as referenced in this document, are calendar days unless otherwise specified.

Communications concerning this bid, with other than the listed Buyer may cause the Bidder to be disqualified.

## **1.9 Examination of Bid Documents**

The submission of a bid shall constitute an acknowledgement upon which the County may rely that the Bidder has thoroughly examined and is familiar with the ITB, including any work site identified in the ITB, and has reviewed and inspected all applicable statutes, regulations, ordinances and resolutions addressing or relating to the goods or services to be provided hereunder.

The failure of a Bidder to comply with above requirement shall in no way relieve the Bidder from any obligations with respect to its bid or to any Contract awarded pursuant to this ITB. No claim for additional compensation shall be allowed which is based upon a lack of knowledge or misunderstanding of this ITB.

## **1.10 Modifications of Bid or Withdrawal of Bid Prior to Bid Due Date**

At any time before the time and date set for submittal of bids, a Bidder may submit a modification of a bid previously submitted to the County. All bid modifications shall be made in writing, executed and submitted in the same form and manner as the original bid.

Bids may be withdrawn by written notice received prior to the exact hour and date specified for receipt of bids. A bid also may be withdrawn in person by a Bidder or authorized representative provided their identity is made known and they sign a receipt for the bid, but only if the withdrawal is made prior to the exact hour and date set for receipt of bids. All requests for modification or withdrawal of bids, whether in person or written, shall not reveal the amount of the original bid.

## **1.11 Bid Withdrawal After Public Opening**

Except for claims of error granted by the County, no Bidder may withdraw a bid after the date and time established for submitting bids, or before the award and execution of a Contract pursuant to this ITB, unless the award is delayed for a period exceeding the period for bid effectiveness.

Requests to withdraw a bid due to error must be submitted in writing along with supporting evidence for such claim for review by the county. Evidence must be delivered to the county within two (2) business days after request to withdraw. The County reserves the right to require additional records or information to evaluate the request. Any review by the County of a bid and/or any review of such a claim of error, including supporting evidence, creates no duty or liability on the County to discover any other bid error or mistake, and the sole liability for any bid error or mistake rests with the Bidder.

## **1.12 Cost of Bid and Samples**

The County is not liable for any costs incurred by Bidder in the preparation and evaluation of bids submitted. Samples of items required must be submitted to the location and by the time specified. Unless otherwise specified, samples shall be submitted with no expense to the County. If not destroyed by testing, samples may be returned at the bidder's request and expense.

### **1.13 Collusion**

By signing this bid, the Bidder certifies that they have not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding. If the County determines that collusion has occurred among Bidders, none of the bids from the participants of such collusion will be considered. The County's determination will be final.

### **1.14 Bid Effective Date**

All bids submitted shall be a firm bid for a minimum period of 90 days after the bid opening date, unless otherwise stated in writing in the bid. The County may request a Bidder grant an extension of the bid effective period.

### **1.15 Bid Price and Tax**

The bid price shall include everything necessary for the prosecution and completion of the Contract, except as may be provided otherwise in this ITB.

Bid Prices shall include all freight charges, FOB to the designated delivery point(s).

Taxes: Sales/use taxes and Federal excise taxes shall not be included in the bid price. The County shall pay any Washington State sales/use taxes applicable to the Contract price or tender an appropriate amount to the Contractor for payment to Washington State. The Bidder is cautioned that taxes may be a factor in evaluating the total cost of bid.

The County is exempt from Federal excise and Transportation taxes. All other government taxes, duties, fees, licenses, permits, royalties, assessments and charges shall be included in the bid price. Said exemption is made pursuant to Chapter 32 of the Internal Revenue Code and Registry No. A-1 02374. When requested, an exemption certificate will be furnished.

### **1.16 Protest Procedures**

King County has a process in place for receiving protests based upon invitation to bid or contract awards. The protest procedures are available at <http://www.kingcounty.gov/procurement/faq>, Suppliers web page.

## **SECTION 2 Bid Evaluation and Contract Award**

### **2.1 Evaluation of Bids**

Bids will be evaluated by the County to determine which bid, if any, may be deemed to be the low responsive bid from a responsible bidder, and should be accepted in the best interest of the County.

King County may use prompt payment discount terms in evaluation of this ITB; however, discounts terms of less the twenty (20) days will not be considered. Minimum acceptable payment terms by the County without benefit of twenty (20) day discount will be net 30 days.

In the event of a discrepancy between the unit price and the extended amount for a bid item, the unit price will govern.

### **2.2 Responsive and Responsible**

#### **Responsive**

The County will consider all the material submitted by the Bidder, and other evidence it may obtain otherwise, to determine whether the Bidder is in compliance with the terms and conditions set forth in this ITB.

#### **Responsible**

In determining the responsibility of the bidder, the County may consider the ability, capacity and skill to perform the Contract or provide the service required (inspection of the bidder's facility may be required prior to award); the character, integrity, reputation, judgment and efficiency; financial resources to perform the Contract properly and within the times specified; the quality and timeliness of performance on previous contracts with the County and other agencies, including, but not limited to, the effort necessarily expended by the County and other agencies in securing satisfactory performance and resolving claims; compliance with federal, state and local laws and ordinances relating to public contracts; other information having a bearing on the decision to award the Contract.

Failure of a bidder to be deemed responsible or responsive may result in the rejection of a bid.

### **2.3 Financial Resources and Auditing**

If requested by the County, prior to the award of a contract, the bidder shall submit proof of adequate financial resources available to carry out the execution and completion of work required by this contract.

King County reserves the right to audit the Contractor throughout the term of this contract to assure the Contractor's financial fitness to perform and comply with all terms and conditions contained within this contract. King County will be the sole judge in determining the Contractor's financial fitness in carrying out the terms of this contract.

## 2.4 Forms Required Before Contract Award

The Bidder shall submit, within five (5) Days of notification from the County, the applicable documents, insurance, bonds, sworn statements, and other requirements prior to award. Failure by the Bidder to submit required documents may result in rejection of the bid.

- Equal Benefit Declaration Form, if requesting alternative compliance
- Internal Revenue Service Form KC W-9, if not provided to King County within the past two (2) years.
- **Certificate of Insurance and Endorsement** \* – Have Insurance Agent e-mail or Fax to Buyer evidence of insurance from insurer(s) satisfactory to the county certifying to the coverage of insurance set forth in this ITB.

\*If not on file with the County

## 2.5 Rejection of Bids

The County reserves the right to reject any bid for any reason or to waive informalities and irregularities in bids.

In consideration for the County's review and evaluation of its bid, the Bidder waives and releases any claims against the County arising from any rejection of any or all bids, including any claim for costs incurred by Bidders in the preparation and presentation of bids submitted in response to this ITB. In addition, Bidders waive the costs of providing additional information requested.

## 2.6 Single Bid Receipt

If the County receives a single responsive, responsible bid, the County may request an extension of the bid acceptance period and/or conduct a price or cost analysis on such bid. The Bidder shall promptly provide all cost or pricing data, documentation and explanation requested by the County to assist in such analysis. By conducting such analysis, the County shall not be obligated to accept the single bid; the County reserves the right to reject such bid or any portion thereof.

## 2.7 Public Disclosure of Bids

This Contract shall be considered a public document and will be available for inspection and copying by the public in accordance with the Public Records Act, Chapter 42.56 RCW (the "Act").

If the Contractor considers any portion of any record provided to King County under this Contract, whether in electronic or hard copy form, to be protected under law, the Contractor shall clearly identify each such portion with words such as "CONFIDENTIAL," "PROPRIETARY" or "BUSINESS SECRET." If a request is made for disclosure of such portion, the County will determine whether the material should be made available under the Act. If the County determines that the material is subject to disclosure, the County will notify the Contractor of the request and allow the Contractor ten (10) business days to take whatever action it deems necessary to protect its interests. If the Contractor fails or neglects to take such

action within said period, the County will release the portions of record(s) deemed by the County to be subject to disclosure. King County shall not be liable to the Contractor for inadvertently releasing records pursuant to a disclosure request not clearly identified by the Contractor as "CONFIDENTIAL," "PROPRIETARY" or "BUSINESS SECRET."

## **2.8 Contract Award**

Contract award, if any, will be made by the County to the low, responsive, responsible Bidder. The County will have no obligations until an award is made and an order placed with the Contractor. The County reserves the right to award one or more contracts as determined to be in the County's best interest. The County may accept any individual item, or group of items, or schedules of any bid, unless otherwise stated herein.

A written award mailed or otherwise furnished to a Contractor within the time for acceptance shall be a binding contract.

## **SECTION 3 Standard Contractual Terms and Conditions**

### **3.1 Administration**

This Contract is between the County and the Contractor who shall be responsible for providing the goods or services described herein. The County is not party to defining the division of work between the Contractor and its Subcontractors. The Contractor represents that it has or shall obtain all duly licensed or qualified personnel, materials and equipment required to perform work hereunder.

The Contractor's performance under this Contract may be monitored and reviewed by a Project Manager appointed by the County. Reports and data required to be provided by the Contractor shall be delivered to the Project Manager or Buyer. Questions by the Contractor regarding interpretation of the terms, provisions and requirements of this Contract shall be addressed to the Buyer or Project Manager for response.

### **3.2 Contract Amendments**

No oral order or conduct by the County shall constitute a Contract Amendment. Contract Amendments shall only be effective upon written notification by the County. The County reserves the right to amend the contract to add or delete goods or services within the intended scope of this contract. This may include, but is not limited to approval of replacements for discontinued items, add items of like function, or similar in nature or purpose to the originally listed products; the provision of ancillary services in response to minor changes in County needs; extend the contract to include optional terms.

Cost or Price Analysis may be required by the County for the evaluation of contract modifications, terminations, revision to contract requirements or other circumstances as determined by the County.

### **3.3 Invoices and Payment**

The Contractor shall submit properly certified invoices to King County. The invoice(s) shall contain the following information:

- Purchase Order/Contract Number
- Item Number(s)
- Description of supplies or services
- Quantities
- Unit prices
- Extended totals
- Discounts, if applicable

For services, identify specific deliverables, and/or hourly rates, hours worked, total hours or related fees.

The Contractor shall send the original invoice to the remit to address on the purchase order. The County will take advantage of any prompt payment discount terms bid. Discount periods shall be extended if the invoice is returned for credit or correction

When a purchase order is issued against this Contract that has the potential for multiple or partial deliveries, a separate invoice shall be generated for each completed delivery accepted by the County.

Failure to comply with these requirements or to provide an invoice in conformance with the contract may delay payment.

Upon acceptance of payment, the Contractor waives any claims for the goods or services covered by the Invoice. No advance payment shall be made for the goods or services furnished by Contractor pursuant to this Contract.

King County will not be bound by prices contained in an invoice that are higher than those in the currently approved price list. If a price increase has not been accepted in writing by King County, the invoice may be rejected and returned to the Contractor for a correction.

### **3.4 Rejection of Goods Or Services**

After award, the Buyer or authorized County representative shall have the option of rejecting or refusing delivery of any and all goods or services which are not in strict conformity with the requirements of the specification and the bid. All rejected goods or services shall be promptly replaced or re-performed and be subject to approval by the County. All replacement goods and services shall be provided at the Contractor's own expense.

### **3.5 Re-procurement Costs**

When a Contractor fails to furnish goods or services in accordance with the terms of this Contract, and the County must purchase at a price greater than the contract price, the difference may be charged to the Contractor. The County may exercise this charge as a credit against invoices due the Contractor.

### **3.6 Termination For Convenience/Default/Non-appropriation**

#### **A. Termination for Convenience**

The County for its convenience may terminate this Contract, in whole or in part, at any time by written notice sent certified mail, return receipt requested, to the Contractor. After receipt of a Notice of Termination ("Notice"), and except as directed by the County, the Contractor shall immediately stop work as directed in the Notice, and comply with all other requirements in the Notice. The Contractor will be paid its costs, including necessary and reasonable Contract close-out costs and profit on that portion of the work satisfactorily performed up to the date of termination as specified in the notice. The Contractor shall promptly submit its request for the termination payment, together with detailed supporting documentation. If the Contractor has any property in its possession belonging to the County, the Contractor shall account for the same and dispose of it in the manner the County directs. All termination payment requests may be subject to Cost or

Price Analysis to determine reasonableness and compliance with the Contract and applicable laws and regulations.

**B. Termination for Default**

If the Contractor does not deliver work in accordance with the Contract, or the Contractor fails to perform in the manner called for in the Contract, or the Contractor fails to comply with any material provisions of the Contract, the County may terminate this Contract, in whole or in part, for default as follows:

A Notice to Cure will be served on the Contractor by certified mail (return receipt requested) or a delivery service capable of providing a receipt. The Contractor shall have ten (10) Days from the date the Notice to Cure was served to cure the default or provide the County with a detailed written plan, which indicates the time and methods needed to bring the work into compliance and cure the default.

If the Contractor has not cured the default or the plan to cure the default is not acceptable to the County, the County may terminate the Contract. Termination shall occur by serving a Notice of Termination by certified mail (return receipt requested) or delivery service capable of providing a receipt on the Contractor setting forth the manner in which the Contractor is in default and the effective date of termination.

The Contractor will only be paid for work delivered and Accepted, or work performed in accordance with the manner of performance set forth in the Contract less any damages to the County caused by or arising from such default. All termination payment requests are subject to Cost or Price Analysis to verify compliance with the Contract and applicable laws and regulations.

The termination of this Contract shall in no way relieve the Contractor from any of its obligations under this Contract nor limit the rights and remedies of the County hereunder in any manner.

**C. Termination for Non-Appropriation**

1. If expected or actual funding is withdrawn, reduced or limited in any way prior to [Final Acceptance and/or Completion of the Project], the County may, upon written notice to the Contractor, terminate this Contract in whole or in part for lack of appropriation. Such termination shall be in addition to the County's rights to terminate for convenience or default. In the event of termination under this section the following shall apply:

- a. Subject to subsection b., the County will be liable only for payment in accordance with the terms of this Contract for Work performed prior to the effective date of termination;
- b. Payment, if any, associated with such termination shall not exceed the appropriation for the biennium in which termination occurs; and
- c. The Contractor shall be released from any obligation to provide further Work under the Contract affected by the termination.

Notwithstanding subsection 1, funding of this Contract beyond the current biennium is conditional upon the appropriation by the County Council of sufficient funds to support the Work described in this Contract. Otherwise, the Contract shall terminate on December 31 of the current biennium

### **3.7 Force Majeure**

The term force majeure shall include, without limitation by the following enumeration: acts of nature, acts of civil or military authorities, fire, accidents shutdowns for purpose of emergency repairs, industrial, civil or public disturbances, causing the inability to perform the requirements of this Contract. If any party is rendered unable, wholly or in part, by a force majeure event or any event cause not within such party's control, to perform or comply with any obligation or condition of this Contract, upon giving notice and reasonably full particulars to the other party, such obligation or condition shall be suspended only for the time and to the extent commercially practicable to restore normal operations. In the event the Contractor ceases to be excused pursuant to this provision, then the County shall be entitled to exercise any remedies otherwise provided for in this Contract, including Termination for Default.

Whenever a force majeure event causes the Contractor to allocate limited resources between or among the Contractor's customers, the County shall receive no less priority in respect to such allocation than any of the Contractor's other customers.

### **3.8 Taxes, Licenses, and Certificate Requirements**

This Contract and any of the work provided hereunder is contingent and expressly conditioned upon the ability of the Contractor to provide the specified goods or services consistent with applicable federal, state or local laws and regulations. If, for any reason, the Contractor's required compliances are terminated, suspended, revoked or in any manner modified from their status at the time this Contract becomes effective, the Contractor shall notify the County immediately of such condition in writing.

The Contractor and subcontractor(s) shall maintain and be liable for all taxes (except sales/use taxes), fees, licenses, permits and costs as may be required by applicable federal, state or local laws and regulations as applicable to the work under this Contract.

### **3.9 Assignment**

Neither party shall assign any interest, obligation or benefit under or in this Contract or transfer any interest in the same, whether by assignment or novation, without prior written consent of the other party. If assignment is approved, this Contract shall be binding upon and inure to the benefit of the successors of the assigning party. This provision shall not prevent the Contractor from pledging any proceeds from this Contract as security to a lender so long as King County Policy Fin10-1 (AP), paragraph 6.1.3 is followed. If assignment is approved, it shall be accepted by either party upon the posting of all required bonds, securities and the like by the assignee and the written agreement by assignee to assume and be responsible for the obligations and liabilities of the Contract, known and unknown, and applicable law.

### **3.10 Indemnification and Hold Harmless**

To the maximum extent permitted by law and except to the extent caused by the sole negligence of the County, the Contractor shall indemnify and hold harmless the County, its officers, officials, agents and employees, from and against any and all suits, claims, actions, losses, costs, penalties and damages of whatsoever kind or nature arising out of, in connection with, or incident to the goods and/or services Provided by or on behalf of the Contractor. In addition, the Contractor shall assume the defense of the County and its officers and employees in all legal or claim proceedings arising out of, in connection with, or incidental to such goods and/or services: shall pay all defense expenses, including reasonable attorney's fees, expert fees and costs incurred by the County on account of such litigation or claims. This indemnification obligation shall include, but is not limited to, all claims against the County by an employee or former employee of the Contractor or its Subcontractors, and the Contractor, by mutual negotiation, expressly waives all immunity and limitation on liability, as respects the County only, under any industrial insurance act, including Title 51 RCW, other Worker's Compensation act, disability benefit act, or other employee benefit act of any jurisdiction which would otherwise be applicable in the case of such claim. In the event that the County incurs any judgment, award and/or cost including attorney's fees arising from the provisions of this subsection, or to enforce the provisions of this subsection, any such judgment, award, fees, expenses and costs shall be recoverable from the Contractor. In the event of litigation between the parties to enforce the rights under this subsection, reasonable attorney fees shall be allowed to the substantially prevailing party.

In the event the County incurs attorney fees and/or costs in the defense of claims under this provision such attorney fees and costs shall be recoverable from the Contractor. In addition King County shall be entitled to recover from the Contractor its attorney fees, and costs incurred to enforce the provisions of this section.

The indemnification, protection, defense and save harmless obligations contained herein shall survive the expiration, abandonment or termination of this Contract.

Nothing contained within this provision shall affect and/or alter the application of any other provision contained within this Contract.

### **3.11 Applicable Law and Forum**

Except as hereinafter specifically provided, this Contract shall be governed by and construed according to the laws of the State of Washington, including, but not limited to, the Uniform Commercial Code, Title 62A RCW. Any claim or suit concerning this Contract shall only be filed in either the King County Superior Court or U.S. District for the Western District of Washington, in Seattle.

### **3.12 Conflicts of Interest and Non-Competitive Practices**

By entering into this Contract to perform work, the Contractor represents that it has no direct or indirect pecuniary or proprietary interest, and that it shall not require any interest that conflicts in any manner or degree with the work required to be performed under this Contract. The Contractor shall not employ any Person or agent having any conflict of interest. In the event

that the Contractor or its agents, employees or representatives hereafter acquires such a conflict of interest, it shall immediately disclose such conflict to the County. The County shall require that the Contractor take immediate action to eliminate the conflict up to and including termination for default.

By entering into this Contract to perform work, the Contractor represents that no Persons except as designated by Contractor shall be employed or retained to solicit or secure this Contract with an agreement or understanding that a commission, percentage, brokerage, or contingent fee would be paid; and no gratuities, in the form of entertainment, gifts or otherwise, were bided or given by the Contractor or any of its agents; employees or representatives, to any official, member or employee of the County or other governmental agency with a view toward securing this Contract or securing favorable treatment with respect to the awarding or amending, or the making of any determination with respect to the performance of this Contract.

### **3.13 Disputes, Claims and Appeals**

The Contractor shall address questions or claims regarding the Contract in writing to the Buyer and Project Manager, within ten (10) Days of the date on which the Contractor knows or should know of the question or claim. No claim by the Contractor shall be allowed if asserted after final payment under this Contract. No claim shall be allowed for any costs incurred more than ten (10) Days before the Contractor gives written notice, as required in this section. The Buyer and Project Manager shall ordinarily respond to the Contractor in writing with a decision, but absent such written response, the question or claim shall be deemed denied upon the tenth (10th) Day following receipt by the Buyer and Project Manager.

In the event the Contractor disagrees with the determination of the Buyer and Project Manager, the Contractor shall within five (5) Days of the date of such determination, appeal the determination in writing to the Procurement and Contract Services Section Manager. Such written notice of appeal shall include all information necessary to substantiate the appeal. The Procurement and Contract Services Section Manager shall review the appeal and make a determination in writing, which shall be final. Appeal to the Procurement and Contract Services Section Manager shall be a condition precedent to alternative dispute resolution or litigation.

Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the Contract and in accordance with the direction of the Buyer or Project Manager. Failure to comply precisely with the time deadlines under this subsection as to any claim shall operate as a waiver and release of that claim and an acknowledgement of prejudice to the County.

### **3.14 Maintenance of Records/Audits**

The Contractor shall maintain, and shall require any sub-contractor to maintain, accounts and records, including personnel, property, financial, and programmatic records and such other records as may be deemed necessary by the County to ensure proper accounting for all contract funds and compliance with this Contract. All such records shall sufficiently and properly reflect all direct and indirect costs of any nature expended and services provided in

the performance of this Contract. The Contractor shall make such documents available to the County for inspection, copying, and auditing upon request.

All records referenced in this section shall be maintained for a period of six (6) years after completion of work or termination hereof unless permission to destroy them is granted by the Office of the Archivist in accordance with RCW Chapter 40.14, or unless a longer retention period is required by law.

The Contractor shall provide access to its facilities, including those of any sub-contractor, to the County, the State and/or federal agencies or officials at all reasonable times in order to monitor and evaluate the services provided under this Contract.

The Contractor agrees to cooperate with County or its designee in the evaluation of the services provided under this Contract and to make available all information reasonably required by any such evaluation process. The results and records of said evaluation shall be maintained and disclosed in accordance with RCW Chapter 42.56.

If the Contractor expended a total of \$500,000.00 or more in federal awards during its fiscal year, and is a non-profit organization, and is, under this Contract, carrying out or administering a program or portion of a program, it shall have an independent audit conducted in accordance with OMB Circular A-133, which shall comply with the requirements of GAAS (generally accepted auditing standards), GAO's Government Audit Standards and OMB Circular A-133, as amended and as applicable. Contractors expending federal awards from more than one source shall be responsible for determining if the combined financial awards are equal to or greater than \$500,000.00. The Contractor shall provide one copy of the audit report to each County division providing federal awards to the Contractor no later than nine (9) months subsequent to the end of the Contractor's fiscal year.

### **3.15 Other Public Agency Orders**

Other federal, state, county and local entities may utilize the terms and conditions established by this Contract if agreeable to all parties. The County does not accept any responsibility or involvement in the purchase orders or contracts issued by other public agencies.

If the contractor agrees to extend this contract to other governmental agencies, this contract is subject to an Administrative Fee (Fee) of 1% (.01). The Fee shall be based on total sales made to each governmental agency outside of King County's Departments, Divisions and Agencies, less sales tax, freight and any credits(s). The Fee shall be paid by the contractor, payable and remitted to King County Procurement and Contract Services Section not less than twice per year, on July 31<sup>st</sup> and January 31<sup>st</sup> for the first and second half of the year sales respectively. Fees submitted shall be accompanied by a sales report, reference the contract number, and show the total sales to other governmental agencies, excluding King County. The contractor shall not invoice the Fee to any contract user.

### **3.16 Environmentally Preferable Product Procurement Policy**

Bidders able to supply products containing recycled and environmentally preferable materials that meet performance requirements are encouraged to offer them in bids and proposals.

The Bidder and Contractor shall use recycled paper for all printed and photocopied documents related to the submission of this solicitation and fulfillment of the contract and shall, whenever practicable, use both sides of the paper. (Reference: KCC 18.20).

### **3.17 Industrial and Hazardous Waste**

The Contractor shall comply with all applicable local ordinances, state and federal statutes, and supporting rules and regulations governing the discharge of industrial waste to public sewer, private sewer, or side sewer tributary to the metropolitan sewer system.

Contractor shall handle and dispose of all hazardous wastes in compliance with all applicable local, state and federal laws and regulations, including the Resource Conservation and Recovery Act, the Washington Hazardous Waste Management Act, and applicable rules and regulations of the Environmental Protection Agency and the Department of Ecology governing the generation, storage, treatment, transportation or disposal of hazardous wastes.

### **3.18 Patents and Royalties**

The Contractor is responsible for paying all license fees, royalties or the costs of defending claims for the infringement of any intellectual property that may be used in performing this Contract.

### **3.19 Supported Employment Program**

The County encourages the creation of supported employment programs for developmentally and/or severely disabled individuals. The County itself has such a program and is actively seeking to do business with those Contractors and Consultants that share this employment approach. If your firm has such a program, or intends to develop such a program during the life of this Contract, please submit Documentation supporting this claim with your bid. If you have questions, or need additional information, please contact the Community and Human Services Division, Developmental Disabilities Division, 206-263-9061.

### **3.20 Nondiscrimination and Equal Employment Opportunity**

- A. Nondiscrimination in Employment - During performance of this Contract, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of the employee or applicant's sex, race, color, marital status, national origin, religious affiliation, disability, sexual orientation, gender identity or expression or age except by minimum age and retirement provisions, unless based upon a bona fide occupational qualification.
- B. Equal Employment Opportunity Efforts - The Contractor will undertake equal employment opportunity efforts to ensure that applicants and employees are treated, without regard to their sex, race, color, marital status, national origin, religious affiliation, disability, sexual orientation, gender identity or expression or age. The Contractor's equal employment opportunity efforts shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeships. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices setting forth this nondiscrimination clause. In accordance with KCC 12.16.010.J, "equal employment opportunity efforts" shall mean active efforts to ensure equal opportunity in employment that is free from all forms of discrimination.
- C. Nondiscrimination in Subcontracting Practices - During the term of this Contract, the Contractor shall not create barriers to open and fair opportunities to participate in County contracts or to obtain or compete for contracts and subcontracts as sources of supplies, equipment, construction and services. In considering offers from and doing business with subcontractor and suppliers, the Contractor shall not discriminate against any person because of their sex, race, color, marital status, national origin, religious affiliation, disability, sexual orientation, gender identity or expression or age except by minimum age and retirement provisions, unless based upon a bona fide occupational qualification.
- D. Compliance with Laws and Regulations - The Contractor shall comply fully with all applicable federal, state and local laws, ordinances, executive orders and regulations that prohibit discrimination. These laws include, but are not limited to, RCW Chapter 49.60, Titles VI and VII of the Civil Rights Act of 1964, the American with Disabilities Act, and the Restoration Act of 1987. In addition, King County Code chapters 12.16, 12.17 and 12.18 are incorporated herein by reference and the requirements in these code sections shall specifically apply to this contract. The Contractor shall further comply fully with any equal opportunity requirements set forth in any federal regulations, statutes or rules included or referenced in the contract documents.
- E. Small Contractors and Suppliers and Minority and Women Business Enterprises Opportunities. King County encourages the Contractor to utilize small businesses, including Small Contractors and Suppliers (SCS) and minority-owned and women-owned business enterprises certified by the Washington state Office of Minority and Women's Business Enterprises (OMWBE) in County contracts. The County encourages the

Contractor to promote open competitive opportunities for small businesses, including SCS firms and minority-owned and women-owned business enterprises. Program information is available at <http://www.kingcounty.gov/bdcc>.

- F. Sanctions for Violations - Any violation of the mandatory requirements of the provisions of this Section shall be a material breach of contract, for which the Contractor may be subject to damages, withholding payment and any other sanctions provided for by contract and by applicable law.

### **3.21 Requirements of King County Equal Benefits Ordinance**

In accordance with King County Ordinance 14823, as a condition of a contract valued at \$25,000 or more, the Contractor agrees that it shall not discriminate in the provision of employee benefits between employees with spouses and employees with domestic partners during the performance of this Contract. Absent authorization for delayed or alternative compliance as referenced below, failure to comply with this provision shall be considered a material breach of this Contract, and may subject the Contractor to administrative sanctions and remedies for breach.

When the contract is valued at \$25,000 or more, by signing the Contract/Bid Submittal the Contractor is indicating compliance with this requirement or with the terms of an authorization for delayed or alternate compliance.

Delayed Compliance: If a Contractor/Bidder is seeking authorization from King County Procurement and Payables Section to delay implementation of equal benefits due to a Collective Bargaining Agreement\*, Open Enrollment\* or internal Administrative\* steps, an Equal Benefits Substantial Compliance Authorization Form must be attached to the Contract/Bid Submittal (CAP – Prior to Contract execution).

Alternative Compliance: If a Contractor/Bidder is seeking authorization from King County Procurement and Payables Section for alternative compliance with the requirements of the equal benefits ordinance, the Contractor/Bidder must complete and return an Equal Benefits Substantial Compliance Authorization Form to King County.

The Substantial Compliance Authorization Form can be found at:

<http://www.kingcounty.gov/depts/finance-business-operations/procurement/for-business/forms.aspx>

### **3.22 Requirements of King County Living Wage Ordinance**

In accordance with King County Ordinance 17909, as a condition of award for contracts for services with an initial or amended value of \$100,000 or more, the Contractor agrees that it shall pay and require all Subcontractors to pay a living wage as described in the ordinance, to employees for each hour the employee performs a Measurable Amount of Work on this Contract. "Measurable Amount of Work" means a definitive allocation of an employee's time that can be attributed to work performed on a specific matter, but that is not less than a total of one hour in any one week period.

The requirements of the ordinance, including payment schedules, are detailed at <http://www.kingcounty.gov/depts/finance-business-operations/procurement/about-us/Living-Wage.aspx>

Violations of this requirement may result in disqualification of the Contractor from bidding on or being awarded a County contract for up to two years; contractual remedies including, but not limited to, liquidated damages and/or termination of the Contract; remedial action as set forth in public rule; and other civil remedies and sanctions allowed by law.

### **3.23 Non-Waiver of Breach**

No action or failure to act by the County shall constitute a waiver of any right or duty afforded to the County under the Contract; nor shall any such action or failure to act by the County constitute an approval of, or acquiescence in, any breach hereunder, except as may be specifically stated by the County in writing.

### **3.24 Severability**

Whenever possible, each provision of this Contract shall be interpreted to be effective and valid under applicable law. If any provision is found to be invalid, illegal, or unenforceable, then such provision or portion thereof shall be modified to the extent necessary to render it legal, valid, and enforceable and have the intent and economic effect as close as possible to the invalid, illegal, and unenforceable provision. If it is not possible to modify the provision to render it legal, valid and enforceable, then the provision shall be severed from the rest of this Contract. The invalidity, illegality or unenforceability of any provision shall not affect the validity, legality or enforceability of any other provision of this Contract, which shall remain valid and binding.

### **3.25 Certification Regarding Debarment, Suspension and Other Responsibility Matters**

Under King County Code 2.93.170, the King County Executive may debar a Consultant from consideration for award of contracts with the County for up to two years, and may suspend a Consultant from consideration for award of contracts with the County if there is probable cause for debarment for up to six months; for the following:

- A. A Conviction within the five years preceding commencement of the debarment or suspension for commission of a criminal offense as an incident to obtaining or attempting to obtain a public or private contract or subcontract, or in the performance of the contract or subcontract;
- B. Conviction within the five years preceding commencement of the debarment or suspension under state or federal statutes of embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property or any other offense indicating a lack of business integrity or business honesty that currently, seriously and directly affects responsibility as a consultant to the county;
- C. Conviction within the five years preceding commencement of the debarment or suspension under state or federal antitrust statutes arising out of the submission of bids or proposals;

- D. Violation of state wage payment laws;
- E. Violation of ethical standards set forth in contracts with the County;
- F. Violation of contract provisions, such as the following, of a character that is regarded by the Executive to be so serious as to justify debarment action:
  - 1. Deliberate failure without good cause to perform in accordance with the specifications or within the time limit provided in the contract;
  - 2. Substantial failure to comply with commitments to and contractual requirement for participation by minority and women's business enterprises and equal employment opportunity; or
  - 3. A recent record of failure to perform or of unsatisfactory performance in accordance with the terms of one or more contracts, though failure to perform or unsatisfactory performance caused by acts beyond the control of the Consultant shall not be considered to be a basis for debarment; or
- G. Any other cause that the Executive determines to be so serious and compelling as to affect responsibility as a Consultant to the county, including debarment by another governmental entity for any cause similar to those in this subsection;

The King County Executive may issue an Order of Suspension/Debarment under King County Code 2.93.170 and Executive Policies and Procedures CON 7-20(PR). Rights and remedies of the County under these provisions are besides other rights and remedies provided by law or under the Agreement

### **3.26 Incorporation of Documents**

The contract between the awarded bidder and King County shall include all documents mutually entered into at the time of contract award, specifically including the contract document, the solicitation, and the response to the solicitation. The contract must include, and be consistent with, the specifications and provisions stated in this solicitation. King County shall not be bound nor obligated to enter into or sign additional agreements and or documents other than those required by law.

## **SECTION 4 Specific Contractual Terms & Conditions**

### **4.1 Contract Value**

The estimated annual value of this contract is approximately \$2,000,000. King County will not be limited, restricted or bound by this dollar value, nor shall the County be obligated to purchase any items contained in this ITB.

### **4.2 Contract Term**

The term of this Contract will be five (5) years, subject to the termination clauses contained herein. King County reserves the right to extend the term if determined to be in the best interest of the County.

Contracts or purchase orders will be issued by the County. Contract amendments or change orders issued by the County may reflect modification(s) of contract terms, funding or other matters.

King County reserves the right to purchase the goods or services described herein from other sources. The Contractor does not have the exclusive right to fill all of the County's requirements for the goods or services awarded nor will the County be obligated to purchase the estimated annual quantity, or any quantity contained in this Contract.

### **4.3 Price Revisions**

Prices shall remain firm for the duration of the Contract period. The Contractor may request price changes, and shall supply documentation satisfactory to King County such as changes to the Producers Price Index for the commodity, the Consumer Price Index for the Seattle-Tacoma-Bremerton area, or a manufacturer's published notification of price change(s). Reasonable price changes based on market conditions and price/cost analysis may be approved by King County.

King County will evaluate this information to determine if revising the pricing is considered fair and reasonable to the satisfaction of King County. Requests for any such change are to be made in writing to the Buyer in the Procurement Services Division office. A written change order issued by the County will institute the price adjustment, provide the new prices and establish the effective date for the new prices.

The Contractor shall endeavor to give the King County Procurement Services Section thirty (30) days but not less than fourteen (14) days written notice prior to the effective date of the price increase. The County may cancel the contract if the price increase request is not approved.

All price reductions at the manufacturer's or distributor's level shall be reflected in a reduction of the contract price(s) to King County retroactive to the effective date of the price reductions.

### **4.4 Shipping Charges**

All prices shall include freight FOB to the designated delivery point. The County will reject requests for additional compensation for freight charges.

#### **4.5 Packing Slips**

Each delivery to the County shall have a packing slip enclosed that identifies the requester, purchase order number, part number, unit price and quantity of each part shipped. If the delivery is a partial shipment, indicate on the packing slip that it is not a complete shipment of that order and identify the items not shipped and provide a projected completion date of the order.

If the delivery combines items from more than one purchase order, separate packing slips shall be included in the shipment for each.

#### **4.6 Use Report**

The Contractor shall, if requested, submit to the Buyer a report of sales made to King County under this Contract. The report, in a format acceptable to King County, shall identify the detail required by the Buyer, which may include but is not limited to, delivery location, the item description, whether it's a Contract or non-Contract item, quantity, price and discount.

#### **4.7 Warranty**

The Contractor warrants that the work performed under this Contract shall be free from defects in material and workmanship, and shall conform to all requirements of this Contract, for a period of at least twelve (12) months from date of acceptance of such work by the County. Any work corrected shall be subject to this subsection to the same extent as the work initially provided.

The bidder shall provide, upon request by the County, their standard warranty. The warranty shall be specific for all components of the equipment regardless of whether these components were built by the original equipment manufacturer or outside suppliers. King County may avail itself of the bidder or manufacturer's standard warranty if more beneficial to the County.

Conducting of tests or inspections, acceptance, or the processing of payment(s) by the County shall not constitute a waiver of any rights under this Contract or in law. The termination of this Contract shall in no way relieve the Contractor from its warranty responsibility.

The Contractor shall ensure that the warranty requirements of this Contract are enforceable through and against the Contractor's suppliers, vendors, distributors and Subcontractors. The Contractor shall cooperate with the County in facilitating warranty related work by such suppliers, vendors, distributors and Subcontractors.

Contractor warrants that the Services shall in all material respects conform to the requirements of this Contract. Contractor warrants that qualified professional personnel with in-depth knowledge shall perform the Services in a timely and professional manner; and that the Services shall conform to the standards generally observed in the industry for similar Services. Contractor warrants that the Services shall be in compliance with all applicable laws, rules and regulations.

#### **4.8 Warranty Remedies**

Whenever possible, the contractor shall provide "on the spot" settlement of warranty claims or disputes, and authorize local representatives to act on the equipment manufacturer's behalf.

If at any time during the twelve (12) month period immediately following acceptance of any work covered by this Contract, Contractor or the County discovers one or more material defects or errors in the work or any other aspect in which the work materially fails to meet the provisions of the warranty requirements herein Contractor shall, at its own expense and within thirty (30) days of notification of the defect by the County, correct the defect, error or nonconformity.

The County shall give written notice of any defect to the Contractor. If the Contractor has not corrected defect within thirty (30) days after receiving the written notice, the County, in its sole discretion, may correct the defect itself. In the case of an emergency where the County believes delay could cause serious injury, loss or damage, the County may waive the written notice and correct the defect. In either case the County shall charge-back the cost for such warranty repair to the Contractor.

The Contractor is responsible for all costs of repair or replacement in order to restore the work to the applicable Contract requirements, including shipping charges, for work found defective within the warranty period, regardless of who actually corrects the defect.

#### **4.9 Hazardous Chemical Communication**

In order to comply with WAC 296-62-054, Hazard Communication, the Contractor shall prepare a Material Safety Data Sheet (MSDS) for all products containing any toxic products that may be harmful to the end user. The MSDS Sheet shall accompany the toxic product(s) to the specified delivery sites and include the Chemical Abstract Service (CAS) numbers for every chemical that is listed in the MSDS. If the product is actually used diluted, the rate shall be so stated in the MSDS and the hazards and corresponding personal protection, etc. also be listed. SARA Title 3 chemicals shall be listed with the percentage by weight of the total product. The MSDS shall include a statement as to the intended use of the product.

#### **4.10 Insurance Requirements**

Prior to the award of a contract, the Contractor shall obtain and maintain the minimum insurance set forth herein for the duration of this contract for itself and any subcontractor performing work. By requiring such minimum insurance, the County shall not be deemed or construed to have assessed the risks that may be applicable to the Contractor under this Contract. The Contractor shall assess its own risks and, if it deems appropriate and/or prudent, maintain greater limits and/or broader coverage. The Contractor shall maintain limits and scope of insurance no less than:

General Liability: \$1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage, and for those policies with aggregate limits, a \$2,000,000 aggregate limit;

Automobile Liability: \$1,000,000 combined single limit per accident for bodily injury and property damage;

Workers' Compensation: Statutory requirements of the state of residency;

Employers Liability Stop Gap: \$1,000,000

Except for Workers Compensation, the county, its officers, officials, employees and agents are to be covered as additional insureds as respects liability arising out of activities performed by or on behalf of the Contractor in connection with this Contract. Use the above exact language on the Endorsement Form. **The County requires this Endorsement to complete the Contract.**

## **SECTION 5 Technical Specifications**

### **5.1 Introduction of Specifications**

King County Department of Natural Resources, Wastewater Treatment Division (WTD) is seeking to contract for the supply and delivery of Dewatering Polymer for use in wastewater treatment operations, in sufficient quantities to treat approximately **32,200 dry tons per year** of digested sludge, at the County's treatment facilities:

14,000 tons - West Point Treatment Plant

15,000 tons - South Treatment Plant

3,200 tons - Brightwater Treatment Plant

32,200 tons – Total for All Sites

The quantities will be used for bidding purposes only. Final contract quantities will be determined by actual conditions and may vary from the values estimated during the pre-qualification trials.

Although the County tested dewatering polymer products at the County's West Point Treatment Plant, the contract will include a family of polymer products to be purchased for use in the dewatering processes at the County's South Plant and Brightwater Treatment Plant. The intent of the family of products is to allow the contractor the opportunity to screen additional products should the awarded product not perform at the other treatment plants, or at the discretion of each treatment plant.

### **5.2 Specifications**

#### **A. Product Qualifications**

Contractor(s) are required to submit new MSDS at any time their polymer differs from the polymer accepted in the initial testing or subsequent approved polymer formulations. Product specifications may include, but not be limited to a percent active polymer, percent solids and viscosity specification for the neat material as well as procedures for determining these parameters. The submitted specifications shall become part of the contract for the successful bid product and will be treated as the proprietary information of the Contractor.

#### **B. Product Disqualification**

The County reserves the right to disqualify any polymer at any time during the Contract, if it is determined that the product poses a safety or health hazard to plant personnel.

The County reserves the right to disqualify any polymer that caused the sludge to exhibit unacceptable slurring or application characteristics or has adverse impacts on any treatment process downstream of the thickening process.

The County reserves the right to disqualify any polymer that poses an odor problem either at the plant site or at the sludge reuse sites. County plant and sludge application personnel will determine the existence of an odor problem with the polymer.

### C. Quantity

Contract quantity estimates have been determined by pre-qualification trials and these values have been assigned to each product tested. The quantities will be used for bidding purposes only. Final contract quantities will be determined by actual conditions and may vary from the values estimated during the pre-qualification trials.

### D. Quality

1. Product specifications for active polymer content and bulk viscosity range that were submitted by the Bidder during testing, shall be considered part of the Contract resulting from this ITB and the Bidder shall be bound by them. The Bidder shall follow the same analytical procedures as the King County's West Point Treatment Plant laboratory to determine the percent activity of the selected polymer.
2. The Bidders are advised to note the difference between percent activity and total solids. Percent activity describes the polymer content of a certain polymer solution whereas the total solids of a polymer may include inert contents such as dispersing agents or surfactants. The procedures for dry and emulsion polymer analyses shall be according to the WERF's (Water Environment Research Foundation) 'Guidance Manual for Polymer Selection in Wastewater Treatment Plants'. The procedures are listed in above referred Manual's Section 3, Module-J.
3. If the Contractor's recommended analytical procedure for percent activity analysis differs from the WERF procedure, the Contractor shall provide a copy of the analytical method.
4. Each bulk delivery shall be accompanied by the Contractor's Lab certificate of analysis for active polymer content (for emulsion and dry polymers) and bulk viscosity (for emulsion polymers). If the deliveries are determined to be below specification, King County reserves the right, to either reject the shipment or be appropriately credited by the Contractor for the discrepancy. If liquid deliveries are not within the viscosity specification, King County reserves the right to reject the polymer shipment or return it to the Contractor at the Contractor's expense. This action would not release the Contractor from the delivery as specified under paragraph F below.
5. If, at any time during the term of the Contract, the polymer is found to be consistently out of product specifications, King County will notify the Contractor in writing of the problem and will request remedial action within one week from date of notification. King County reserves the right to terminate the contract for noncompliance if the problem is not corrected promptly after this notification.
6. If the successful product is a dry product, the quality of the delivered product shall be consistent with that of the product tested. Changes in the physical composition of the product (e.g. granular to powder), which result in abnormal batching and reduced dewatering performance will be considered grounds for returning any remaining bags of the affected lot for credit. The Contractor shall be responsible for crediting King County for the reduced performance with credit based on price per dry ton.

### E. Equipment

ITB 1096-16-LSM – Dewatering Polymer  
(Based on RFQ 1207-15-LSM)

1. King County's existing polymer storage and batching system at West Point is capable of handling emulsion polymers. The South Plant system can handle dry and emulsion products, whereas the Brightwater Plant's system can handle emulsion polymers only.
2. All bids for the supply of polymer products that would require the use of additional equipment shall include a submittal detailing the additional equipment proposed and a sketch indicating the location in the process stream. Any equipment proposed by the Contractor is subject to determination by County staff as to the suitability and reliability in performing its function and to its adaptability to the existing system.
3. Should it be determined after the Contract that additional equipment is necessary to utilize the polymer product under Contract, the Contractor shall then provide and install this equipment at no additional cost to the County, subject to King County's approval as previously described. Such equipment shall become the property of King County. Should the Contractor fail to provide suitable necessary equipment, King County reserves the right to cancel the Contract.
4. King County's West Point Treatment Plant has two (2) bulk storage tanks that are used for liquid or emulsion polymer storage, approximately 20,000 gallons total. A minimum storage of twenty (20), 1,000 to 1,100 -pound bags of dry product is maintained. Additional tank storage and ancillary equipment required shall ~~must~~ be supplied by the Contractor to provide adequate standby capacity to ensure two week polymer storage beyond the anticipated maximum delivery time.

F. Delivery

1. Delivery under the contract will be dependent on the type of polymer being provided by the Contractor. All deliveries shall be via motor freight as no railroad unloading facilities are available. Site specific constraints at the Brightwater Facilities require the carrier to have rear off-loading capabilities.
2. All freight and delivery charges shall be the responsibility of the Contractor. King County will not accept any additional charges for freight, surcharges, fees or packaging.
3. All emulsion polymer deliveries shall be unloaded and transferred to King County's storage vessels by the carrier's on board equipment. No pressurized air will be available from King County for unloading purposes.

Delivery shall be made within twenty-four (24) hours of the delivery time and date specified by the County. The County will place orders a minimum of five (5) working days in advance. Preferred hours for receiving deliveries are 8:00 a.m. – 3:00 p.m., Monday through Friday. However, deliveries can be received outside these hours under exceptional situations. The Contractor shall inform the County at least six (6) hours in advance of any delivery that may fall outside the range of preferred hours of delivery. Business Days are Monday through Friday.

Deliveries shall be made within two (2) working days for dry products and within twenty-four (24) hours for liquid and emulsion polymers. Bid prices shall include delivery, FOB destination, to the following locations:

ITB 1096-16-LSM – Dewatering Polymer

(Based on RFQ 1207-15-LSM)

West Point Treatment Plant  
1400 Discovery Park Blvd.  
Seattle, WA 98119-1064  
Monday – Friday 8:00 a.m. to 3:00 p.m.

South Treatment Plant  
1200 SW Monster Rd.  
Renton, WA 98055  
Monday – Friday 8:00 a.m. to 3:00 p.m.

Brightwater Treatment Plant  
22505 State Route 9 SE  
Woodinville, WA 98072-6010  
Monday – Friday 7:00 a.m. to 3:00 p.m.

4. The Contractor or their delivery firm shall notify King County at least twenty-four (24) hours prior to any attempt to deliver any product of material, in either case this delivery notification requirement is the full responsibility of the Contractor.
5. The handling of chemicals shall comply with all applicable safety laws and standards of the State of Washington, and standards established by the United States Department of Transportation, the United States Department of Labor's Occupational Safety and Health Act (OSHA), accepted industry practices, and City/Council requirements.
6. Dry Polymer:

King County's WPTP will accept delivery of dry polymer products in minimum quantities of 10,000 pounds and a maximum of 120,000 pounds. Orders will normally be for 1,000 - 1,500 pound non-returnable bulk bags with lifting straps and bottom outlet spouts. The bag size should be selected based on the specifications of the existing dry polymer system. The Contractor may also be asked to provide an occasional pallet load order of 50-pound bags, no bags heavier than 55 pounds shall be accepted. All individual bags and bulk bags shall be shipped on pallets having a minimum weight of 1,000 pounds and a maximum weight of 1,500 pounds. All pallets shall be non-returnable. No loose bag shipments are accepted. The shipper shall provide a means of moving pallets to the end of the truck where they can be lifted by county supplied forklift.

7. Emulsion Polymer:

For emulsion polymers, the County will accept delivery of approximately 5,000 gallons truckloads. No containerized shipments shall be accepted.

The Contractor shall supply documentation of the liquid polymer poundage delivered by supplying the heavy load weight slip and after the product is delivered, a light load weight slip (weighing the truck before and after the delivery). The Contractor shall fax the copy of light load weight slip within two (2) days after the polymer delivery to the appropriate contact for each treatment plant. The County shall be billed according to the difference of these two weights.

### 5.3 Performance

#### A. Requirement

ITB 1096-16-LSM – Dewatering Polymer

(Based on RFQ 1207-15-LSM)

1. All samples for Contract compliance will be analyzed for percentage total solids in King County's Wastewater Treatment Plant laboratory. A dosing point in the sample, which meets or exceeds recovery and remains within the biosolids (cake) dryness range (**90%** for recovery and **25%** for Total Solids) shall be a condition of the Contract. The minimum performance requirements for South Plant is 22.5% cake solids, recovery of 95% based on Total Suspended Solids, and a polymer dosage of 42 lbs. active/dry tons shall not be exceeded. The minimum performance requirements for Brightwater is 20% cake solids, recovery of 91% based on Total solids and not exceed a polymer dosage of 43 lb. active/dry tons
2. Throughout the life of the Contract, King County shall obtain consistent performance within ten percent (10%) of the Contracted performance standard established during the trial. Meaning that if biosolids (cake) dryness and/or polymer dosage rates change such that when entered into the dewatering polymer evaluation formula, the resultant total polymer cost shall not exceed the value calculated as part of the bid process by more than 10%
3. The Contractor will be offered the opportunity to assist county staff to make suggestions for improving product performance or by changing products. All remedial action taken by the Contractor will be subject to prior approval by County staff and shall result in no additional cost to the County. The Contractor is responsible for bringing the performance back into compliance
4. Odor – If an odor problem occurs during the Contract, as determined by County staff, the Contractor is responsible for correcting the problem. The Contractor will be given the opportunity to investigate the problem and to offer proposed solutions prior to correcting the problem.

**B. Contractor responsibility for correcting Performance and Odor Problems**

1. The Contractor shall correct performance and odor problems by assisting county staff in making adjustments or by testing and supplying the county a different product that meets the performance. All remedial action taken by the Contractor will be subject to prior approval by King County staff. If the performance is not resolved within one month the county may elect to Terminate Contract (see Part A Section 3.6.).
2. If the Contractor is unable to offer a solution satisfactory to the County, then the county reserves the right to switch to an alternative polymer from the current Contractor or purchase from another firm if the problem is temporary, or terminate the Contract. All costs pertaining to correcting the odor or performance problem will be paid by the Contractor, including purchasing product from another firm

**5.4 Technical Support**

Technical support shall be provided from the Contractor which will include but not limited to the following subject areas at no cost to King County.

**A. Process Optimization**

The Contractor shall assist when requested in the evaluation of polymer injection points, process control tools or strategies, polymer applied concentration, process equipment set points or polymer type.

Neat Product Analysis - total solids, viscosity (when applicable) in centi-poise, and chemical composition, and percent active.

B. Toxicity Issues

Scientific Literature Search

Following a written request from the county, the Contractor shall assist in conducting a literature search for information including topics such as but not limited to: polymer degradation in the environment, impact of polymer on digestion. The information should be completed within 10 working days after receiving request.

C. Contractor Support

The Contractor or designated Contractor representative should be available within two hours of notification by phone or beeper for consultation, problem solving or inquires.

**SECTION 6 Bid Response**

**6.1 Rules of Price Evaluation**

Bids meeting all requirements of this ITB will be evaluated on price. Bids stating price in effect at the time of shipment will not be accepted.

In the event of a discrepancy between the unit price and the extended price, the unit price will prevail.

Bidders shall only submit pricing on their exact chemical as submitted and approved by King County during the test phase.

Low bid will be determined by the County calculating the bidder's "Total Net (from Incumbent)" price ( individually for each qualified product) based on the results of their individual test runs.

Note: The incumbent's current price of \$2.33 Polymer, \$ Active Lb is used on Attachment B price sheets as a bench mark and not as a suggested price to the county.

**6.2 Bidder's Contact Information**

- A. Primary Location 1 Chemical Plant Road, Riceboro, GA 31323  
Physical Address: \_\_\_\_\_  
Mailing Address: P.O. Box 279, Riceboro, GA 31323  
Name of Contact Person: Boyd Stanley, Business Director  
Email: PolyBidDpt@snfhc.com  
Telephone No. (Local/Toll Free): 800-848-7659  
Fax No. (Local/Toll Free): 912-880-2078  
UBI No.: 601-689-241  
Washington State Contractor's License (if applicable): \_\_\_\_\_  
State hours and days of operation:  
Hours: 8 a.m. to 5 p.m. Days: Monday - Friday
- B. State your firm's preference for receiving purchase orders. (check only one and enter information if different from above)  
Fax: 912-880-2078 E-mail: \_\_\_\_\_

**6.3 Remit Address (where payment will be mailed):**

Polydyne Inc.  
\_\_\_\_\_  
P.O. Box 404642  
\_\_\_\_\_  
Atlanta, GA 30384-4642  
\_\_\_\_\_

**6.4 Retail and Stocking/Warehouse Facility Locations (if applicable)**

The Contractor shall attach a separate list of the location(s) for all facilities including the address, contact name(s), email(s), telephone number(s), and fax number(s), for each facility.

**6.5 Prompt Pay Discount**

Prompt payment discounts offered by Contractors shall be used to calculate the low bid provided the discount offered allows a minimum of 20 days for payment. The number of days is calculated from the date of acceptance of goods or services or from the date a complete invoice is date stamped as received by King County, whichever event occurs last, and the check/warrant date. The County will take advantage of any prompt payment discount terms bid. Discount periods shall be extended if:

- The date printed on the invoice is more than three days earlier than the invoice receipt date;
- The delay is caused awaiting a credit memo, invoice correction, adjustment or reissue;
- An invoice is received prior to receiving goods ordered.

Prompt pay discount offered 0 % - 30 Days, Net N/A

**6.6 Purchasing Card (P-Card) Acceptance**

Contractors are requested to have the capability of accepting the King County's authorized VISA Procurement Card (p-card) as a method of payment. Price change(s) or additional fee(s) may not be assessed when accepting the p-card as a form of payment. The Contractor may receive payment from King County by a p-card in the same manner as other VISA purchases.

**VISA acceptance is preferred, but is not the exclusive method of payment.**

Accept VISA cards: Yes  No

Additional purchasing (charge) cards accepted:

- (x) America Express
- (x) Discover
- (x) MasterCard
- ( ) Other: \_\_\_\_\_
- ( ) \_\_\_\_\_
- ( ) \_\_\_\_\_
- ( ) \_\_\_\_\_

**6.7 Pricing of Dewatering Polymer**

See Attachment – B, Pricing

**ATTACHMENT A Specification for each Product**  
**SPECIFICATION SHEET (Complete a separate form for each Product)**

(To be filled out by polymer Contractor)

These specifications constitute the Specification of the product being bid.

All test methods and procedures used to determine Specifications shall be furnished with bid. \*\*

Polymer Supplier	Polydyne Inc.
Polymer Trade Name	Clarifloc WE-1514
Polymer Type	Emulsion
Price per Pound Active	\$1.540/ Active Lb.
Polymer % Active	43%
Price per Pound Neat*	\$0.662/Lb.

\*Note: The neat price will be the unit price per the ITB Attachment - B, Price sheet.

	Units to be reported in	Specification
<b>Cationicity**</b>	%	80.0
UL Viscosity**	centipoise	4.2 - 5.2
<b>Minimum Active Solids**</b>	<b>Wt %</b>	43
Residual Acrylamide**	%	less than 0.1
<b>Maximum Inert Solids**</b>	<b>Wt %</b>	10%
Viscosity Range** 0.25% sol. at 25 degrees centigrade	cps	700
0.5 % Solution pH**	None	4 - 6

**For Dry Products**

Dry Content**	<b>Wt %</b>	
On 10 mesh**	<b>Wt %</b>	
Through 100 mesh**	<b>Wt %</b>	

**For Neat Liquid Polymers**

Specific Gravity	none	1.007
Percent Active Solids**	%	43
Freezing Point**	Fahrenheit	less than 20°F

**Minimum Storage Life in days:**

**Dry\*\***

0.5 % Solution**	1
0.25% Solution**	1
0.1 % Solution**	1

**Neat Liquid\*\*** 365

**SECTION 7 Bid Opening Label**

Complete the form below (or a reasonable facsimile thereof) and affix to the exterior lower left hand corner of the submission package.

<b>URGENT – SEALED BID ENCLOSED</b> <b>Do Not Delay – Deliver Immediately</b>			
<b>URGENT</b>	 <b>King County</b>	<b>King County</b> <b>Procurement and Contract Services Section</b> Chinook Building, 3 <sup>rd</sup> FL CNK-ES-0340 401 Fifth Avenue, Seattle, WA 98104	<b>URGENT</b>
	<b>Bid No.:</b>	<b>1096-16-LSM</b>	
	<b>Bid Title:</b>	<b>Dewatering Polymer</b>	
	<b>Due Date:</b>		
	<b>Vendor:</b>		

ATTACHMENT B PRICING

Company Polydyne

	Trial	Trial	Incumbent Product
Product Name	<b>WE-1515</b>	<b>WE-1514</b>	<b>Polydyne WE-973</b>
Type	<b>Emulsion</b>	<b>Emulsion</b>	<b>Emulsion</b>
% Activity	<b>45.0%</b>	<b>43.0%</b>	<b>43%</b>
Qualify	No	Yes	
Sludge Quantity, DT	32,200	32,200	32,200
X	0.0	40.7	38.3
M		\$1.54	\$2.33
Y	0.0	93.4	93.7
E	\$0	\$2	\$0
Zt	0.0	29.7	29.6
Zc		29.6	29.6
H	\$48.47	\$48.47	\$48.47
A	\$0	\$2,018,232	\$2,873,496
B	#DIV/0!	\$142,616	\$193,202
C	\$0	\$2	\$0
D	#DIV/0!	-\$17,753	\$0
<b>Total (A+B+C+D)</b>	<b>#DIV/0!</b>	<b>\$2,143,096</b>	<b>\$3,066,698</b>
<b>Net (From Incumbent)</b>	<b>#DIV/0!</b>	<b>-\$923,602</b>	<b>\$0</b>
Dose lb/dt		40.7	38.3
Cake TS%		29.7	29.6
Recovery %		93.4	93.7

Fill your price in the yellow cells only

Note: price of \$2.33 under Incumbent is for bidding analysis only and represents the price the county is paying under the current Contract.

Blue Cells Autofill

Polymer Evaluation Formula

<b>A</b>	<b>Polymer Dosage Cost Factor</b>
<b>B</b>	<b>Recovery Cost Factor</b>
<b>C</b>	<b>Polymer Handling Equipment Cost Factor</b> Note: Bidder shall be responsible for all costs associated with additional equipment or modifications to piping systems necessitated by a change in polymer type.
<b>D</b>	<b>Sludge Haul/Application Cost Factor</b>
<b>A</b>	$[(DT/YR) * (X \text{ lbs polymer}/DT) * (M \text{ \$/lb polymer})]$
<b>B</b>	$[\{(DT/YR) / (Y/100)\} - (DT/YR)] * (X \text{ lbs/ polymer}/DT) * (M \text{ \$/lb polymer})$
<b>C</b>	E \$
<b>D</b>	$[\{(DT/YR) / (Zt/100)\} - \{(DT/YR) / (Zc/100)\}] * (H \text{ \$/WT})$

Where:

<b>X</b>	Polymer Dosage, lbs/DT
<b>M</b>	Price of Polymer, \$/active lb
<b>Y</b>	Recovery %
<b>E</b>	Annual Handling Equipment Cost
<b>Zt</b>	Trial Polymer Cake %
<b>Zc</b>	Incumbent Cake %
<b>H</b>	Haul Cost \$/Wet Ton

**Price of Neat in Attachment A is the unit price.** (See Subsection 6.1 Rules of Price Evaluation)  
 To calculate the M-"Price of Polymer, \$/active lb" = Neat price / % active.  
 For example the Incumbent Neat price is \$1.00 / 43% active = M of \$2.33 the price in red.

ITB 1096-16-LSM

Dewatering Polymer (Based on RFQ 1207-15-LSM)

BULK VISCOSITY

Issue	Application date	Issued by	Controlled by	Approved by
03	01/03/13	M. Huart	L. Avond	R. Hind
Remarks: Paragrah 3 modification following BVQI audit.				

**1- PRINCIPLE**

The purpose of this test is to measure the thickness of the emulsion itself.

**2- EQUIPMENT**

- ◆ Brookfield viscosimeter model LVT with its LV spindles,
- ◆ 250 ml bottle,
- ◆ Thermometer.

**3- 3- PROCEDURE**

- ◆ Put 250 ml of the emulsion in a clean and dry 250 ml bottle.
- ◆ Homogenize the sample prior to testing.
- ➔ ◆ Measure the viscosity with the Brookfield viscosimeter using the suitable spindle at 30 rpm after checking that the temperature is between 23 - 25° C.
- ◆ Let turn the spindle till the index is stable on the graduation (about 30 seconds).

<b>Viscosity (in cps) = read value x factor</b>
-------------------------------------------------

30 tr/min	LV1	LV2	LV3
Factor	x 2	x 10	x 40

Choose the module which allows a direct reading between 20 and 80.

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DETERMINATION OF THE PERCENTAGE OF  
NON VOLATILE SOLID

Issue	Application date	Issued by	Controlled by	Approved by
03	21/03/14	M. Hiant	L. Avond	R. Lund
Remarks: Paragraphs 3 and 4 modification.				

**1- PRINCIPLE**

All volatiles are removed from the sample by heating the product in a desiccator.

**2- WITH AN INFRA-RED DESSICATOR****2.1- EQUIPMENT**

- ♦ IR Desiccator (Mettler LP16 / LJ16 / MJ 33 for example) made by :
  - balance
  - IR desiccator
- ♦ aluminium dish (  $\phi = 9.5\text{cm}$  ;  $H = 1\text{ cm}$ ).

**2.2- PROCEDURE**

- ♦ Weigh in a dish about 1.0 g of emulsion.
- ♦ Program: heat at 160 °C for 15 minutes.
- ♦ The percentage of non volatiles is directly given on the screen when the measurement is finished.
- ♦ Remark:
- ♦ The non volatiles solid is given by:

$$\text{SOLID \%} = \frac{W_d}{W_s} \times 100$$

with :  $M_d$  = dry weight (in g)  
 $M_i$  = sample weight (in g)

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DETERMINATION OF THE PERCENTAGE OF  
NON VOLATILE SOLID**3- WITH AN HALOGEN DESSICATOR****3.1- EQUIPMENT**

- ◆ Halogen desiccator (Mettler HR73P or HR 83 for example),
- ◆ aluminium dish (  $\phi = 9.5\text{cm}$  ;  $H = 1\text{ cm}$ ).

**→ 3.2- PROCEDURE**

- ◆ Weigh in a dish about 2.0 g of sample.
- ◆ Program :
  - select a moderate program,
  - an increase at 180° C during 2 minutes and a stabilisation at this temperature during 6 minutes.
- ◆ The non volatiles percentage is directly given on the screen when the measurement is finished.

**Remark:**

The non volatiles solid is given by:

$$\text{SOLID \%} = \frac{W_d}{W_s} \times 100$$

with :  $M_d$  = dry weight (in g)  
 $M_i$  = sample weight (in g)

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STANDARD BROOKFIELD UL ADAPTATOR  
VISCOSITY

Issue	Application date	Issued by	Controlled by	Approved by
05	19/04/13	M. Huart	L. Avond	R. Hund
Remarks: Paragraphs 3 and 4 modification.				

**1- REAGENT AND APPARATUS**

- ◆ NaCl,
- ◆ Deionised water,
- ◆ 8 times Ethoxylated alcohol (for example LUTENSOL TO 89 from BASF),
- ◆ Mechanical stirrer fitted with a stainless steel shaft equipped at the end with approx. 2 cm radius long blades, propeller type,
- ◆ High tall 600 ml beaker,
- ◆ Disposable plastic syringes (5 ml, 2 ml and 10 ml),
- ◆ Balance with an accuracy of 0.001 g,
- ◆ Thermometer,
- ◆ 200 µm stainless steel screen.

**2- PREPARATION OF THE INITIAL 0.5 % POLYMER SOLUTION**

- ◆ Obtain a clean 600 ml beaker and fill it with 100 g of deionised water.
- ◆ Start stirring with the mechanical stirrer at 500 rpm.
- ◆ Calculate the weight of pure emulsion ( $W_0$ ) required to obtain 0.5 g of polymer.

$$W_0 = \frac{50}{C}$$

C is the percentage of active matter in the emulsion.

- ◆ Withdraw approximately the weight ( $W_0$ ) of emulsion into a plastic syringe.
- ◆ Weigh accurately the syringe and record the weight filled ( $W_F$ ).
- ◆ Disperse rapidly the content of the syringe into the vortex of the beaker.
- ◆ Let stir 30 minutes.
- ◆ Weigh the empty syringe and record the weight empty ( $W_E$ ).
- ◆ Calculate  $W = W_F - W_E$ .

**3- PREPARATION OF THE 0.1 % POLYMER IN 1 M NaCl**

- ◆ Add in the beaker:

0.2 ml of TO 89

( $Q_E$ ) g of deionised water

$$Q_E = W \times (9.7949 \times C - 1) - 100.2$$

- ◆ Stir for 5 minutes at 500 rpm.

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STANDARD BROOKFIELD UL ADAPTATOR  
VISCOSITY

- ◆ Then add the salt  $Q_S$  in g : let it stir for 5 minutes  
 $Q_S = 0.585 \times W \times C$
- ◆ So, we have a 0.1 % solution of polymer in 1 M NaCl.
- ◆ Then the solution is ready for viscosity measurement.

**4- CASE OF HIGH MOLECULAR WEIGHT EMULSION**

- ◆ Prepare the solution at 0.5 % like in § 2.

- ◆ Add in the beaker:

→ 0.2 ml of TO 89

( $Q_E$ ) g of deionised water

$$Q_E = W \times (9.7949 \times C - 1) - 100.2$$

- ◆ Stir for 5 minutes at 850 rpm.
- ◆ Then add the salt  $Q_S$  in g : let it stir for 5 minutes at 850 rpm.  
 $Q_S = 0.585 \times W \times C$
- ◆ So, we have a 0.1 % solution of polymer in 1 M NaCl.
- ◆ Then the solution is ready for viscosity measurement.

**5- VISCOSITY MEASUREMENT OF POLYMER SOLUTION**

The viscosity is determined by means of a Brookfield viscosimeter model LVT with the UL adaptator and a spindle speed of 60 rpm.

- ◆ 16 ml of the solution are placed in the cup, and the temperature is adjusted to 23 - 25° C. The cup is then attached to the viscosimeter.
- ◆ Let the spindle turn at 60 rpm till the reading is stable on the dial (about 30 seconds).
- ◆ Read the value indicated on the dial:

$$\text{VISCOSITY (in cps)} = (\text{Readen value} - 0.4) \times 0.1$$

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## Specific Gravity

Rev: 03  
Page 2 of 2I. REAGENTS AND EQUIPMENT

- \*250 ml calibrated volumetric cylinder
- \*Balance accurate to 0.01 g

II. PROCEDURE

- A. Weigh a dry 250 ml calibrated volumetric cylinder to the nearest 0.01g and record this weight as  $W_1$ .
- B. Fill the volumetric cylinder with the powder sample to the 250 ml mark and lightly shake the cylinder to eliminate the air pockets. Measure the powder volume and record as  $V$ .
- C. Reweigh the cylinder containing this polymer to the nearest 0.01g and record as  $W_2$ .

III. RESULTS

Specific Gravity is obtained by the following calculation, it has no units.

$$\text{Specific Gravity} = \frac{W_2(\text{g}) - W_1(\text{g})}{V(\text{ml}) * 1.000(\text{g/ml})} \quad (\text{see note A})$$

Note A: Specific gravity is weight of substance divided by weight of equal volume of water. At reference temperature of 4 degrees density of water is 1.000 g/ml.

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## 0.5 % POLYMER SOLUTION pH

Issue	Application date	Issued by	Controlled by	Approved by
02	21/03/14	M. Hualt	L. Avond	R. Hund
Remarks: Paragraph 3 up-dating.				

**1- PRINCIPLE**

Hydrogen ion activity determination in solution.

**2- APPARATUS AND REAGENTS**

- ◆ Magnetic stirrer,
- ◆ 400 ml beaker,
- ◆ pH-meter with compatible probe,
- ◆ Analytical balance (0.001 g).
- ◆ pH = 4.0 or pH = 10.0 and pH = 7.0 buffer solution,
- ◆ Deionised water.

**→ 3- pH-METER CALIBRATION**

The pH-meter should be calibrated each day of use at a given temperature, with pH = 7.0 and pH = 4.0 (or pH = 7.0 and pH = 10.0) buffer solutions, depending the measure scale.

If the electrode have not an integrated temperature probe, the solution temperature should be put manually in the pH-meter.

Electrodes should be stored in a KCl 3 M solution and washed with deionized water before and after each use.

At the calibration end, the zero point is obtained for a pH between 6.0 and 8.0 and the slope at 25° C in mv/pH between 51 and 61.

**4- pH MEASUREMENT****4.1- 0.5 % POLYMER SOLUTION**

We prepare a solution at 5 g/l of dry polymer. Therefore, we dilute 1.00 g of dry polymer (determined with SNF procedure QC-100 A) in 200 ml of deionized water, while stirring on a magnetic stirrer.

The polymer is added slowly to the water sprinkling into the wall of the vortex.

0.5 % POLYMER SOLUTION pH

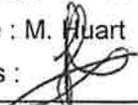
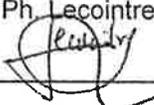
4.2- pH MEASUREMENT OF THE SAMPLE

When the powder is well dissolved, we measure the pH of the solution.

Therefore, we place the electrode of the pH-meter in the solution and allow about one minute for the reading to stabilize.

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INSOLUBLE PERCENTAGE DETERMINATION

ISSUE	ISSUED BY	CONTROLLED BY	APPROVED BY	REMARKS
01	Date : 18/05/92 Name : M. Huart Initials :	Date : 19/05/92 Name : Ph. Lecointre Initials :	Date : 20/05/92 Name : R. Hund Initials :	First issue
02	Date : 06/07/98 Name : M. Huart Initials :	Date : 08/07/98 Name : Ph. Lecointre Initials :	Date : 08/07/98 Name : R. Hund Initials :	Modification of paragraphs 2- and 3-
03	Date : 21/03/01 Name : M. Huart Initials : 	Date : 22-03-2001 Name : Ph. Lecointre Initials : 	Date : 23/03/01 Name : R. Hund Initials : 	Update to be used at Chemtall - No technical change.
	Date : Name : Initials :	Date : Name : Initials :	Date : Name : Initials :	
	Date : Name : Initials :	Date : Name : Initials :	Date : Name : Initials :	
	Date : Name : Initials :	Date : Name : Initials :	Date : Name : Initials :	
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	Date : Name : Initials :	Date : Name : Initials :	Date : Name : Initials :	

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**1- EQUIPMENT**

- ◆ 400 ml beaker,
- ◆ Magnetic stirrer,
- ◆ Forced air drying oven,
- ◆ Analytic scale (0.001 g),
- ◆ Filtering funnel (4 cm diameter) equipped with a stainless steel 200 µm screen,
- ◆ Desiccator,
- ◆ 250 ml volumetric cylinder,
- ◆ Timer,
- ◆ Aluminium weighing pan,
- ◆ Deionised water (DI water).

**2- PROCEDURE**

- ◆ Pour 200 ml of water in a 400 ml beaker at room temperature.
- ◆ Add 1 g of powder while stirring on a magnetic stirrer. For anionic and cationic polymers, the stirring will be maintained during 2 hours. For non ionic or partially hydrolysed and weakly cationic (less than 5 %) products, allow to stir during 4 hours.
- ◆ Pour the dissolved sample into the filter funnel, and drain.
- ◆ After the filter funnel is completely drained, rinse the filter funnel under a gentle stream of cold running tap water (avoid high pressure water) until the filtrate is free of polymer. This can be determined by lack of stringiness or slickness of the filtrate.

**3- SCREEN OBSERVATION**

Count the number of points remaining on the screen and report the percentage as determined below :

- ◆ If there are less than 30 points, the insoluble percentage is estimated to be less than 1 %.
- ◆ If the screen is covered and the solution has filtered, the insoluble percentage is estimated to be less than 2 %.

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INSOLUBLE PERCENTAGE DETERMINATION

- ◆ If the screen is covered, and all the solution will not filter through the screen, complete the following steps :
  - Place the screen and gel contents in the weighting pan, and dry in the oven at 105 °C for 4 hours.
  - Remove from oven and let cool in desiccator before weighing. Record the weight (screen + insoluble + pan).
  - Rinse the screen with DI water and dry at 105° C for 4 hours. Remove the screen and pan from the oven and cool in a desiccator. Record the weight of screen and pan.

The percentage of insoluble matter is determined by the following formula :  
$$\text{Insoluble\%} = 100 \times [\text{Weight of (screen+insoluble+pan)} - \text{Weight of (screen+pan)}]$$

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## FREE ACRYLAMIDE CONTENT BY HPLC

Issue	Application date	Issued by	Controlled by	Approved by
10	09/10/15	M. Huart	L. Avond	R. Hund
<b>Remarks :</b> Modification HPLC columns and extraction phases. Calibration modification. Polymers by precipitation addition.				

**1- PRINCIPLE**

Unreacted acrylamide in polymer is extracted from the sample with a mixture of solvents and water.

The solution is then analysed by liquid chromatography for the determination of acrylamide content. Peaks are identified by retention time.

Concentrations are calculated from peak area measurements using ratio and proportion with an external standard.

**2- APPARATUS**

- 
- ◆ Liquid chromatograph, equipped with a UV detector and integration system (like Empower from WATERS for example).
  - ◆ Column Atlantis dC 18 (Waters)  
 Length ..... : 150 mm  
 DI ..... : 4,6 mm  
 Particles size ..... : 3 µm

**3- REAGENTS**

- ◆ Acrylamide, analytical reagent,
- ◆ Absolute ethanol,
- ◆ HPLC quality water,
- ◆ Isopropanol,
- ◆ HPLC quality methanol,
- ◆ Acetone,
- ◆ Potassium phosphate monobasic,  $\text{KH}_2\text{PO}_4$ , 99 % + ( $M = 136,09 \text{ g}$ ),
- ◆ Concentred  $\text{H}_3\text{PO}_4$ .

**4- EQUIPMENT**

- ◆ 50, 100, 500 ml and 1000 ml volumetric cylinders,
- ◆ Vials: 30 ml size with caps,
- ◆ Mechanical shaker,
- ◆ 1000 ml glass bottle,
- ◆ 100 ml and 1000 ml volumetric flasks,
- ◆ 1 ml and 10 ml pipets,

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## FREE ACRYLAMIDE CONTENT BY HPLC

- ◆ Analytical balance (0.001 g),
- ◆ 0.45 µm filter (compatible with solvent),
- ◆ Calibrated pHmeter
- ◆ Vibrating stirrer.

**5- CHROMATOGRAPH SETTING****5.2- ATLANTIS COLUMN**

Wavelength..... : 205 nm  
Flow rate ..... : 1.0 ml/min  
Eluent..... : 85% KH<sub>2</sub> PO<sub>4</sub> 20 mM/l  
pH = 3.8 / 15% methanol (V/V)  
→ Injected volume ..... : 10 µl  
Acrylamide retention time .... : 2,5 minutes  
Analysis time..... : 6 minutes (for all extraction)

**5.3- BUFFER SOLUTION PREPARATION**

Weigh 2.72 g of KH<sub>2</sub> PO<sub>4</sub> and complete with water to 1 liter in a volumetric flask.

When complete dissolution, adjust the pH to 3.8 with phosphoric acid (use first the concentrated solution and finish the adjustment with diluted solution).

We obtain a 20 Mm/l KH<sub>2</sub> PO<sub>4</sub> solution at pH 3.8.

**6- REPARATION OF THE FREE MONOMER EXTRACTANTS****6.1- SOLUTION A**

Mix 540 ml of Isopropyl alcohol and 450 ml of HPLC water measured with a volumetric cylinder.

Pipet 10 ml of ethanol into the solution and blend it with the two first components. Store in a one liter glass bottle.

**6.2- SOLUTION B**

Mix 740 ml of isopropyl alcohol and 250 ml of HPLC water with a volumetric cylinder.

Pipet 10 ml of ethanol into the solution and mix. Store in a 1 liter glass bottle.

**6.3- SOLUTION C**

Pipet 10 ml of ethanol and add it to 990 ml of Isopropyl alcohol measured with a volumetric cylinder. Store it in a 1 liter glass bottle.

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**6.3- SOLUTION D**

Mix 900 ml of acetone and 100 ml of HPLC water measured with a volumetric cylinder. Store it in a 1 liter glass bottle.

**7- PREPARATION OF STANDARDS**

Dissolve 1.00 g of solid acrylamide in HPLC water, in a 100 ml flask. So, we obtain a 1 % solution in acrylamide.

This solution will be diluted to obtain standards between 10 and 100 ppm real.

For example, for a 100 ppm standard :

- ◆ pipet 1 ml of 1 % acrylamide solution,
- ◆ add separately
  - \* 49 ml of solution A,
  - \* 50 ml of solution B.

The solution will be stored one month, but standard solutions must be prepared freshly every week.

Remark: therefore standards can be prepared with HPLC water.

**8- PREPARATION OF SAMPLES**

Extraction	Anionic AN 900 / AB / FP	Cationic ≤ 15M% FO 4000 / KB	Cationic ≥ 20M% FO 4000 / KB	Polymer by precipitation	Other polymers
Sample mass	1.99 - 2.01 g	1.99 - 2.01 g	0.99 - 1.01 g	0.49 - 0.51 g	1.99 - 2.01 g
1st extraction	10 ml solution A	10 ml solution A	10 ml solution A1	20 ml solution D	20 ml solution D
	Shake 40 min.	Shake 40 min.	Shake 40 min.	Shake 1 H	Shake 4 H
2nd extraction	10 ml solution B	10 ml solution B	10 ml solution C		
	Agiter 40 min.	Agiter 40 min.	Agiter 40 min.		

- ◆ Weigh the sample mass in a vial.
- ◆ Add the first selected extractant.
- ◆ Close the vial and stir during the time requested.
- ◆ Repeat for the 2<sup>nd</sup> extractant.
- ◆ The extract is then filtrated through a 0.45 µm filter.

The sample is ready to be analysed.

Remark: If after sample injection, the obtained value is outside the calibration curve, remake the extraction in decreasing the sample mass.

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## 9- CALCULATION

### 9.1- STANDARD PRODUCTS



Calibration curve allows us to calculate acrylamide content:

$$\text{Area} = B \times \text{conc. (ppm)}$$

Residual acrylamide in sample is given by:

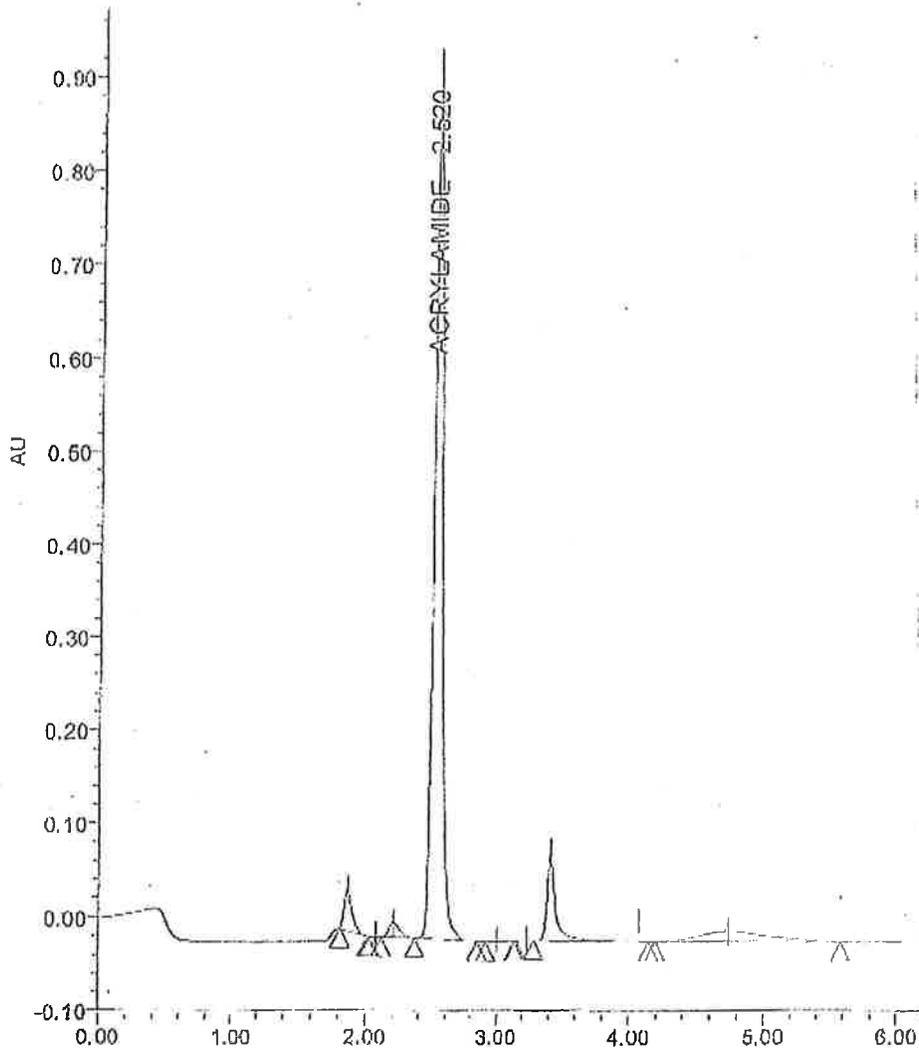
$$\text{ACM (ppm)} = \text{conc. (ppm)} \times \frac{\text{Extractant volume (ml)}}{\text{Sample mass (g)}}$$

### 9.3- SPECIAL PRODUCTS

- ◆ Powders for "potable water" in Europe  
in SNF range, name of product with the letters "SEP"  
*Example: AN 934 SEP*  
free acrylamide < 200 ppm based on powder
- ◆ Powders for "potable water" in Europe outside Europe  
in SNF range, name of product with the letters "PWG"  
*Example : AN 934 PWG*  
free acrylamide < 500 ppm based on powder
- ◆ Powders with GRAS affirmation  
in SNF range, name of product with the letters "GR",  
*Example : FO 4240 GR*  
free acrylamide < 500 ppm based on powder
- ◆ Powders for "Nordic White Swan Ecolabel"  
in SNF range, name of product with the letters "NWS",  
*Example : FO 4240 NWS*  
free acrylamide < 700 ppm based on powder

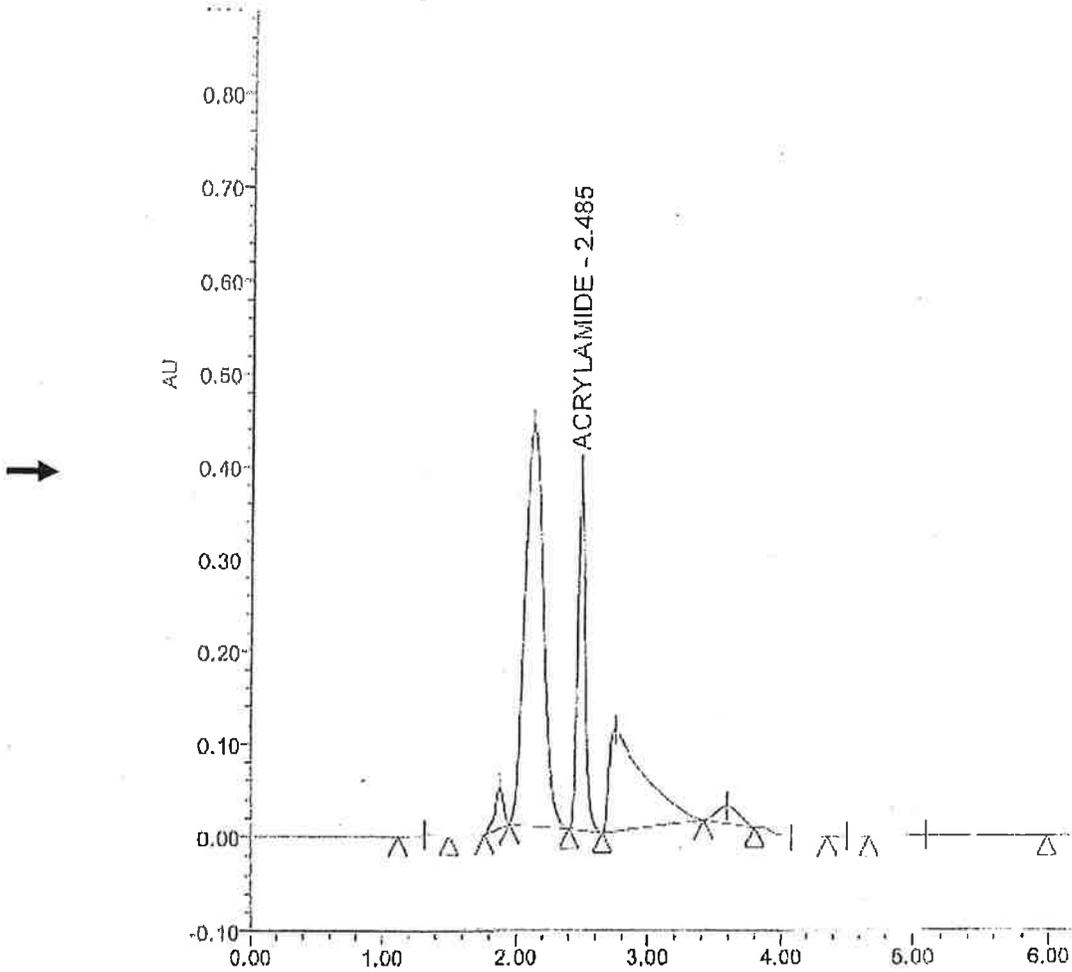
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TYPICAL CHROMATOGRAM  
FOR ALCOHOL EXTRACTION



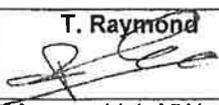
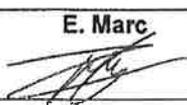
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TYPICAL CHROMATOGRAM  
FOR ACETONE EXTRACTION



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STANDARD BROOKFIELD UL ADAPTATOR VISCOSITY  
MEASUREMENT

Issue	Application date	Issued by	Controlled by	Approved by
04	21/02/2014	T. Raymond 	E. Marc 	M. Huart 
Remarks : § 2-3: Update for very high MW polymer.				

**1- APPARATUS AND REAGENT**

- ◆ 600 ml tall form beaker,
- ◆ 1000 ml low form beaker,
- ◆ Magnetic stirrer,
- ◆ 200 µm stainless steel screen,
- ◆ Brookfield viscosimeter model LVT with UL adaptator,
- ◆ Thermometer,
- ◆ Analytical balance (0.0001 g),
- ◆ 100, 250 and 500 ml volumetric cylinder,
- ◆ Deionised water,
- ◆ Sodium chloride.

**2- PROCEDURE****2.1- DETERMINATION OF SOLID CONTENT**

Run procedure QC- 100 A to determine the solid content.

**2.2- SOLUTION PREPARATION FOR STANDARD POLYMER**

- ◆ Place 100 ml of deionised water in 600 ml tall form beaker and let it stir.
- ◆ Weigh out accurately 0.500 g of dry polymer (based on 2.1).
- ◆ The polymer is then added slowly to the water by sprinkling into the wall of the vortex.
- ◆ After complete dissolution, add 390 ml of deionised water (\*).
- ◆ When the solution is homogenised, add 29.25 g of sodium chloride and stir for further 5 minutes, until the salt is completely dissolved.  
So we have a 0.1 % solution of polymer in 1M NaCl.
- ◆ Filter the solution through a 200 µm screen.

(\*)Remark: For the high molecular weight polymers (VHM anionic and SSH/VHM cationic grades):

- Add slowly the 390 ml of deionised water and let it homogenise during 5 minutes with the maximal stirring speed.
- Add the salt with maintaining a maximal stirring until complete homogenisation (15 minutes).

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STANDARD BROOKFIELD UL ADAPTATOR VISCOSITY  
MEASUREMENT Rev : 04**2.3- SOLUTION PREPARATION FOR VERY HIGH MW POLYMER**

- Mainly for post hydrolysed polymer or polymer with a UL value higher than 7.00 cP
- ◆ Place 200 ml of deionised water in 1000 ml beaker and let it stir.
  - ◆ Weigh out accurately 0.500 g of dry polymer (based on 2.1).
  - ◆ The polymer is then added slowly to the water by sprinkling into the wall of the vortex.
  - ◆ After complete dissolution, add 290 ml of deionised water and let it homogenise during 10 minutes with the maximal stirring speed.
  - ◆ When the solution is homogenised, add 29.25 g of sodium chloride and stir for further 15 minutes with the maximal stirring speed, until the salt is completely dissolved.
- So we have a 0.1 % solution of polymer in 1M NaCl.
- ◆ Filter the solution through a 200 µm screen.

**3- VISCOSITY MEASUREMENT OF POLYMER SOLUTION**

The viscosity is determined by mean of a Brookfield viscosimeter model LVT with an UL adaptator and a spindle speed of 60 rpm.

**3.1- USE OF THE CLOSED CUP**

16 ml of the previous solution are placed in the closed cup and the temperature is adjusted to 23 - 25 °C.  
The cup is then attached to the viscosimeter.

**3.2- USE OF A BEAKER**

Adapt the spindle and its tank on the viscosimeter (don't close the bottom of the tank).

Dive the spindle and its tank into the beaker containing solution of polymer. Pay attention to air bubbles. The level of the liquid must arrive to the level of the index marked on the tank. The temperature of solution must be comprised between 23 - 25 °C.

This method gives similar results than if we use a closed cap, but allows serial measurements for routine control.

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STANDARD BROOKFIELD UL ADAPTATOR VISCOSITY MEASUREMENT Rev : 04

3.3- MEASUREMENT

Let turn the spindle at 60 rpm till the index is stable on the graduation (about 30 seconds).

$$\text{VISCOSITY (in cps)} = (\text{Readen value} - 0.4) \times 0.1$$

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## TOTAL SOLID CONTENT

Issue	Application date	Issued by	Controlled by	Approved by
05	21/03/14	M. Huart	L. Avond	R. Hund
Remarks: Paragraphs 3 and 4 modification.				

**1- PRINCIPLE**

All volatiles are removed from the sample by heating the product either in a oven, or in an IR desiccator or an halogen desiccator. The results obtained with all the methods below are equivalent.

**2- WITH AN OVEN****2.1- EQUIPMENT**

- ◆ Analytical weighing scale (0.001 g),
- ◆ Desiccator with silica gel,
- ◆ Aluminium dish ( $\phi = 6.5$  cm ; H = 2 cm),
- ◆ Ventilated oven.

**2.2- PROCEDURE**

- ◆ Weigh accurately a dish to the nearest 0.001 gm and record it as  $W_d$ .
- ◆ Add in this dish 10 gm of sample and weigh it again. Record this weigh as  $W_{d+HS}$ .
- ◆ Put it in an oven, which has been prealably stabilised at a temperature of 120°C.
- ◆ Let it dry during 2 hours.
- ◆ After 2 hours, take the sample out of the oven, and let it cool in a desiccator containing silica gel.
- ◆ Weigh the dish with the dried powder as  $W_{d+DS}$ .

**2.3- CALCULATION**

$$\% \text{ SOLIDS} = \frac{W_{d+DS} - W_d}{W_{d+HS} - W_d} \times 100$$

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## TOTAL SOLID CONTENT

2.4- FOR SPECIFIC PETROLEUM PRODUCT

Conditions are :

- ◆ Weigh accurately 2 or 3 g sample,
- ◆ Stabilize the oven at 105° C,
- ◆ Let it dry during 120 minutes.

3- WITH AN IR DESICCATOR3.1- EQUIPMENT

- ◆ IR Desiccator (Mettler LP16 / LJ16 / MJ 33 for example)
  - balance
  - IR desiccator
- ◆ aluminium dish (  $\phi = 9.5\text{cm}$  ;  $H = 1\text{ cm}$ ).

3.2- PROCEDURE

- ◆ Weigh in a dish about 1.6 g of sample.
- ◆ Program: heat at 160 °C for 16 minutes.
- ◆ The non volatiles percentage is directly given on the screen when the measurement is finished.

Remark:

The non volatiles solid is given by:

$$\text{SOLID \%} = \frac{W_d}{W_s} \times 100 \quad \text{with: } \begin{array}{l} M_d = \text{dry weight (in g)} \\ M_i = \text{sample weight (in g)} \end{array}$$

3.3- FOR PRODUCT WITH AMMONIUM ACRYLATE

To avoid any degradation, conditions are modified: heat at 120° C during 20 minutes.

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## TOTAL SOLID CONTENT

**4- WITH AN HALOGEN DESICCATOR****4.1- EQUIPMENT**

- ◆ Halogen desiccator (Mettler HR 73 / HR 83 for example).
- ◆ aluminium dish (  $\phi = 9.5\text{cm}$  ;  $H = 1\text{ cm}$ ).

**4.2- PROCEDURE**

- 
- ◆ Weigh in a dish about 2.0 g of sample.
  - ◆ Program : - 30 seconds at 70 °C  
- 2 minutes at 180° C  
- 5 minutes at 160° C.
  - ◆ The non volatiles percentage is directly given on the screen when the measurement is finished.

**Remark:**

The non volatiles solid is given by:

$$\text{SOLID \%} = \frac{W_d}{W_s} \times 100$$

with:  $M_d$  = dry weight (in g)  
 $M_i$  = sample weight (in g)

**4.3- CASE OF PRODUCTS WHICH CONTAINS AMMONIUM ACRYLATE**

To avoid degradation, conditions are modified as following:

- Program: - 40 secondes to 53° C,  
- 2.30 minutes to 135° C,  
- 6 minutes to 120° C.

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Determination of Specific Gravity  
Of Liquid

Rev: 01

Page 2 of 2

## I. Objective

The objective of this procedure is to determine the specific gravity of a polymer or polymer blend in solution / liquid form.

## II. Equipment Needed

- One thermometer capable of measurement within the desired range
- One clean, dry hydrometer cylinder
- One clean, dry hydrometer capable of measurement within the desired range

## III. Procedure

1. Sample should be between 60°F and 90°F. In necessary, cool sample in water bath.
2. Pour approximately two ounces of the sample into a clean hydrometer cylinder. Slowly turn the cylinder, letting the sample liquid coat the cylinder and collect any water. Pour off all liquid into waste pail.
3. Select the hydrometer with the expected value within its range and immerse slowly into the solution, making sure that it does not hit the bottom. Let the hydrometer come to rest.
4. The specific gravity is read by reading the value at the bottom of the meniscus.
5. Determine the temperature by inserting a thermometer into the sample in the cylinder.
6. Calculate the specific gravity at 60°F by the following formula:

$[(\text{Actual Temp. } ^\circ\text{F} - 60)(0.0002) + \text{Specific Gravity @ Temp } ^\circ\text{F}]$

e.g. Specific Gravity @ 84°F = 1.2805

$[(84 - 60)(0.0002)] + 1.2805 = 1.2853 @ 60^\circ\text{F}$

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CATIONICITY DETERMINATION WITH POTASSIUM  
POLYVINYL SULFATE BY COLLOIDAL TITRATION

ISSUE	ISSUED BY	CONTROLLED BY	APPROVED BY	REMARKS
01	Date : 23.2.93 Name : M. Huard Initials : <i>MH</i>	Date : 24/02/93 Name : Ph. Lecointre Initials : <i>PL</i>	Date : 25/2/93 Name : R. Hund Initials : <i>RH</i>	First issue
	Date : Name : Initials :	Date : Name : Initials :	Date : Name : Initials :	
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CATIONICITY DETERMINATION WITH POTASSIUM  
POLYVINYL SULFATE BY COLLOIDAL TITRATION

1- PRINCIPLE

A known weight of polymer is titrated with anionic polymer (Potassium polyvinyl sulfate = KPVS) in presence of a cationic dye (Blue of toluidine). The colour changes from blue (cationic medium) to purple (anionic medium).

2- REAGENTS

- 0.1 % Toluidine blue solution  
(weigh 0.1 g of Toluidine blue and dissolve it to 100 ml with water),
- N/4000 solution of KPVS of factor f (given by Wako)  
(this solution is diluted from N/400 mother solution, just before titration)
- N/10 hydrochloride acid,
- Deionised water.

3- APPARATUS

- Analytical balance (0.001 g),
- Mechanical stirrer fitted with a stainless steel shaft equipped at the end with 2 cm long blades, propeller type,
- Magnetic stirrer,
- 200 and 1,000 ml beakers,
- 100 ml and 500 ml volumetric cylinder,
- Disposable plastic syringes of 1 and 10 ml,
- 25 ml buret.

4- SAMPLES PREPARATION

4.1- Mother solution

- In a clean 1,000 ml beaker, pour 450 ml of deionised water at 25 °C. Start stirring with the mechanical stirrer at 500 rpm.
- Calculate the weight of pure emulsion  $W_0$  required to obtain 500 g of a solution at about 0.5 % of dry polymer :

$$W_0 = \frac{500 \times 0.5}{C}$$

C is the active content of emulsion. It is either known or can be determined by the procedure QC-1003 A.

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CATIONICITY DETERMINATION WITH POTASSIUM  
POLYVINYL SULFATE BY COLLOIDAL TITRATION

- Withdraw approximately this weight  $W_0$  of emulsion into a plastic disposable syringe.
- Weigh accurately the syringe and record the weight filled  $W_F$ .
- Disperse the weighed emulsion into the vortex, and let it stir at 500 rpm.
- Weigh the empty syringe and record the weight empty  $W_E$ .
- Add the amount  $q$  of deionised water necessary to obtain an exact 0.5 % polymer solution.  
 $W = W_F - W_E$   
 $q = 2 \times W \times C - (450 + W)$
- Let stir at least for 45 minutes.

4.2- Diluted solution

When the solution is well homogenised, weigh 10.00 g of this mother solution in a 200 ml beaker and complete to 100 g with deionised water. Let it stir until getting an homogeneous solution on a magnetic stirrer.

So we have a 0.05 % solution.

4.3- Sample for titration

When the solution is well homogenised, weigh 1.00 g of this mother solution in a 200 ml beaker and add about 100 ml with deionised water. Let it stir until getting an homogeneous solution on a magnetic stirrer.

5- MEASUREMENT

While stirring with a magnetic stirrer, a few drops of N/10 HCl aqueous solution are added to set the pH at 4.

After having added 2 or 3 drops of toluidine blue indicator, titrate the solution with N/4000 KPVS.

The colour changes from blue to purple. When the purple does not fade away in a few seconds (about 20 seconds), it is considered as the end. Such situation value is called  $V$  ml.

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CATIONICITY DETERMINATION WITH POTASSIUM  
POLYVINYL SULFATE BY COLLOIDAL TITRATION

6- CALCULATION

$$E = \frac{V \times 10^{-3}}{5 \times 10^{-4}} \times \frac{1}{4000} \times f \text{ (in eq / g)}$$

That means :

$$E = \frac{V}{2} \text{ meq / g}$$

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I. REAGENTS AND EQUIPMENT

- \*Freezer capable of  $-29^{\circ}\text{C}$  ( $-20^{\circ}\text{F}$ )
- \*4oz jar with lid

II. PROCEDURE

- A. Pour approximately 90 mls of the polymer into the 4oz jar and cap.
- B. Place the jar containing the polymer into the freezer at  $-29^{\circ}\text{C}$  ( $-20^{\circ}\text{F}$ ) for 4 hours.
- C. Remove the jar from the freezer and allow the polymer to warm to  $22^{\circ}\text{C}$  ( $72^{\circ}\text{F}$ ) for 2 hours.
- D. Repeat steps B and C.

III. RESULTS

The polymer is considered passing if no separation has occurred after two cycles. If separation has occurred, notify the supervisor.

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CATIONICITY TITRATION WITH POTASSIUM  
POLYVINYL SULFATE

Rev : 02

Page : 1/2

Issue	Application date	Issued by	Controlled by	Approved by
02	27/07/07	M. Huart	S. Varlot	R. Hund
Remarks : Measurement of PVS <sub>K</sub> titration.				

**1- PRINCIPLE**

A known weight of polymer is titrated with anionic polymer (Potassium polyvinyl sulfate = KPVS) in presence of cationic dye (Blue Toluedine). The colour changes from blue (cationic) to purple (anionic).

**2- REAGENTS AND EQUIPMENT**

- ♦ 0.1 % Toluedine blue solution (indicator),
- ♦ N/400 solution of KPVS (Standard solution of WAKO),
- ♦ N/10 HCl solution,
- ♦ Cethylpyridinium chloride(Aldrich - Ref C 9002)
- ♦ Deionised water,
- ♦ Magnetic stirrer,
- ♦ Dessicator,
- ♦ Analytical balance (0.001 g),
- ♦ 25 ml burette,
- ♦ 400 ml and 250 ml beaker,
- ♦ 100 and 250 ml volumetric cylinder,
- ♦ 100 ml volumetric flask,
- ♦ 25 ml flask,
- ♦ 50 ml pipet.

**3- TITRATION OF PVS<sub>K</sub>**

- ♦ Dry 2 to 3 g of cethylpyridinium chloride in a dessicator overnight.
- ♦ Weigh about exactly 0,035 g of chlorure cethylpyridinium chloride and record the weight as W (in g).
- ♦ Dissolve this W g with deionised water in a 100 ml volumetric flask. (Add first approximately 20 ml of water to allow the dissolution and then complete to 100 ml).
- ♦ Put 50 ml of this solution, with a pipet, in a 250 ml beaker and add 50 ml of deionised water.
- ♦ Ajust the pH between 3.5 to 4.5.
- ♦ Add 2 drops of indicator.

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CATIONICITY TITRATION WITH POTASSIUM  
POLYVINYL SULFATE

- ♦ Titrate with the KPVS to be standardised in a buret. The color varies from blue to purple. Record the equivalent volume as V (in ml).

The normality of KPVS solution is given by:  $N = \frac{W \times 0.99 \times 10 \times 50}{358.01 \times V}$

with : 0.99 = purity of cethylpyridinium chloride  
 50 ml = volume of solution for titration  
 358.01 g = molar mass of cethylpyridinium chloride  
 $\frac{W \times 0.99 \times 10}{358.01}$  = normality of cethylpyridinium chloride solution

This result is expressed as :  $N = \frac{1}{400} \times f$

Remark : this measure is done for each batch number of PVSK.

#### 4- SAMPLE PREPARATION

##### 4.1- Mother solution

Prepare a solution at 5 g/l of dry polymer (determined in procedure QC- 100 A). Therefore, dilute 1.0 g of dry polymer in 200 ml of deionised water, while stirring on a magnetic stirrer.

##### 3.2- SAMPLE SOLUTION

When the powder is completely dissolved, weigh 1.0 g of this mother solution in a 400 ml beaker, and add 100 ml of deionised water. Let stir until getting a homogeneous solution, on a magnetic stirrer.

#### 4- MEASUREMENT

While stirring with a magnetic stirrer, 3 to 5 drops of N/10 HCl aqueous solution are added to set the pH at 4.

After having added 2 or 3 drops of T.B Indicator, titrate the solution with N/400 solution of KVPS in the buret.

The colour changes from blue to purple. When the purple does not fade away in a few seconds (about 20 seconds), it is considered as the end.

The equivalent volume is called C ml. The cationicity is expressed as follow:

$$E = \frac{C \times 10^3}{5 \times 10^3} \times \frac{1}{400} \times f \text{ (in meq/g)}$$

$$\text{That means : } E = \frac{C}{2} \times f \text{ (in meq/g)}$$

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## 0.5 % POLYMER SOLUTION pH

Issue	Application date	Issued by	Controlled by	Approved by
04	09/05/2014	M. Hwart	L. Avond	R. Hund
Remarks: Change of the title				

**1- EQUIPEMENT AND REAGENTS**

- ◆ Mechanical stirrer made with a variable speed electric motor fitted with a stainless steel shaft equipped at the end with 2 cm long (about) blade, propeller type.
- ◆ Beaker 1 000 l.
- ◆ Disposable plastic syringe (10 ml).
- ◆ Balance with accuracy of 0.01 g.
- ◆ pH meter with compatible probe.
- ◆ pH = 4.0 or pH = 10.0 and pH = 7.0 : buffer solution
- ◆ Deionised water.

**2- pH-METER CALIBRATION**

The pH-meter should be calibrated each day of use at a given temperature, with pH = 7.0 and pH = 4.0 (or pH = 7.0 and pH = 10.0) buffer solutions, depending the measure scale.

If the electrode have not and integrated temperature probe, the solution temperature should be put manually in the pH-meter.

Electrodes should be stored in a KCl 3 M solution and washed with deionized water before and after each use.

At the calibration end, the zero point is obtained for a pH between 6.0 and 8.0 and the slope at 25° C in mv/pH between 51 and 61.

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### 3- PROCEDURE

All percentages are in weight.

#### 3.1- PREPARATION OF SOLUTION

- ◆ Obtain a clean 1 000 ml beaker and fill it with 500 ml of deionised water. Start stirring with the mechanical stirrer at 500 rpm.
- ◆ Calculate the weight of pure emulsion,  $W_O$ , required to obtain 2.5 g of dry polymer :

$$W_O = \frac{500}{C} \times 0.5$$

C is the percentage of dry polymer in the pure emulsion. It is either known, or can be determined by the procedure N° QC-1003 A.

- ◆ Withdraw approximately ( $\pm 2$  %) this weight  $W_O$  of emulsion into a plastic disposable syringe.
- ◆ Disperse the emulsion weighed into the vortex.
- ◆ Let it stir during 30 minutes.

#### 3.2- pH MEASUREMENT

Measure the pH of the solution just prepared:

- ◆ Place the electrode of the pH-meter in the solution and allow about one minute for the reading to stabilize.

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FREE ACRYLAMIDE CONTENT  
ON EMULSIONS

Issue	Application date	Issued by	Controlled by	Approved by
10	31/08/05	M. Hertz	Ph. Lecointre	R. Hund
<b>Remarks :</b> NWS residual acrylamide modification. Addition of new chromatographic conditions.				

The free acrylamide content on emulsion is determined:

- Or by liquid chromatography,
- Or by gas chromatography.

**A- LIQUID CHROMATOGRAPHY****A1- PRINCIPLE**

Unreacted acrylamide in polymer is extracted from the sample with a mixture of solvents and water.

The solution is then analysed by liquid chromatography for the determination of the acrylamide content. Peaks are identified by retention time. Concentrations are calculated from peak area measurements using ratio and proportion with an external standard.

**A2- APPARATUS**

- Liquid chromatograph equipped with a variable wavelength detector and an integration system (Millenium of WATERS for example),
- or ECONOSIL C18 (Alltech)  
length : 25 cm  
ID: 4.6 mm  
Particule size: 10 µm
- or ATLANTIS DC 18 (Waters) column  
length : 150 mm  
ID: 4.6 mm  
Particule size: 3 µm

**A3- REAGENTS**

- Acrylamide,
- HPLC quality water,
- HPLC quality methanol,
- Acetone, ethanol or isopropanol,
- NaH<sub>2</sub>PO<sub>4</sub> buffer 50 m M/l of pH = 3.75.

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FREE ACRYLAMIDE CONTENT  
ON EMULSIONS**A6.2- PREPARATION OF THE STANDARD**

Dissolve 1.00 g of solid acrylamide in HPLC water in a 100 ml flask. Complete to 100 ml (1 % solution).

This solution will be diluted to obtain standards between 10 and 100 ppm real (o.g. between 100 and 1000 ppm taking in account the sample dilution).

For example :

Add by pipet 1.0 ml of the initial acrylamide solution in a 100 ml flask and complete to 100 ml with HPLC water

This last blending is a standard containing 0.01 % of acrylamide

The 1 % solution will be stored 1 month, but standard solutions must be prepared freshly every weeks.

**A6.3- PREPARATION OF SAMPLES**

- Weigh a sample of 1.99 - 2.01 g into a vial. Add 20 ml of solution D. Cap the vial and allow to shake for 4 hours.
- The extract is filtrated through a 0.45 µm filter. The sample is ready to be analysed.

Remark : if the obtained value is higher than the calibration curve, make a more important dilution of the sample.

**A6.4- CALCULATION**

$$\% \text{ Acrylamide} = \frac{100 \times \text{sample peak area}}{\text{Standard peak area}} \times 10$$

10 factor is due to dilution.

Remark : with the integration software utilisation, we make a calibration in 5 points (100, 250, 500, 750 and 1000 ppm) and the dilution is directly integrated in the calculation.

**A7- ETHANOL EXTRACTION****A7.1- STANDARD PREPARATION**

Dissolve 1.0 g of acrylamide in ethanol in a 100 ml volumetric flask.

We obtain a 1 % solution. This solution will be diluted to obtain standards between 10 and 100 ppm real (o.g between 100 and 1000 ppm taking in account the sample dilution).

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FREE ACRYLAMIDE CONTENT  
ON EMULSIONS

For example :

- ♦ Take 1 ml of this solution with a pipet,
- ♦ complete to 100 ml with ethanol in a volumetric flask.

So we obtain a solution at 100 ppm in acrylamide.

The 1 % solution and standards in ethanol must be made freshly every week.

**A7.2- SAMPLE PREPARATION**

- ♦ In a 100 ml beaker, pour 50 ml of ethanol<sup>(\*)</sup> with a cylinder.
- ♦ Under stirring, pour about accurately 5.0 g of emulsion with a seringe [m emulsion (g) = filled seringe weight – empty seringe weight] and let it stir for 30 minutes (pay attention to eventual projections)
- ♦ Stop the stirring and wait. Filter the extract with the 0.45 µm filter.

<sup>(\*)</sup> for high cationic emulsions, it is better to use isopropanol, to avoid that emulsion is partially dissolved.

**Remark** : if the obtained value is higher than the calibration curve, make a more important dilution of the sample.

**A7.3- CALCULATION**

$$\text{Acrylamide (in ppm)} = 100 \times \frac{\text{Sample peak area}}{\text{Standard peak area}} \times \frac{50}{m}$$

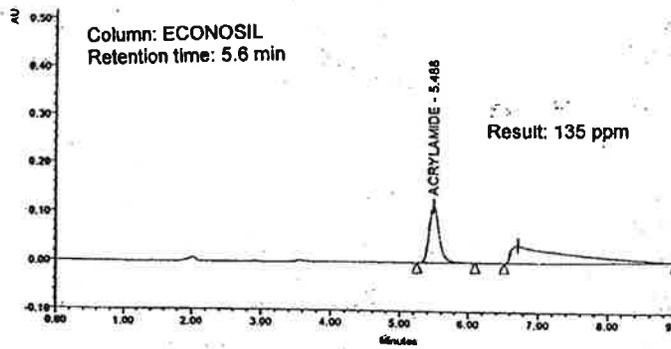
$\frac{50}{m}$  = dilution factor

m = weight of sample (g)

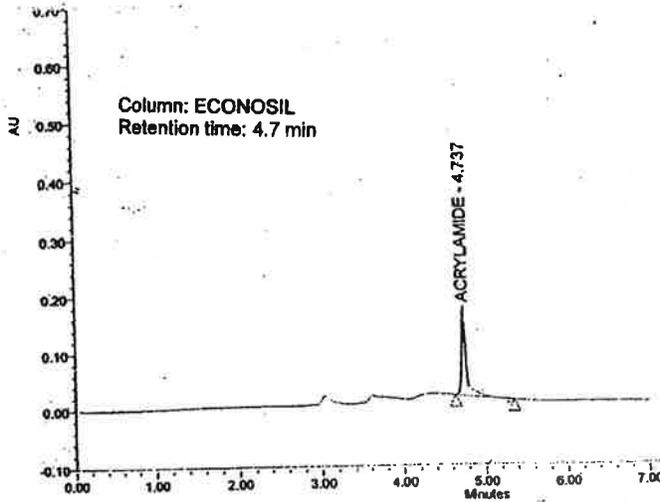
**Remark** : with the integration software utilisation, we make a calibration in 5 points (100, 250, 500, 750 and 1000 ppm) and the dilution is directly integrated in the calculation.

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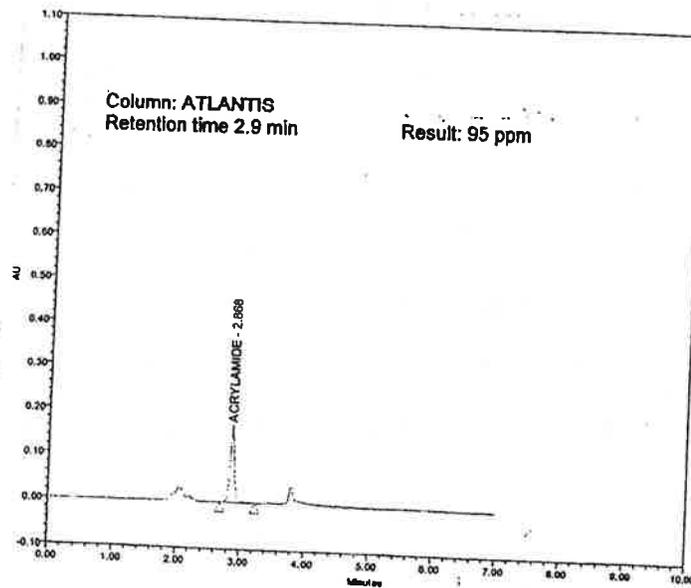
FREE ACRYLAMIDE CONTENT  
ON EMULSIONS



TYPICAL CHROMATOGRAM  
WITH ACETONE EXTRACTION  
(HPLC)



TYPICAL CHROMATOGRAMS  
WITH ETHANOL EXTRACTION  
(HPLC)



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FREE ACRYLAMIDE CONTENT  
ON EMULSIONS**B- GAS CHROMATOGRAPHY****B1- PRINCIPLE**

Unreacted acrylamide in polymer is extracted with ethanol. The solution is then analysed by gas chromatography for the determination of acrylamide content. The concentration in acrylamide is calculated from peak area measurement using ratio and proportion with an internal standard.

**B2- APPARATUS**

- Gas chromatograph for capillary column with a flame ionisation detector (like Fisons GC 8000),
- Column : SUPELCOWX 10 (L = 15 m, ID = 0.53 mm, Film : 1 µm),
- Conditions : Injector temperature..... : 200° C  
Oven temperature..... : 155° C (isothermal)  
Detector temperature..... : 250° C  
Carrier gas (nitrogen)..... : 8 Psi
  - split..... : 170 ml/minute
  - injection..... : 5 µlAnalysis time..... : 4 minutes

**B3- EQUIPEMENT AND REAGENT**

- Magnetic stirrer,
- Scaling weight (0.01 g),
- 0,45 µm filter (compatible with the solvent)
- 100, 250 and 1,000 ml volumetric flask,
- 100 ml beaker,
- 5 ml disposable syringe,
- 50 ml volumetric cylinder,
- 1 ml pipet.
  
- Acrylamide, analytical grade,
- Metacrylamide, analytical grade (= internal standard),
- Ethanol.

**B4- STANDARD PREPARATION**

- First, we prepare an ethanol solution with 100 ppm of metacrylamide (solution A).  
In a 1,000 ml flask, pour 0,1 g of metacrylamide and complete to 1 liter with ethanol.

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FREE ACRYLAMIDE CONTENT  
ON EMULSIONS

- Then, prepare a solution at 40 ppm in acrylamide.
  - dissolve 1.00 g of acrylamide with 100 ml of solution A in a volumetric flask (= 1 % solution).
  - take 1 ml of this solution and complete to 250 ml with solution A in a volumetric flask (= 40 ppm solution).

**B5- SAMPLE PREPARATION**

- In a 100 ml beaker, pour 50 ml of solution A with a volumetric cylinder.
- Under stirring, pour about precisely 5 g of emulsion and let it stir for 30 minutes (pay attention to possible projection).  
[w emulsion (in g) = filled syringe weight - empty syringe weight]  
Stop the stirring and wait. Filter the extract with the 0,45 µm filter.

The sample is ready to be analysed.

**B6- CALCULATION**

$$\text{Acrylamide (in ppm)} = 40 \times \frac{\text{AM sample area}}{\text{AM std area}} \times \frac{\text{IS std area}}{\text{IS sample area}} \times \frac{50}{w}$$

AM sample.....: acrylamide peak in sample

AM std .....: acrylamide peak in standard

IS sample.....: metacrylamide peak in sample

IS std .....: metacrylamide peak in standard

w .....: weight of emulsion (about 5 g)

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FREE ACRYLAMIDE CONTENT  
ON EMULSIONS

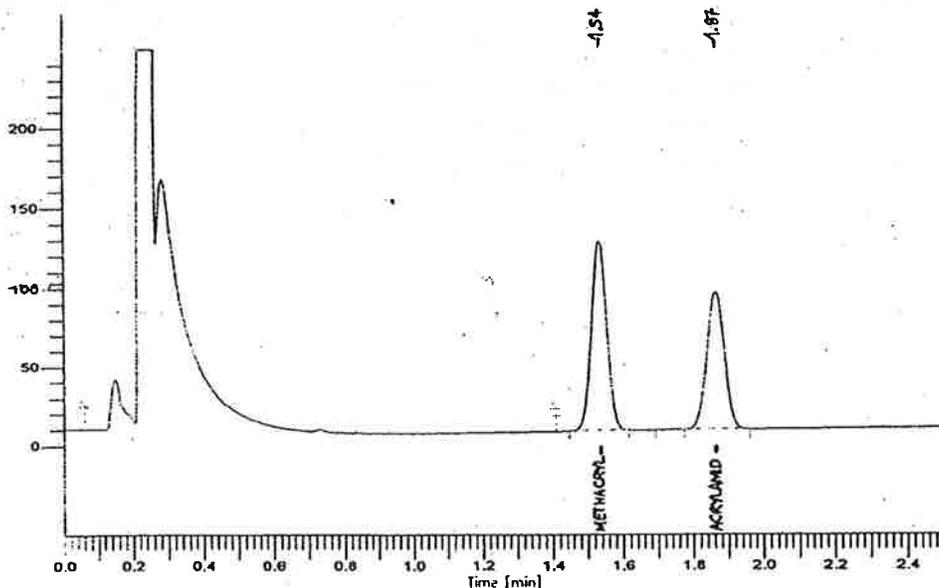
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TYPICAL CHROMATOGRAM  
ETHANOL EXTRACTION (GC)

Conditions

Column ..... : SUPELCOWAX 10  
Nitrogen ..... : 8 Psi  
Split..... : 155° C  
Isothermal..... : 200° C  
Injector..... : 250° C  
Detector ..... : 170 ml/minute  
Retention time:  
Ethanol..... : 0.25 minutes  
Internal standard.. : 1.5 minutes  
Acrylamide ..... : 1.9 minutes



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FREE ACRYLAMIDE CONTENT  
ON EMULSIONSRemarks on paragraphs A6.4-, A7.3- and B6 :

1- If we want to take in account either active matter or non volatile solids, we apply the following equation :

$$\text{– \% acrylamide (based on active matter)} = \frac{\% \text{ measured acrylamide}}{\% \text{ theoretical active matter}}$$

$$\text{– \% acrylamide (based on volatile solids)} = \frac{\% \text{ measured acrylamide}}{\% \text{ measured non volatile solids}}$$

2- For the above emulsions, the acrylamide content is calculated on the basis of active matter :

\* emulsion with BGVV approval

- in SNF range, name of product with the letter "S",  
Example : EM 533 S
- free acrylamide < 1 000 ppm based on active content.

\* emulsion with GRAS affirmation

- in SNF range, name of product with the letters "GR",  
Example : EM 533 GR
- free acrylamide < 500 ppm based on active content.

\* emulsion for "Nordic White Swan Ecolabel"

- in SNF range, name of product with the letters "NWS",  
Example : EM 533 NWS
- free acrylamide < 700 ppm based on active content.

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## Items to Note for Use of Procedure:

<u>Section</u>	<u>Note</u>
A2 - Apparatus	The procedure calls for ECONOSIL C18 Packing; however, an equivalent Packing (Column), such as a Whatman ODS-2 C18, is acceptable.
A6.2 - Preparation the Standard	The procedure calls for the use of one standard. However, follow the steps in Attachment QC-200A2 to prepare and run not one, but five, standards.

### **Miscellaneous:**

#### Residual Acrylamide by Calculation

For Wet Strength Resin (e.g. WS 72), if you cannot run the analytical method(s) described in the procedure, you may calculate the residual acrylamide level based on the residual acrylamide level of the raw materials used (e.g. WSB 30 or WSB 40), using the following equation:

$$RA_{WSR} \text{ (ppm)} = RA_{WSB} \text{ (ppm)} \times \frac{\text{Quantity of WSB used in batch}}{\text{Total batch size}}$$

Where  $RA_{WSR}$  = Residual Acrylamide level of Wet Strength Resin  
 $RA_{WSB}$  = Residual Acrylamide level of Wet Strength Base  
as reported on COA  
WSB = Wet Strength Base

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**DETERMINATION OF RESIDUAL ACRYLAMIDE  
FOR EMULSION**

For this procedure, follow procedure QCM-1001A up to the results section, then complete the calculations shown here.

Based on active content:

$$\text{Residual Acrylamide} = \frac{\text{Residual Acrylamide from (a) above}}{\text{Active}} \times 100$$

where active = Theoretical active in weight %

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# CLARIFLOC® WE-1514 POLYMER

## PRINCIPAL USES

CLARIFLOC WE-1514 is a **high** charge cationic polyacrylamide in emulsion form that is used as a flocculant in municipal wastewater treatment applications. It has been successfully applied in all liquid/solids separation systems including clarification, thickening, and dewatering.

## TYPICAL PROPERTIES

Physical Form	Clear to Milky White Liquid
Cationicity	80 %
Active Polyacrylamide Min.	43 %
Freezing Point	<-20° F (<-29° C)
Density	8.4 - 8.6 lb/gal

## PREPARATION AND FEEDING

CLARIFLOC WE-1514 is a single component emulsion polymer that must be pre-diluted in water before use. In most cases, this product should not be applied neat. One method for dilution is adding the neat polymer into the vortex of a mixed tank at a concentration between 0.25-1.0% polymer (0.5% is optimum) by weight. The polymer can also be injected through a number of commercially available systems that provide in-line mechanical mixing. The best feed systems use initial high energy mixing (>1000 rpm) for a short time (<30 sec) to achieve good dispersion followed by low energy mixing (<400 rpm) for a longer time (10-30 min). Polymer solutions should be aged for 15-60 minutes for best results. Solution shelf life is 8-16 hours.

## MATERIALS OF CONSTRUCTION

Cross-linked polyethylene, fiberglass, stainless steel or lined steel are the preferred materials of construction for bulk tanks. Avoid natural rubber and Buna-N gaskets as these materials swell when placed in contact with neat polymer. Unlined mild steel, black iron, galvanized steel, copper or brass are not recommended in any part of the feed system. Stainless steel, Viton or Teflon are the best choices for pump heads. For feed lines, use PVC or reinforced Tygon tubing.

## MANUFACTURING SPECIFICATIONS

Total Solids	44.0 - 51.0 %
Residual AcAm	< 1000 ppm
Neat Viscosity	500 - 2000 cPs
UL Viscosity	4.2 - 5.2 cPs

## HANDLING AND STORAGE

Suggested in-plant storage life is one year in unopened drums. For best results, store at 50-80 F. Bulk tanks should be mixed by periodically recirculating the contents bottom to top. Bulk tanks can also be fitted with an agitator type mixer that reaches the bottom 2 feet of the tank. Drums and bins should be mixed very well before first use and weekly after that. Do not allow emulsion polymers to freeze. Should freezing occur, allow the product to thaw thoroughly in a heated area and mix well before attempting to use it. For spills of CLARIFLOC WE-1514, sprinkle vermiculite or equivalent absorbant over the spill area and sweep the material into approved chemical disposal containers. Do not spray water onto a spill because the resulting gel is very difficult to clean up.

## SAFETY INFORMATION

CLARIFLOC WE-1514 is a mildly acidic product that can irritate the skin and eyes and should be handled accordingly. Gloves, goggles and apron are highly recommended. Anyone responsible for the procurement, use or disposal of this product should familiarize themselves with the appropriate safety and handling precautions involved. Such information is outlined in the POLYDYNE Material Safety Data Sheet. In the event of an emergency with this product, contact Chemtrec anytime day or night at (800) 424-9300.

## SHIPPING

CLARIFLOC WE-1514 Polymer is shipped in 55 gallon drums containing 450 pounds net or in 275 gallon totes containing 2300 pounds net. Bulk quantities are also available.

## ADDITIONAL INFORMATION

To place an order or obtain technical information from anywhere in the continental United States, call toll free:

**1800 848-7659**

All statements, information and data given herein are believed to be accurate, but are presented without warranty expressed or implied. Statements concerning possible use are made without representation or warranty that any such use is free of patent infringement, and is not a recommendation to infringe on any patent. The user should not assume that all safety measures are indicated or that other measures may not be required. Any determination of the suitability of a particular product for any use contemplated by the user is the sole responsibility of the user.

# SAFETY DATA SHEET

According to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

---

## SECTION 1: Identification of the substance/mixture and of the company/undertaking

### 1.1. Product identifier

Product name: **CLARIFLOC WE-1514**

Type of product: Mixture.

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Processing aid for industrial applications.

Uses advised against: None.

### 1.3. Details of the supplier of the safety data sheet

Company: Polydyne Inc.  
1 Chemical Plant Road  
PO BOX 279, Riceboro, GA 31323  
United States.

Telephone: 1-800-848-7659

Telefax: (912)-884-8770

E-mail address: -

### 1.4. Emergency telephone number

24-hour emergency number: 1-800-424-9300

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

Classification according to paragraph (d) of 29 CFR 1910.1200:

Not classified.

### 2.2. Label elements

Labelling according to paragraph (f) of 29 CFR 1910.1200:

Hazard symbol(s): None.

Signal word: None.

Hazard statement(s): None.

Precautionary statement(s): None.

### 2.3. Other hazards

Spills produce extremely slippery surfaces.

For explanation of abbreviations see Section 16.

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Not applicable, this product is not a substance.

#### Hazardous components

##### Distillates (petroleum), hydrotreated light

Concentration/ -range: 20 - 30%

CAS Number: 64742-47-8

Classification according to paragraph (d)  
of 29 CFR 1910.1200: Asp. Tox. 1;H304

#### Notes

Does not result in classification of the mixture if the kinematic viscosity is greater than 20.5 mm<sup>2</sup>/s measured at 40°C.

##### Poly(oxy-1,2-ethanediyl), $\alpha$ -tridecyl-w-hydroxy-, branched

Concentration/ -range: < 5%

CAS Number: 69011-36-5

Classification according to paragraph (d)  
of 29 CFR 1910.1200: Acute Tox. 4;H302, Eye Dam. 1;H318

For explanation of abbreviations see section 16

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

#### Inhalation:

Move to fresh air. No hazards which require special first aid measures.

*Skin contact:*

Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. In case of persistent skin irritation, consult a physician.

*Eye contact:*

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention immediately.

*Ingestion:*

Rinse mouth with water. Do NOT induce vomiting. Call a physician or poison control centre immediately.

**4.2. Most important symptoms and effects, both acute and delayed**

None under normal use.

**4.3. Indication of any immediate medical attention and special treatment needed.**

None reasonably foreseeable.

*Other information:*

None.

**SECTION 5: Fire-fighting measures****5.1. Extinguishing media***Suitable extinguishing media:*

Water. Water spray. Foam. Carbon dioxide (CO<sub>2</sub>). Dry powder.

*Unsuitable extinguishing media:*

None.

**5.2. Special hazards arising from the substance or mixture***Hazardous decomposition products:*

Ammonia. Carbon oxides (CO<sub>x</sub>). Nitrogen oxides (NO<sub>x</sub>). Hydrogen chloride. Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

**5.3. Advice for fire-fighters***Protective measures:*

Wear self-contained breathing apparatus and protective suit.

*Other information:*

Spills produce extremely slippery surfaces.

**SECTION 6: Accidental release measures****6.1. Personal precautions, protective equipment and emergency procedures***Personal precautions:*

Do not touch or walk through spilled material. Spills produce extremely slippery surfaces.

*Protective equipment:*

Wear adequate personal protective equipment (see Section 8 Exposure Controls/Personal Protection).

*Emergency procedures:*

Keep people away from spill/leak.

**6.2. Environmental precautions**

Do not contaminate water.

**6.3. Methods and material for containment and cleaning up***Small spills:*

Do not flush with water. Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal.

*Large spills:*

Do not flush with water. Dam up. Clean up promptly by scoop or vacuum.

*Residues:*

Soak up with inert absorbent material. After cleaning, flush away traces with water.

**6.4. Reference to other sections**

SECTION 7: Handling and storage; SECTION 8: Exposure controls/personal protection; SECTION 13: Disposal considerations;

**SECTION 7: Handling and storage****7.1. Precautions for safe handling**

Avoid contact with skin and eyes. Renders surfaces extremely slippery when spilled. When using, do not eat, drink or smoke.

**7.2. Conditions for safe storage, including any incompatibilities.**

Keep away from heat and sources of ignition. Freezing will affect the physical condition and may damage the material. Incompatible with oxidizing agents.

**7.3. Specific end use(s)**

None.

**SECTION 8: Exposure controls/personal protection****8.1. Control parameters***Occupational exposure limits:*

Distillates (petroleum), hydrotreated light

ACGIH: 200 mg/m<sup>3</sup> (8-hour)

**8.2. Exposure controls**

Appropriate engineering controls:

Ensure adequate ventilation, especially in confined areas. Use local exhaust if misting occurs. Natural ventilation is adequate in absence of mists.

Individual protection measures, such as personal protective equipment:*a) Eye/face protection:*

Safety glasses with side-shields.

*b) Skin protection:*

Wear coveralls and/or chemical apron and rubber footwear where physical contact can occur.

*i) Hand protection:*

PVC or other plastic material gloves.

*c) Respiratory protection:*

No personal respiratory protective equipment normally required.

*d) Additional advice:*

Wash hands and face before breaks and immediately after handling the product. Wash hands before breaks and at the end of workday.

Environmental exposure controls:

Do not allow uncontrolled discharge of product into the environment.

SECTION 9: Physical and chemical properties9.1. Information on basic physical and chemical properties

<i>a) Appearance:</i>	Viscous liquid, Milky.
<i>b) Odour:</i>	Aliphatic.
<i>c) Odour Threshold:</i>	No data available.
<i>d) pH:</i>	4 - 6 @ 5 g/L
<i>e) Melting point/freezing point:</i>	< 5°C
<i>f) Initial boiling point and boiling range:</i>	> 100°C
<i>g) Flash point:</i>	Does not flash.
<i>h) Evaporation rate:</i>	No data available.
<i>i) Flammability (solid, gas):</i>	Not applicable.
<i>j) Upper/lower flammability or explosive limits:</i>	Not expected to create explosive atmospheres.
<i>k) Vapour pressure:</i>	2.3 kPa @ 20°C
<i>l) Vapour density:</i>	0.804 g/L @ 20

m) Relative density:	1.0 - 1.1
n) Solubility(ies):	Completely miscible.
o) Partition coefficient:	Not applicable.
p) Autoignition temperature:	Not applicable.
q) Decomposition temperature:	> 150°C
r) Viscosity:	> 20.5 mm <sup>2</sup> /s @ 40°C
s) Explosive properties:	Not expected to be explosive based on the chemical structure.
t) Oxidizing properties:	Not expected to be oxidising based on the chemical structure.

## 9.2. Other information

None.

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Stable under recommended storage conditions.

### 10.2. Chemical stability

Stable under recommended storage conditions.

### 10.3. Possibility of hazardous reactions

Oxidizing agents may cause exothermic reactions.

### 10.4. Conditions to avoid

Protect from frost, heat and sunlight.

### 10.5. Incompatible materials

Oxidizing agents.

### 10.6. Hazardous decomposition products

Thermal decomposition may produce: hydrogen chloride gas, nitrogen oxides (NO<sub>x</sub>), carbon oxides (CO<sub>x</sub>). Ammonia. Hydrogen cyanide (hydrocyanic acid).

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

#### Information on the product as supplied:

Acute oral toxicity: LD50/oral/rat > 5000 mg/kg.

<i>Acute dermal toxicity:</i>	LD50/dermal/rat > 5000 mg/kg
<i>Acute inhalation toxicity:</i>	The product is not expected to be toxic by inhalation.
<i>Skin corrosion/irritation:</i>	Non-irritating to skin.
<i>Serious eye damage/eye irritation:</i>	Not irritating. (OECD 437)
<i>Respiratory/skin sensitisation:</i>	Not sensitizing.
<i>Mutagenicity:</i>	Not mutagenic.
<i>Carcinogenicity:</i>	Not carcinogenic.
<i>Reproductive toxicity:</i>	Not toxic for reproduction.
<i>STOT - single exposure:</i>	No known effects.
<i>STOT - repeated exposure:</i>	No known effects.
<i>Aspiration hazard:</i>	Due to the viscosity, this product does not present an aspiration hazard.

Relevant information on the hazardous components:

Distillates (petroleum), hydrotreated light

<i>Acute oral toxicity:</i>	LD50/oral/rat > 5000 mg/kg. (OECD 401)
<i>Acute dermal toxicity:</i>	LD50/dermal/rabbit > 5000 mg/kg (OECD 402)
<i>Acute inhalation toxicity:</i>	LC50/inhalation/4 h/rat = 4951 mg/m <sup>3</sup> . (OECD 403)
<i>Skin corrosion/irritation:</i>	Not irritating. (OECD 404) Repeated exposure may cause skin dryness or cracking.
<i>Serious eye damage/eye irritation:</i>	Not irritating. (OECD 405)
<i>Respiratory/skin sensitisation:</i>	By analogy with similar products, this product is not expected to be sensitizing. (OECD 406)
<i>Mutagenicity:</i>	Not mutagenic. (OECD 471, 473, 474, 476, 478, 479)
<i>Carcinogenicity:</i>	Carcinogenicity study in rats (OECD 451): Negative.
<i>Reproductive toxicity:</i>	By analogy with similar substances, this substance is not expected to be toxic for reproduction. NOAEL/rat = 300 ppm. (OECD 421)
<i>STOT - single exposure:</i>	No known effects.
<i>STOT - repeated exposure:</i>	NOAEL/oral/rat/90 days $\geq$ 3000 mg/kg/day (OECD 408) (Based on results obtained from tests on analogous products).
<i>Aspiration hazard:</i>	May be fatal if swallowed and enters airways.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Acute oral toxicity:	LD50/oral/rat = 500 - 2000 mg/kg.
Acute dermal toxicity:	LD50/dermal/rabbit > 2000 mg/kg
Acute inhalation toxicity:	No data available.
Skin corrosion/irritation:	Not irritating. (OECD 404)
Serious eye damage/eye irritation:	Causes serious eye irritation. (OECD 405)
Respiratory/skin sensitisation:	The results of testing on guinea pigs showed this material to be non-sensitizing.
Mutagenicity:	Not mutagenic.
Carcinogenicity:	Not carcinogenic.
Reproductive toxicity:	Two-Generation Reproduction Toxicity (OECD 416) NOAEL/rat > 250 mg/kg/day Prenatal Development Toxicity Study (OECD 414) NOAEL/Maternal toxicity/rat > 50 mg/kg/day NOAEL/Developmental toxicity/rat > 50 mg/kg/day
STOT - single exposure:	No known effects.
STOT - repeated exposure:	NOAEL/oral/rat/600 days = 50 mg/kg/day
Aspiration hazard:	No known effects.

**SECTION 12: Ecological information****12.1. Toxicity**Information on the product as supplied:

Acute toxicity to fish:	LC50/Fish/96 hours = 10 - 100 mg/L (Estimated)
Acute toxicity to invertebrates:	EC50/Daphnia/48 hours = 10 - 100 mg/L (Estimated)
Acute toxicity to algae:	Algal inhibition tests are not appropriate. The flocculation characteristics of the product interfere directly in the test medium preventing homogenous distribution which invalidates the test.
Chronic toxicity to fish:	No data available.
Chronic toxicity to invertebrates:	No data available.
Toxicity to microorganisms:	No data available.
Effects on terrestrial organisms:	No data available. Readily biodegradable, exposure to soil is unlikely.
Sediment toxicity:	No data available. Readily biodegradable, exposure to sediment is unlikely.

Relevant information on the hazardous components:Distillates (petroleum), hydrotreated light

Acute toxicity to fish:	LC0/Oncorhynchus mykiss/96 hours > 1000 mg/L. (OECD 203)
Acute toxicity to invertebrates:	EC0/Daphnia magna/48 hours > 1000 mg/L. (OECD 202)
Acute toxicity to algae:	IC0/Pseudokirchneriella subcapitata/72 hours > 1000 mg/L. (OECD 201)
Chronic toxicity to fish:	NOEC/Oncorhynchus mykiss/28 days > 1000 mg/L.
Chronic toxicity to invertebrates:	NOEC/Daphnia magna/21 days > 1000 mg/L.
Toxicity to microorganisms:	EC50/Tetrahymena pyriformis/ 48h > 1000 mg/L.
Effects on terrestrial organisms:	No data available.
Sediment toxicity:	No data available. Readily biodegradable, exposure to sediment is unlikely.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Acute toxicity to fish:	LC50/Cyprinus carpio/96 hours = 1 - 10 mg/L (OECD 203)
Acute toxicity to invertebrates:	EC50/Daphnia/48 hours = 1 - 10 mg/L (OECD 202)
Acute toxicity to algae:	IC50/Desmodesmus subspicatus/72 hours = 1 - 10 mg/L (OECD 201)
Chronic toxicity to fish:	No data available.
Chronic toxicity to invertebrates:	No data available.
Toxicity to microorganisms:	EC10/activated sludge/17 hours > 10000 mg/L (DIN 38412-8)
Effects on terrestrial organisms:	No data available.
Sediment toxicity:	No data available.

**12.2. Persistence and degradability**Information on the product as supplied:

Degradation:	Readily biodegradable.
Hydrolysis:	At natural pHs (>6) the polymer degrades due to hydrolysis to more than 70% in 28 days. The hydrolysis products are not harmful to aquatic organisms.
Photolysis:	No data available.

Relevant information on the hazardous components:

Distillates (petroleum), hydrotreated light

Degradation: Readily biodegradable.

Hydrolysis: Does not hydrolyse.

Photolysis: No data available.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Degradation: Readily biodegradable. > 60% / 28 days (OECD 301 B)

Hydrolysis: Does not hydrolyse.

Photolysis: No data available.

**12.3. Bioaccumulative potential**Information on the product as supplied:

The product is not expected to bioaccumulate.

Partition co-efficient (Log Pow): Not applicable.

Bioconcentration factor (BCF): No data available.

Relevant information on the hazardous components:Distillates (petroleum), hydrotreated light

Partition co-efficient (Log Pow): 3 - 6

Bioconcentration factor (BCF): No data available.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Partition co-efficient (Log Pow): > 3

Bioconcentration factor (BCF): No data available.

**12.4. Mobility in soil**Information on the product as supplied:

No data available.

Relevant information on the hazardous components:Distillates (petroleum), hydrotreated light

*Koc*: No data available.

*Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched*

*Koc*: > 5000

#### 12.5. Other adverse effects

None.

### SECTION 13: Disposal considerations

#### 13.1. Waste treatment methods

##### Waste from residues/unused products:

Dispose in accordance with local and national regulations.

##### Contaminated packaging:

Rinse empty containers with water and use the rinse-water to prepare the working solution. If recycling is not practicable, dispose of in compliance with local regulations.

##### Recycling:

Store containers and offer for recycling of material when in accordance with the local regulations.

### SECTION 14: Transport information

#### Land transport (DOT)

Not classified.

#### Sea transport (IMDG)

Not classified.

#### Air transport (IATA)

Not classified.

### SECTION 15: Regulatory information

#### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

##### Information on the product as supplied:

##### TSCA Chemical Substances Inventory:

All components of this product are either listed on the inventory or are exempt from listing.

# SAFETY DATA SHEET

CLARIFLOC WE-1514

## US SARA Reporting Requirements:

SARA (Section 311/312) hazard class:  
Not concerned.

RCRA status :  
Not RCRA hazardous.

## California Proposition 65 Information:

WARNING! This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm, Acrylamide.

## SECTION 16: Other information

### NFPA and HMIS Ratings:

#### NFPA:

Health:	0
Flammability:	1
Instability:	0



#### HMIS:

Health:	0
Flammability:	1
Physical Hazard:	0
PPE Code:	B

This data sheet contains changes from the previous version in section(s):

SECTION 11. Toxicological information, SECTION 16. Other Information.

Key or legend to abbreviations and acronyms used in the safety data sheet:

#### Abbreviations

Acute Tox. 4 = Acute toxicity Category Code 4  
Asp. Tox. 1 = Aspiration hazard Category Code 1  
Eye Dam 1 = Serious eye damage/eye irritation Category Code 1



	Trial	Trial	Incumbent Product
Product Name	<b>WE-1515</b>	<b>WE-1514</b>	<b>Polydyne WE-973</b>
Type	<b>Emulsion</b>	<b>Emulsion</b>	<b>Emulsion</b>
% Activity	<b>45.0%</b>	<b>43.0%</b>	<b>43%</b>
Qualify	No	Yes	
Sludge Quantity, DT	32,200	32,200	32,200
X	0.0	40.7	38.3
M			\$2.33
Y	0.0	93.4	93.7
E	\$0	\$0	\$0
Zt	0.0	29.7	29.6
Zc		29.6	29.6
H	\$48.47	\$48.47	\$48.47
A	\$0	\$0	\$2,873,496
B	#DIV/0!	\$0	\$193,202
C	\$0	\$0	\$0
D	#DIV/0!	-\$17,753	\$0
<b>Total (A+B+C+D)</b>	<b>#DIV/0!</b>	<b>-\$17,753</b>	<b>\$3,066,698</b>
<b>Net (From Incumbent)</b>	<b>#DIV/0!</b>	<b>-\$3,084,451</b>	<b>\$0</b>
Dose lb/dt		40.7	38.3
Cake TS%		29.7	29.6
Recovery %		93.4	93.7

Fill your price in the yellow cells only

Note: price of \$2.33 under Incumbent is for bidding analysis only and represents the price the county is paying under the current Contract.

Blue Cells Autofill

Polymer Evaluation Formula

<b>A</b>	<b>Polymer Dosage Cost Factor</b>
<b>B</b>	<b>Recovery Cost Factor</b>
<b>C</b>	<b>Polymer Handling Equipment Cost Factor</b> Note: Bidder shall be responsible for all costs associated with additional equipment or modifications to piping systems necessitated by a change in polymer type.
<b>D</b>	<b>Sludge Haul/Application Cost Factor</b>
<b>A</b>	$[(DT/YR) * (X \text{ lbs polymer}/DT) * (M \text{ \$/lb polymer})]$
<b>B</b>	$[\{(DT/YR) / (Y/100)\} - (DT/YR)] * (X \text{ lbs/ polymer}/DT) * (M \text{ \$/lb polymer})$
<b>C</b>	E \$
<b>D</b>	$[\{(DT/YR) / (Zt/100)\} - \{(DT/YR) / (Zc/100)\}] * (H \text{ \$/WT})$

Where:

<b>X</b>	Polymer Dosage, lbs/DT
<b>M</b>	Price of Polymer, \\$/active lb
<b>Y</b>	Recovery %
<b>E</b>	Annual Handling Equipment Cost
<b>Zt</b>	Trial Polymer Cake %
<b>Zc</b>	Incumbent Cake %
<b>H</b>	Haul Cost \\$/Wet Ton

**Price of Neat in Attachment A is the unit price.** (See Subsection 6.1 Rules of Price Evaluation)  
 To calculate the M-"Price of Polymer, \\$/active lb" = Neat price / % active.  
 For example the Incumbent Neat price is \$1.00 / 43% active = M of \$2.33 the price in red.

ITB 1096-16-LSM

Dewatering Polymer (Based on RFQ 1207-15-LSM)

H-Phrases

H302 - Harmful if swallowed

H304 - May be fatal if swallowed and enters airways

H318 - Causes serious eye damage

This SDS was prepared in accordance with the following:

U.S. Code of Federal Regulations 29 CFR 1910.1200

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Version: 15.01.b

ENCC003

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.