

HRSD TREATMENT DEPARTMENT POLYMER EVALUATION POLICY

SUBJECT: Selection and Purchase of Polymer

DATE: June 4, 1993; Rev. October 11, 2001; June 2003

OBJECTIVE

The objective of this policy is to establish procedures for the procurement of polymer products for the treatment plants.

This policy provides an organized approach for competitive evaluation and purchase of those polymers which, based on performance, are determined to be most cost effective for a particular application by:

1. Defining the responsibilities of Plant Managers and Vendors.
2. Defining the terms used in this policy.
3. Outlining the evaluation and procurement procedures for continuous and intermittent polymer purchase.
4. Summarizing pricing policies and criteria for selection.

PLANT MANAGER'S RESPONSIBILITY

The Plant Manager has the flexibility and responsibility to investigate new polymer products or re-evaluate existing products routinely. In evaluating and making purchases of polymer the Plant Manager is acting as an extension of HRSD's Procurement Manager. The Plant Manager has a responsibility to:

1. Evaluate the performance of polymers in current use and contact the vendors when deterioration in performance is noted.
2. Contact other vendors, if the current vendor is unable to satisfactorily improve process performance.
3. Consider new polymer products.
4. Insure that evaluations and testing are non-biased.
5. Insure documentation and procurement procedures are in accordance with this policy.
6. Insure evaluation and purchases are conducted in accordance with this policy.
7. Insure the confidentiality of the challenging vendor's written pricing.
8. Establish an agreed upon testing schedule with challenging vendors.
9. Insure testing is conducted within the agreed upon testing schedule.
10. Provide the vendor with the most recent version of the Polymer Policy.

VENDOR'S RESPONSIBILITY

Vendors, whose products are being used, have an ongoing responsibility to maintain their competitiveness by:

1. Assuring that HRSD facilities are utilizing their most cost-effective product for any particular application.
2. Reviewing and adjusting product prices on a routine basis.
3. Evaluating the use of other polymers manufactured by their company, for improved process performance or cost- effectiveness.
4. Evaluating whether their polymers are being properly used and making recommendations concerning polymer use.
5. Insuring their product is compatible with HRSD equipment and environment.
6. Insuring HRSD receives the same polymer as tested and approved by the Plant Manager. The existing polymer vendor may evaluate and test other polymers at any time, but the Plant Manager must approve a change in product. Substitution of polymer product without written authorization of the Plant Manager may result in termination of all HRSD polymer contracts with the existing vendor.
7. Providing a Certificate of Analysis with each shipment of polymer. The Certificate of Analysis shall provide the following information: molecular weight, viscosity, density (gr/m. or lb/ft³), charge, active content and particle size.
8. Provide written notification to the Procurement Division of any change in polymer price.

DEFINITION OF TERMS

BENCH TESTS - Screening tests that provide indication of a polymer's effectiveness. These tests may include, but are not limited to: jar tests, Capillary Suction Tests, filtration tests, and specific resistance tests.

CHALLENGING VENDOR - Vendor, whose product is not being used for a specific plant unit process application and who wishes to compete against the existing vendor.

CONTINUOUS APPLICATION - Continuous, day to day, application of polymer to a unit process necessary to obtain acceptable unit process performance. Normally continuous applications are used for solids unit processes such as thickening or dewatering

EXISTING VENDOR - Vendor whose product is currently being used for a specific plant unit process application.

INTERMITTENT APPLICATION - Polymer used or applied only periodically to a unit process to control a temporary upset condition. Normally intermittent applications apply to secondary clarifier flocculation.

NEW UNIT PROCESS –Polymer required for newly installed unit process equipment at a plant where there is no current vendor supplying polymer.

MULTIPLE VENDOR TESTING – Testing more than one polymer product within a single test period. This is permitted only for ‘New Unit Processes’ polymer applications.

PURCHASE OF CONTINUOUS APPLICATION POLYMERS

Initiation of Polymer Evaluation:

Plant Managers or vendors may initiate an evaluation of polymers as follows:

1. Existing vendors may evaluate different products from their company at any time mutually convenient to the vendor and the plant.
2. Challenging vendors may initiate an evaluation of their polymer products, on an appointment basis, provided they have not conducted a "one-day" polymer test for the particular application within the past **two** years. Vendors will be tested one at a time based on the order of their bench test.
3. Plant Managers may initiate an evaluation of polymers at any time there is a sustained deterioration in polymer performance (% T.S., % recovery or polymer dosage). Challenging vendor(s) may be requested to test their products, regardless of whether they have conducted a "one day" test within the last two years. If managers note deterioration in the existing vendor's product performance, the existing vendor should be contacted and given the opportunity to correct the problem, prior to contacting a challenging vendor. The Procurement Division should be contacted if there are significant problems.
4. For "new unit process" installations, the Plant Manager will initiate a request for evaluation of polymers. By appointment with the Plant Manager, vendors will be invited to conduct bench scale testing. A "one day" test will be conducted for those products determined by the Plant Manager to appear competitive. Based on results of the "one day test" no more than 3 vendors will be asked to conduct further testing. Documentation of all participating vendors, description and evaluation of bench scale testing, and evaluation of the "one day" test results will be forwarded to the Treatment Chief and the Procurement Division by the Plant Manager before full scale testing is conducted.

5. Additional requirements may be imposed on a polymer vendor where testing is deemed impractical or costly or where demonstrated problems with a particular type of polymer has occurred within HRSD. Such cases require the approval of a Treatment Chief and notification to the Procurement Office.
6. Except for “new unit process” installations, multiple vendor testing is not allowed.

Initial Screening of Polymer: Bench Testing

1. Vendors should bench test their polymer product(s) to determine which product provides cost effective results. The plant should provide the vendor with samples and space to run the tests. The vendor should submit a recommendation supported by results of the bench test to the Plant Manager
2. The Plant Manager should review the bench test data, and if a product appears competitive, a "one day" test should be arranged. If deemed desirable by the manager, more than one product from the same vendor may be tested for each application.
3. **Prior** to the “one day” test, the challenging vendor must submit the price of the polymer(s) to be tested in writing to the Procurement Office in accordance with the polymer pricing section of this policy. In addition, the plant will collect and save a sample of the polymer for future reference. Once this information has been received, no further testing by the existing vendor can occur until after all evaluations of the challenging vendor’s product(s) are completed. Testing will be arranged at a time mutually agreeable to the vendor and the plant. Testing should be completed within 60 days of the challenging vendor’s price submittal to procurement, unless there are extenuating circumstances. In such cases a Treatment Chief must approve the delay and the Procurement Office notified. It is recommended the challenger wait until testing dates have been established before submitting a written price to the Procurement Office.

“One Day” Testing:

1. A “one day” preliminary polymer test will be conducted to determine the suitability for further testing.
 - a. Vendors will supply polymer for the one-day test at no cost to HRSD.
 - b. The challenging vendor can only test the polymer product as submitted in writing to the HRSD Procurement Office. Vendors cannot substitute alternative products during the “one day” testing. An alternative product is one with a different brand name, product number or different chemical analysis than the sample taken prior to the one-day test.

- c. The challenging vendor, by participating in the “one day” test, may not initiate another polymer evaluation for that unit process in that facility for a period of **two** years, unless requested by the Plant Manager
2. The Plant Managers are responsible for documenting the results of the one-day testing and making a recommendation on whether to proceed with full scale testing. This documentation should specify the product (type and manufacturer), date tested, % feed and cake total solids, % recovery, estimated cost/recovered ton or estimated cost/million gallons (MG). Compatibility with existing storage and feed equipment and other pertinent factors relevant to the recommendation to continue or cease testing should be documented. A copy of the memo documenting the “one day” test results and recommended full-scale testing should be forwarded to the Procurement Office with a copy to the appropriate Chief of Treatment for inclusion in the Treatment Department's files.
3. If the documented results of the “one day” test show that the product appears competitive, the Plant Manager should arrange a full-scale evaluation of the polymer.

Full Scale Testing:

1. The full-scale test shall consist of a minimum of 10 days of testing for the challenging polymer, unless the Plant Manager determines that the product adversely affects process performance. **ONLY** the product used during the “one-day” test shall be tested. Vendors **can not** substitute polymer products.
2. Polymer for this evaluation must be purchased through standard procurement procedures. A requisition must be issued and should clearly indicate the polymer is "for trial evaluation". A copy of documentation from the “one day” testing should be attached to the requisition. Supply contracts may **not** be used, even if the polymer is currently used at another HRSD facility. The Procurement Office should be contacted immediately if the requisition needs to be expedited. Vendor's lead time should be considered when establishing test dates.
3. The vendor may be required by the plant to supply storage tanks, mixing or other equipment necessary to conduct the test at no cost to HRSD. The Plant Manager may eliminate from consideration those polymers, which require special handling equipment or modifications to existing equipment that can not be accommodated by the plant without the expenditure of labor and/or money beyond normal operating conditions. Vendor supplied equipment may be used by Challenging Vendors during testing.

4. Prior to and during testing, the Plant Manager should insure that equipment to be used in the test is functioning properly and that there are no conditions at the plant that would adversely affect test results. Attached are sample "Guidelines for Polymer Testing" that may be a helpful checklist. Regardless, the challenging vendor is responsible for verifying that test conditions and equipment are acceptable.
5. The vendor should monitor the testing to verify that all polymers and other related variables are within normal operating parameters. If the vendor has any concerns these should be communicated to the Plant Manager or individual designated by the manager to supervise the test not later than 2 days after completion of testing. Vendors can not directly request operators to make process changes.
6. It is desirable to conduct the test alternating days between the existing and the trial polymer, to insure changing characteristics do not affect results. It is recommended using: 5 days existing/10 days challenging/ 5 days existing to evaluate the results. New unit process equipment process testing should use 5 days vendor #1, 5 days vendor #2, and 5 days vendor #3. This cycle should be repeated so that two complete cycles are achieved for each vendor. Other rotations may be used at the plant's discretion, but should be patterned to provide accurate and valid results.
7. If the polymer trial is discontinued due to operational or maintenance problem caused by the polymer, HRSD will return the remaining polymer and the vendor will reimburse HRSD for the entire cost of the polymer. The Plant Manager shall document any such operational or maintenance problems.

Evaluation:

1. Based on the results from the full-scale test, the Plant Manager will perform an evaluation that compares the performance and cost/recovered ton or cost/MG of the existing polymer to that of the challenging polymer. Other factors affecting plant operations can also be considered. The manager shall prepare a memo summarizing the full-scale test data and a cost evaluation. Raw data obtained during the test period shall also be attached. This memo shall be submitted to the appropriate Chief of Treatment. The Procurement Office must receive a final copy of any evaluation. An example evaluation is attached.
2. Data that should be considered in the evaluation are the liquid sludge feed rate (gpm), solids loading rate (lbs/hr), % feed total solids, % volatile solids, % thickened or dewatered sludge total solids, % solids recovery, and dosage (lb/ton or lb/MG) and fuel use/dry ton. Whenever there is a significant difference in cake solids, the evaluation should also consider the cost impact of cake solids on downstream unit processes, such as incineration or composting or land application as follows:

- a. Incineration - Cost of additional fuel associated with lower cake solids. Plants should utilize the attached plant graphs as a standard estimate of fuel usage versus cake solids.
- b. Composting or Hauling to Another Plant - Haul cost for transportation associated with the wetter cake solids. If hauling is through a contractor, the haul cost per wet ton will be used. If hauling is by an HRSD vehicle, obtain the current vehicle cost per mile from the Automotive Manager.
- c. Land Application - Application cost per wet ton for the additional wet tons applied with lower cake solids.

Documentation concerning the data used to assess these downstream costs should be attached with other evaluation documentation.

- 3. The cost evaluations involving existing polymer applications will consider the price of the challenging vendors product as submitted prior to the "one day test" and the price of the existing vendor's polymer in effect 30 days prior to the submission of the challenging vendor's price.
- 4. Cost evaluations involving different polymers from an existing vendor are evaluated using the price provided by the vendor at the time of Plant Manager's cost evaluation.
- 5. Polymer cost evaluations will be made based on the unit cost per recovered ton or per MG as follows:

$$\frac{\text{polymer dosage(lb/ton)} \times \text{polymer cost (\$/lb)}}{\% \text{ recovery}} = \text{polymer cost (\$/recovered ton)}$$

Or

$$\text{polymer dosage(lb/MG)} \times \text{polymer cost (\$/lb)} = \text{polymer cost (\$/MG)}$$

6. Cost evaluations should also include capital costs of any equipment that must be purchased to accommodate the proposed polymer. New equipment capital costs are annualized over a 3-year life, at an interest rate established by the Finance Manager and at current projected usage. The vendor may supply tanks and equipment free of charge, with the understanding that challenging vendor(s) may use this equipment for testing of their polymer(s). Vendor supplied equipment must provide reliable operation. Excessive maintenance on vendor supplied equipment is cause for termination of the test and/or contract with the vendor.

$$\text{Capital Cost of Equipment (\$/ton)} = \frac{\text{Annual Cost}}{\text{Annual tons dewatered cake}}$$

Or

$$\text{Capital Cost of Equipment (\$/MG)} = \frac{\text{Annual Cost}}{\text{Total million gallons/yr.}}$$

7. In order to change polymer products, the cost evaluation must show that:
- The overall cost of handling solids will not increase
 - The product proposed by the challenging vendor will provide an overall solids handling cost savings (polymer + downstream processing - incineration, land application, etc.) that is at least 10% of the current polymer cost alone.
8. When products from an existing vendor are compared, the 10% cost criteria does not apply. An existing vendor's product that meets the desired performance criteria, and provides any cost savings as determined by the Plant Manager is justification for changing products.

PRICE POLICY

1. For continuous application polymers, vendors must submit unit cost of polymer prior to conducting any “one day” preliminary testing. During a polymer test, the polymer price for the existing vendor will be based on the price in effect 30 days prior to the price submission by the challenging vendor.
2. Prices must be submitted by the vendor to the HRSD Procurement Office on company letterhead and signed by an authorized company representative. The price letter must include:
 - Polymer product name and number
 - HRSD plant name
 - Minimum order requirements
 - Delivery lead time
 - Standard Packaging
 - MSDS sheet
 - Specifications
 - Certificate of Analysis
 - Certificate of Insurance
3. Prices may not be raised for one year after a new contract is awarded. They may be reduced at any time to maintain the competitiveness of the product.
4. Prices submitted for any particular product will apply to all HRSD facilities using that product.
5. It is recognized that biosolids characteristics and polymer prices are variable, and that it can be difficult to convincingly determine which polymer produces the most cost-effective operation, when results are very similar. Accordingly, HRSD’s intent is generally not to select a polymer product from a different vendor unless the overall solids handling costs (including polymer + subsequent downstream processing costs) are at least 10% less than the current polymer costs.
6. HRSD will maintain the confidentiality of written prices submitted for testing by the Challenging Vendor to HRSD’s Procurement Office. However, HRSD can **not** maintain the confidentiality of prices verbally quoted to plant personnel. Vendors are encouraged to reveal exact pricing only in their written submittal to the HRSD Procurement Office.

PURCHASE OF INTERMITTENT APPLICATION POLYMERS

Plant Managers are periodically required to use polymers to improve settling characteristics in the primary or secondary clarifiers. Managers may evaluate these intermittent application polymers as necessary to meet the required performance criteria or to improve cost effectiveness.

Initiation of Polymer Evaluation:

Plant Managers or vendors may initiate an evaluation of polymers as follows:

1. Existing vendors may evaluate different products from their company as plant conditions warrant.
2. Challenging vendors may request their polymer products be evaluated during the next application period, provided they have not conducted a polymer test for this particular application within the past two years.
3. Plant Managers may request vendor's evaluation of polymers at any time, regardless of whether a particular vendor has tested within the last two years. If managers note deterioration in the existing vendor's product performance he should contact this vendor and provide him the opportunity to correct the problem prior to contacting other vendors.

Initial Screening of Polymer:

1. Initial screening may be performed by the vendor or the Plant Manager using bench scale testing to estimate full-scale performance.
2. The Plant Manager should review the bench test data and document the results of these bench scale tests. The Plant may arrange for a full-scale test of product(s) that appear competitive and meet performance criteria.

Testing:

1. The test should be of duration that the Plant Manager feels provide sufficient information to document the dosage for a cost evaluation.
2. Polymer for the full scale testing may be purchased on a routine or an emergency basis during upset conditions. The Procurement Office must receive a requisition in either case, and should be notified if the procurement is required immediately.

Evaluation:

1. The Plant Manager will perform an evaluation that summarizes the performance and evaluates the cost of polymer(s) reviewed in a full-scale test. The manager shall prepare a memo summarizing the full-scale test data and the cost evaluation. Raw data obtained during the test period shall also be attached. This memo shall be submitted to the Procurement Office with a copy to the appropriate Chief of Treatment. The Procurement Office should receive a final copy of any evaluation and will require a requisition if the challenging vendor's polymer is selected.
2. The cost evaluation will be based on cost per million gallons (MG). Cost evaluations involving two different vendors products will consider the price of the challenging vendor's product as submitted prior to the full scale test and the price of the existing vendor's in effect at the time of the full scale test. Cost evaluations should also include capital costs of any equipment that must be purchased to accommodate the proposed polymer. New equipment capital costs are annualized over a 3-year life, at the interest rate established by the Finance Manager and at the current usage. The vendor may supply tanks and equipment with the understanding that the challenging vendor may use this equipment for testing.
3. Only polymers that meet desired performance criteria can be considered.
4. If the cost analysis shows that product proposed by the challenging vendor can provide a cost savings of at least 10% and meet the required performance criteria, then that polymer product will be purchased. Otherwise, the existing vendor's polymer product will continue to be used, provided it also met the performance criteria.
5. If the existing vendor's product does not meet the required performance the lowest cost polymer that meets the performance criteria will be used.
6. When products from an existing vendor are compared, the 10% cost criteria does not apply. An existing vendor's product that meets the desired performance criteria, and provides any cost savings as determined by the Plant Manager is justification for changing products.

EXAMPLE POLYMER EVALUATION

CURRENT POLYMER PERFORMANCE

Biosolids Production:	20 dt/d
Land Application Costs:	\$15/wt
Polymer Dose:	20#/dt
Polymer Cost:	\$1.65/lb
Dewatered cake solids:	19%TS
% Recovery:	95%

CURRENT COSTS:

1. Polymer Cost/day =
 $20\text{dt/d} \times 20\text{\#/dt} \times \$1.65/\text{lb} \div .95 = \$695/\text{day}$
2. Land Application Costs=
 $20\text{ dt/d} \times \$15/\text{wt} \div .19 = \$1579/\text{day}$
3. Total cost = $\$695 + \$1579 = \$2274$

CHALLENGING VENDOR

Polymer Dose:	19#/dt
Polymer Cost:	\$1.60/lb
Dewatered cake solids:	20 %TS
% Recovery:	99%

CHALLENGING VENDOR COSTS:

1. Polymer Cost/day =
 $20\text{dt/d} \times 19\text{\#/dt} \times \$1.60/\text{lb} \div .99 = \$614/\text{day}$
2. Land Application Costs=
 $20\text{ dt/d} \times \$15/\text{wt} \div .2 = \$1500/\text{day}$
3. Total cost = $\$614 + \$1500 = \$2114$

COST DIFFERENCE:

Challenging Vendor =	\$2114
Current Vendor =	<u>\$2274</u>
Difference =	\$160

Since \$160 is less than 10% of \$2274; therefore do not change polymers