

Polymer Test – The Forgotten Cost

Mike Welke

Biosolids Manager

City of Warren Water Pollution Control









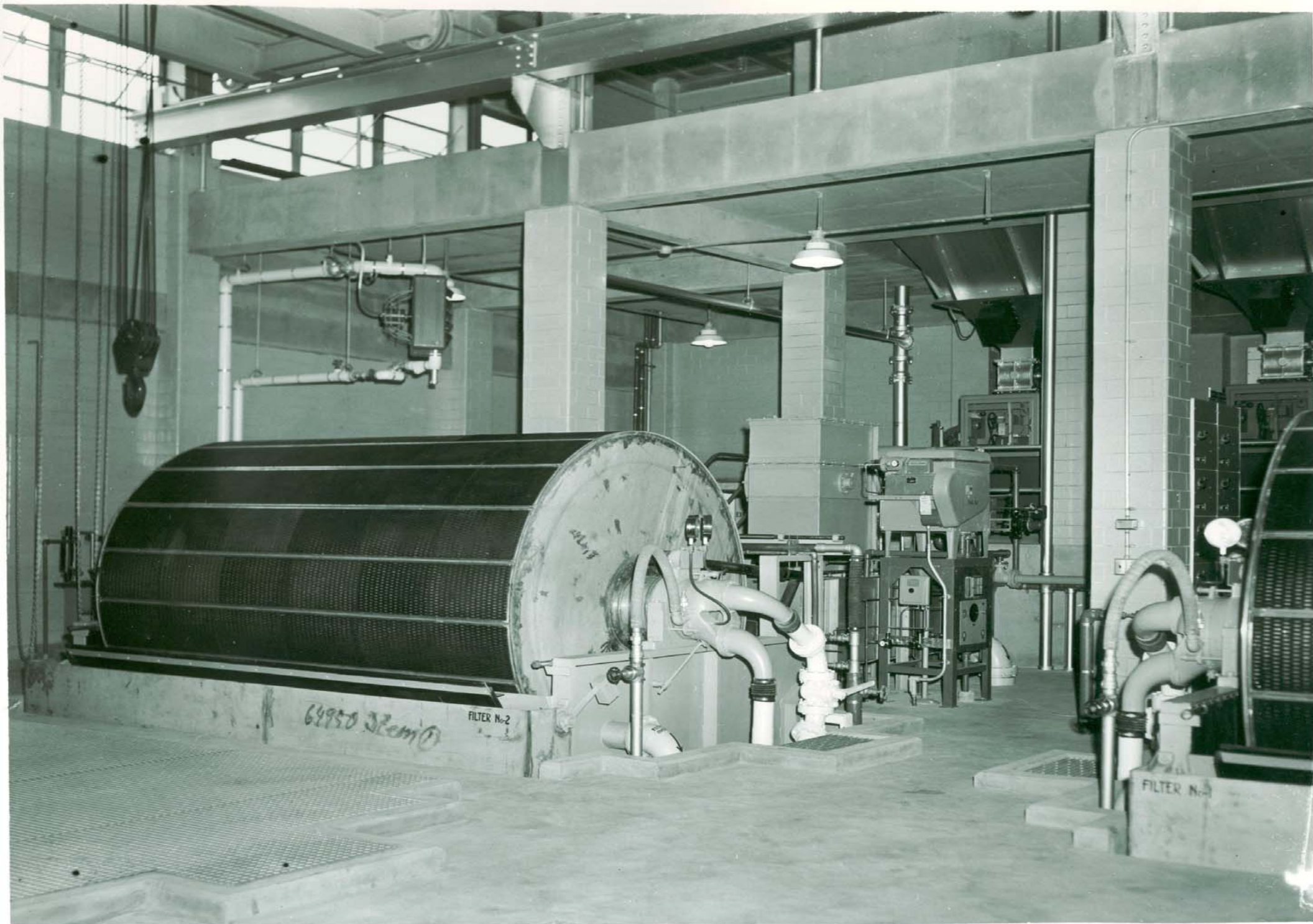
Outline of Presentation

- History of warren's WPC solids handling
- Review of polymer types
- Polymer bids
- Polymer trials
- Cost saving of polymer trials



History of Warren's solids handling

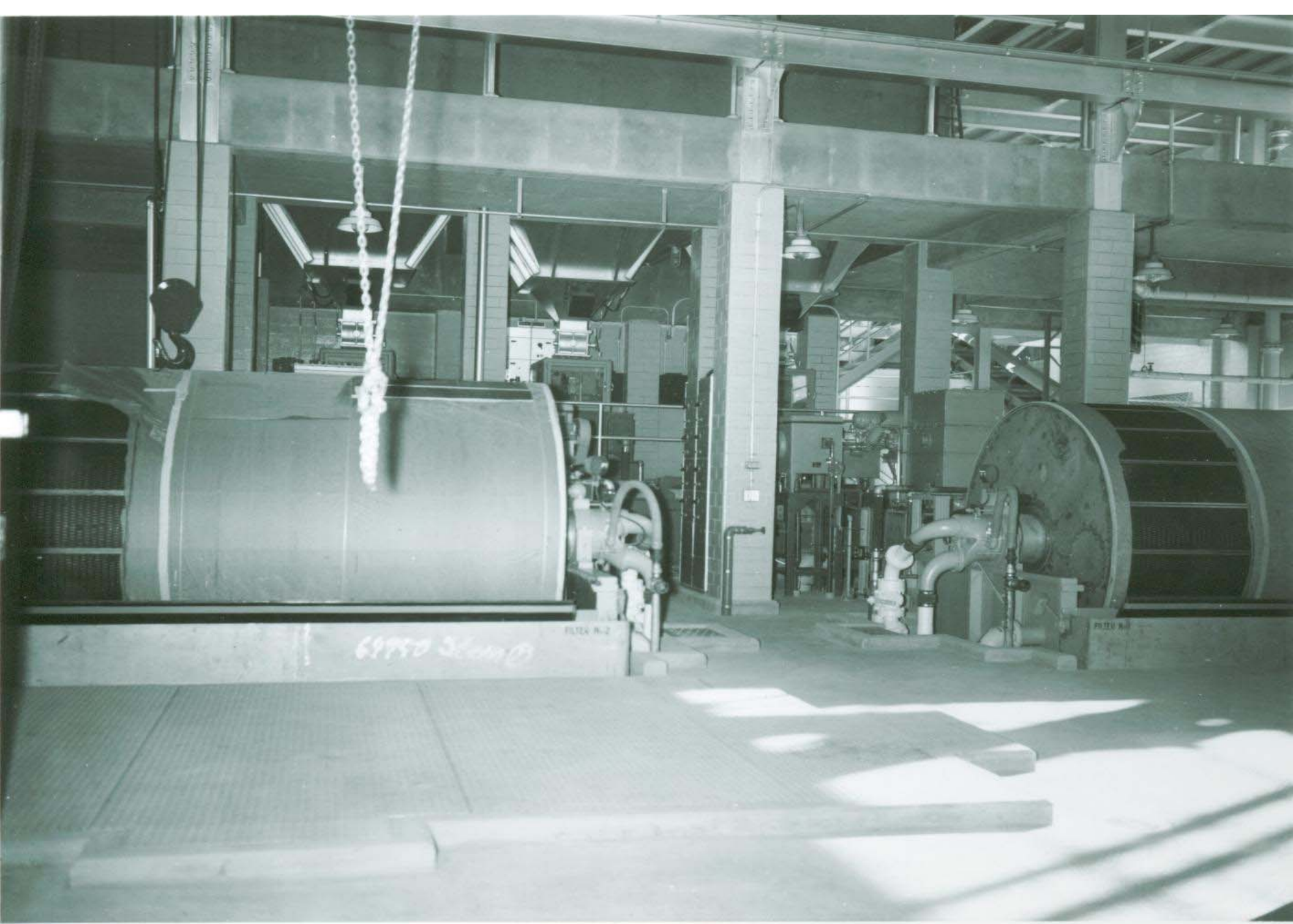
- Vacuum presses/Incineration
- Plate and frame presses/Incineration
- Belt Presses/ RDP class A process



64950 Stem

FILTER No-2

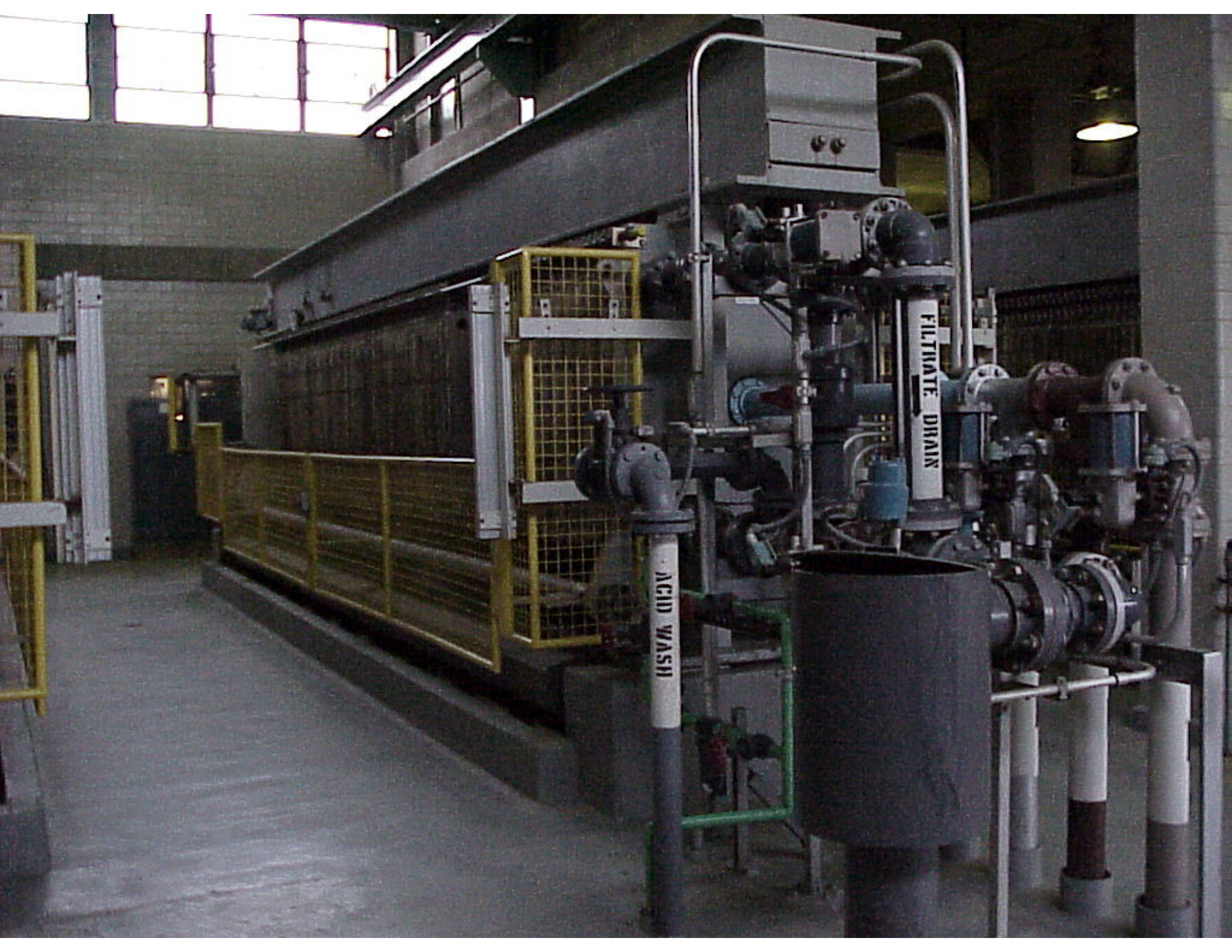
FILTER No-1



69950 36400

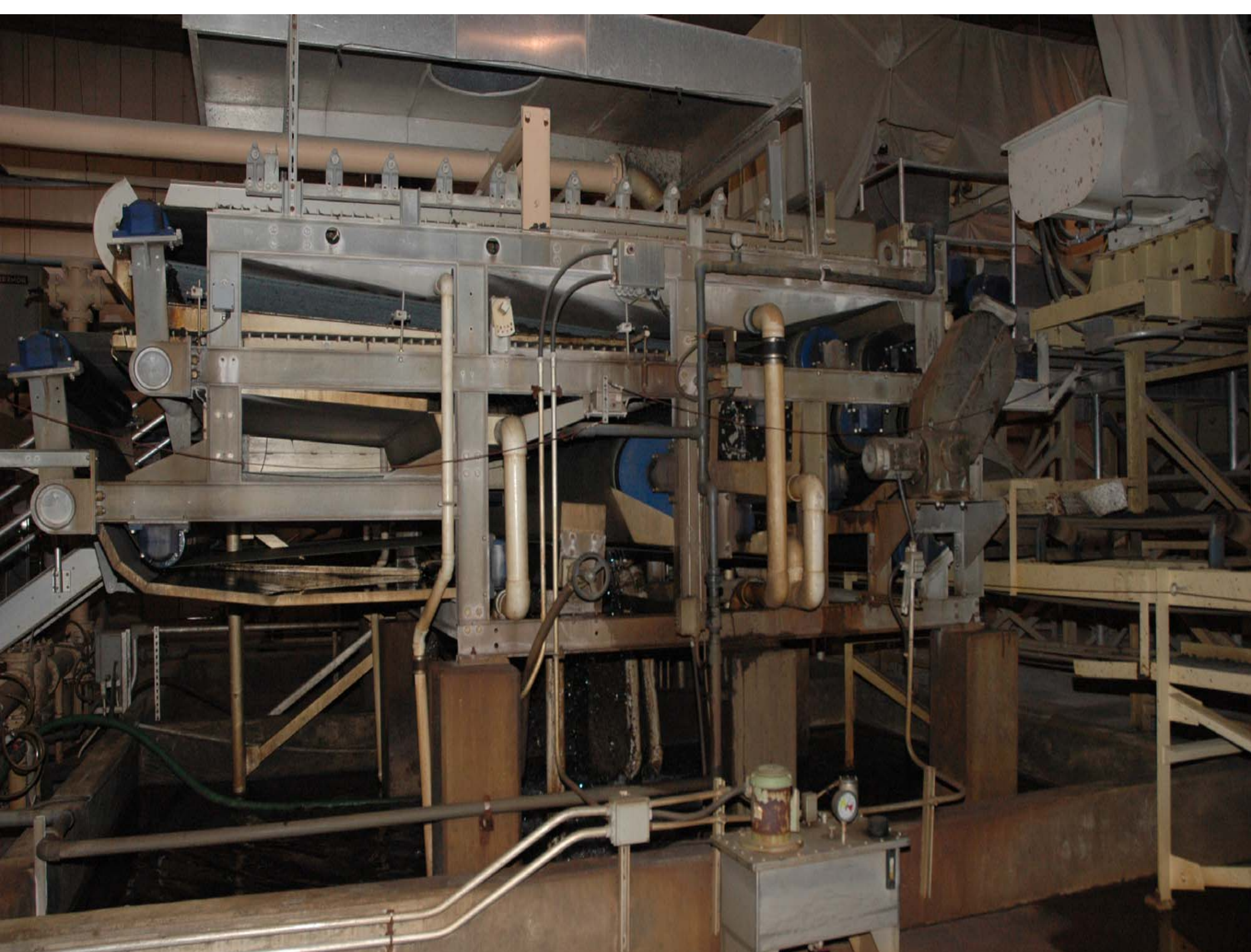
FILTER N-2

FILTER N-1



ACID WASH

FILTRATE DRAIN







Types of Polymer

- Powder
- Emulsion
- Anionic, Cationic, and Nonionic
- Manic



What to look for in polymer

- Will it break down when heat is applied
- How versatile is the polymer (with different sludge's)
- Their molecular weight
- Their shear force (when does the flock break up during mixing)





Choosing the right Polymer

- One that will release water
- Filtrate water should be clear
- One that gives you good flock(looks like black cottage cheese)
- One that save on cost(in other words use less of)









Polymer Bid

- Our polymer bids are set up on a one year with a one year renewal
- The price is per pound of polymer delivered
- There is a specification page which list all the requirements of the bid

WATER POLLUTION CONTROL CENTER

SPECIFICATIONS

FOR THE PURCHASE/DELIVERY OF EMULSION POLYMER

These specifications are for supplying and delivery of Organic Emulsion Polyelectrolytes (Polymer) for the Water Pollution Control Center of the City of Warren, Ohio as authorized by Ordinance No. 12076/07. Contract will be valid through December 31, 2008 with a one year performance renewable clause.

1. The supplier is to provide liquid emulsion polymer for use at the City of Warren, Ohio, Water Pollution Control Center. The emulsion polymer is to be water-soluble at ambient temperature (60°F) utilizing conventional introduction and agitation techniques. It is to be supplied in bulk quantities in the range of 250 – 1500 gallons/per shipment. The bid to the City of Warren is to include the delivered cost per/pound. The City of Warren de-waters approximately 1,230,000 gallons of sludge per month. Orders for emulsion polymer will be placed with the successful bidder on an as needed basis by the Water Pollution Control Center.
2. The supplier is to deliver all emulsion polymer with a full shelf life potential with a visible date of manufacture stamp located on the shipment record. No polymer shall be accepted that has the possibility of exceeding the specified shelf life before being used.
3. It is expected that all prospective bidders visit the plant site, contact the plant Superintendent and make themselves thoroughly familiar with the equipment and conditions under which the polymer is to be used. Sludge to be de-watered is a combination of residential, industrial, and water treatment sludge (high alum and/or carbon). All prospective bidders will pre-qualify (run jar test) prior to submitting bids. Bidders will only be allowed to bid one product. Bidders are to contact the Water Pollution Control Superintendent to schedule an appointment to pre-qualify.
4. The basis of cost evaluation of the bids shall be the product of the price per pound of emulsion polymer multiplied by the suppliers recommended and confirmed dosage in pounds and/or per wet tons of de-watered sludge.
5. Prior to the awarding of the contract, bidders shall supply sufficient quantities of the emulsion polymer determined by the bench tests, at the bidders expense (freight included) for the purpose of conducting a full-scale plant performance evaluation.

Polymer Specifications

During this test period, samples of sludge cake will be analyzed, emulsion polymer dosages will be measured, and impact of sludge cake released from press to determine performance efficiency. The results of this testing, along with the product cost will determine the lowest and best bid. All products under consideration will be subjected to daily testing over a six (6) hour period (2 hours to optimize system, and 4 hours of actual testing). Four (4) additional hours will be added in the event that no conclusive decision can be made. At the end of each testing day, the vendor along with WPC representative will review and sign daily testing data sheet stating that all figures are accurate. The Director of the WPC will be the final judge of all polymer evaluations.

6. The supplier must provide one product capable of performing in both D.A.F. and sludge de-watering, with emphasis being placed on sludge de-watering.
7. Polymer is to be delivered in company owned truck that is dedicated to transporting emulsion polymer only.
8. Technical assistance is to be provided on an as needed basis throughout the duration of the contract at no cost to the City of Warren, Ohio. This will include analytical analysis and hard copy analytical report, of a maximum of (12) twelve sets of (5) grab samples per year for sludge alum and carbon concentrations.
9. Bidders shall send one (1) quart of product ten (10) days prior to bid for testing.
10. Successful bidder will guarantee the emulsion polymer throughout the duration of contract is to be the same content in which plant trials were conducted. If any delivery is determined to be different from the polymer specification given with the bid, the contract can and may be canceled. Random samples will be taken and tested throughout bid contract.
11. Successful bidder will guarantee the emulsion polymer throughout the duration of contract is to be the same content in which plant trials were conducted. If any delivery is determined to be different from the polymer specification given with the bid, the contract can and may be canceled. Random samples will be taken and tested throughout bid contract.

Polymer Specifications

12. Each bid is to include the following information:

- Polyelectrolyte
- Name of identification of polyelectrolyte
- Polymer form (cationic, anionic, nonionic)
- Density (lbs./cu.ft.)
- Molecular weight
- Percent active solids
- Normal application solution strength (%)
- Ph of product
- Supportive information from the plant bench test
- Recommended dosage in mg/l and pounds/wet ton solids
- Bid price per/lb

13. Successful bidder must guarantee delivery of product within twenty-four (24) hours of receipt of order.
14. Payments for polymer shipments delivered to the Water Pollution Control Center shall be due and payable within 30 days of receipt of invoices. Polymer is to be delivered to the Water Pollution Control Center located at 2323 Main Avenue, Warren, Ohio 44481.
15. All bids must be accompanied by material safety data information (MSDS).
16. The contract will end on December 31, 2008. There will be a one year renewable clause for the year 2009. By October 1, 2008 the successful bidder and the City of Warren must notify each other, by letter, stating their intentions as to renewing the contract for the year 2009.
17. The City of Warren, Board of Control has the option to reject any or all bids.



Polymer Trials

- As part of the bid a six hour trial is required.
- The vendor must provide enough product to run for the six hours. We recommend 3 to 4 five gallon pails.
- The vendor gets two hours to tweak in their product. Then they have to run for four hours under the testing phase.



Polymer trial con't

- We weight all buckets of polymer before and after trial.
- Just after the tweak in part of the trial a new bucket of polymer will be started.
- The bucket used for the tweak in phase will be weighted again and set aside.
- An evaluation sheet is filled out.



Sartorius MA 35 analytical balance. The display shows: $+ 1.361 \text{ g}$. The balance is open, revealing a weighing pan containing a dark granular sample.

Hot plate with a beaker of yellow liquid and a dark circular object.

Container of grey powder.

Bottle labeled 'veyo'.

Beaker containing a reddish-brown liquid.

White marker and glass rod.

Aluminum lid.

Aluminum lid and metal tool.



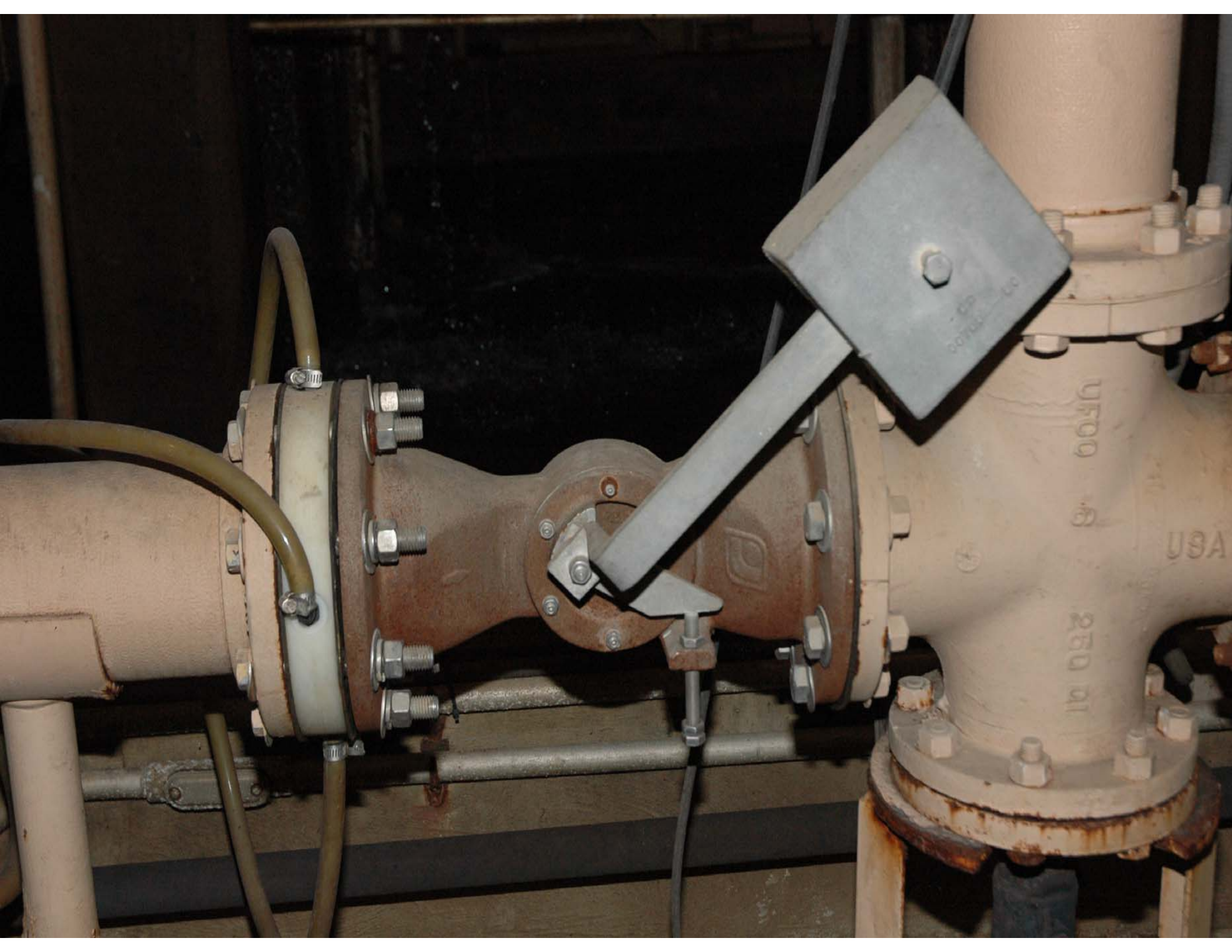
Things that are constant

- Sludge pump setting (flow rate)
- Sludge pump is cleaned the night before.
- The same press is used for all trials.
- A plant representative will oversee the trial and run the system during the trial.



Things the vendor can adjust

- Change the dilution water setting
- Adjust the ventury mixer(during tweak in phase)
- Belt speed
- Polymer setting





What to look for during the trial

- How well the sludge is breaking in the box
- How does the sludge look in the gravity zone.
- How does the filtrate look.
- How is the cake coming off the press.
- How do the filter belts look on the return side.



What to look for con't

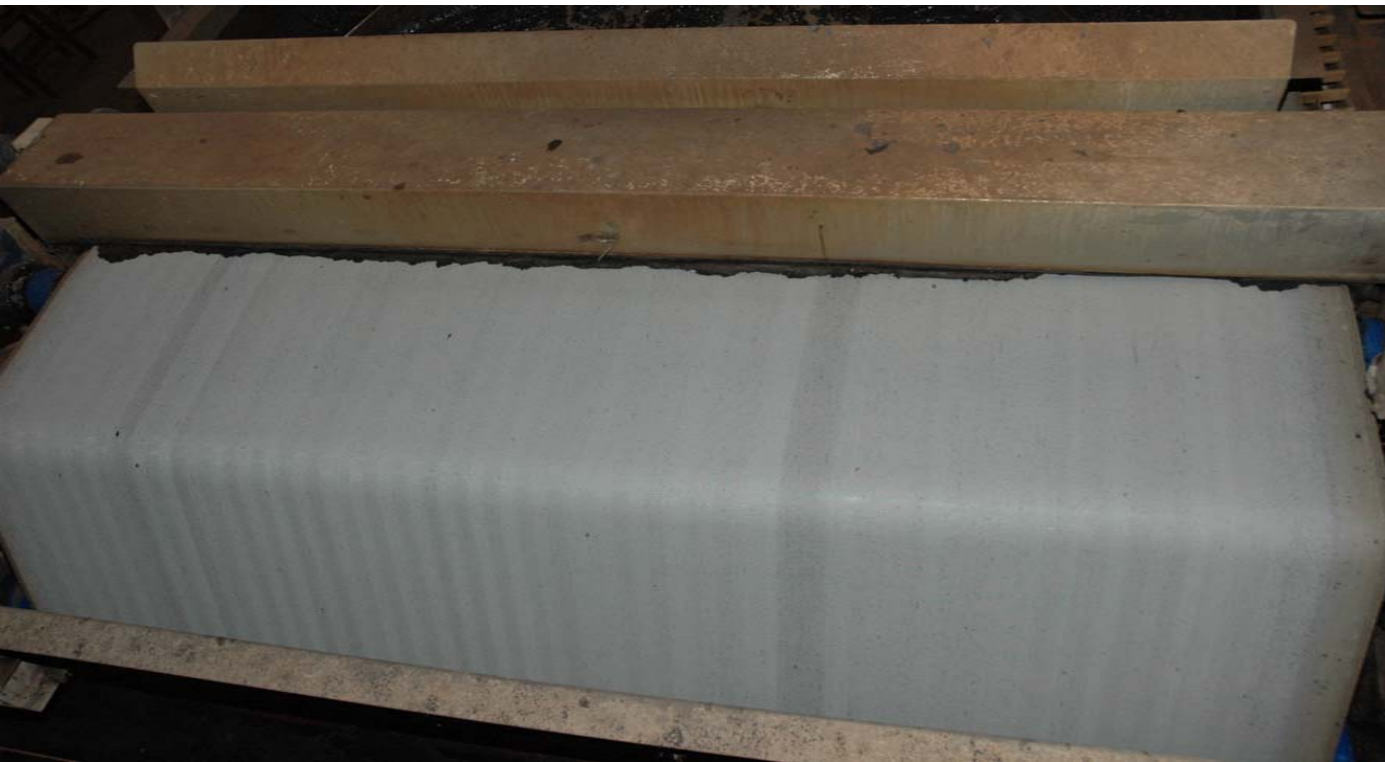
- The feed and cake solids.
- The cake weight going across the belt scale.
- The thickness of the cake.
- Most importantly the end product solids and appearance.















Cost savings of polymer trials

- Allows you to see the performance of the polymer product.
- You can project cost of polymer based on the trial.
- The better the solids are of the end product the less cost to your facility. because there will be less water to add to the cost.



Questions ?

