



12TH CANADIAN POLLUTION PREVENTION ROUNDTABLE

June 10-12, 2008
Edmonton, Alberta

Crowne Plaza- Chateau Lacombe





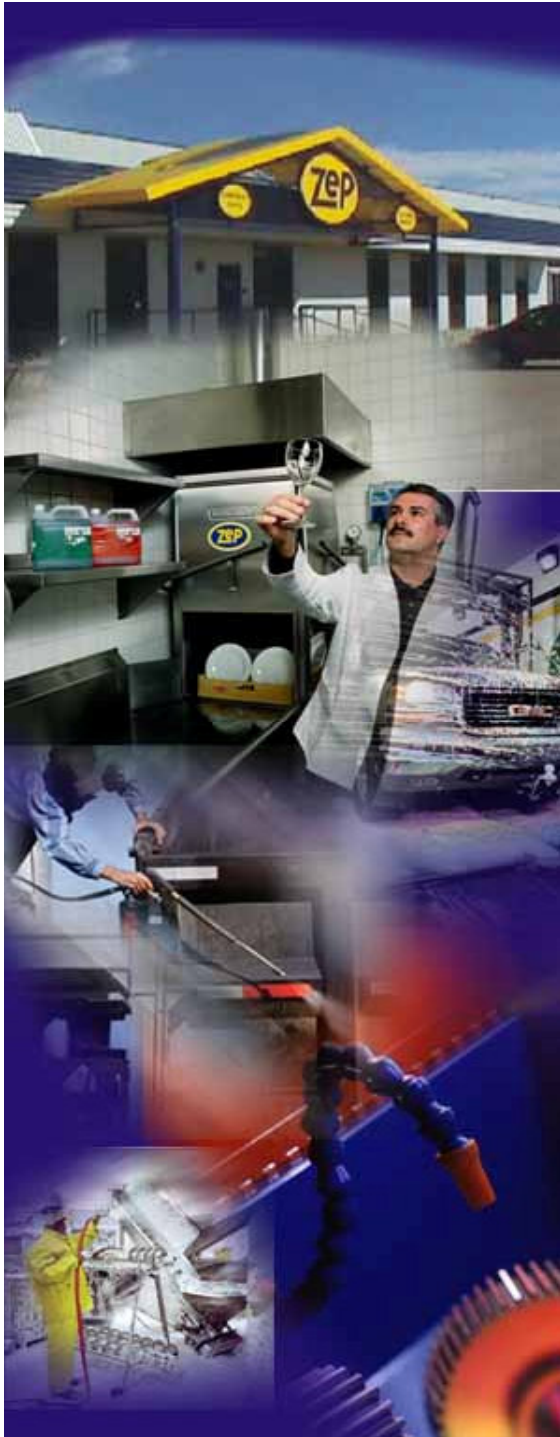
7.1 “Zep’s Current Incentives for Pollution Prevention”

Leah Hogendoorn, Health & Safety Director,
Zep Sales and Services



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Aerobic Biological Wastewater Treatment System

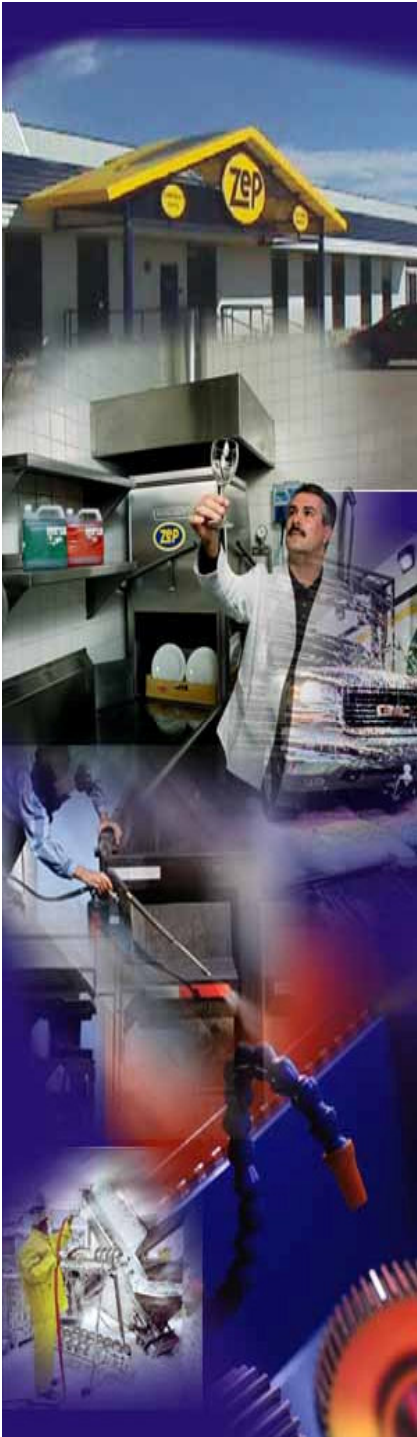


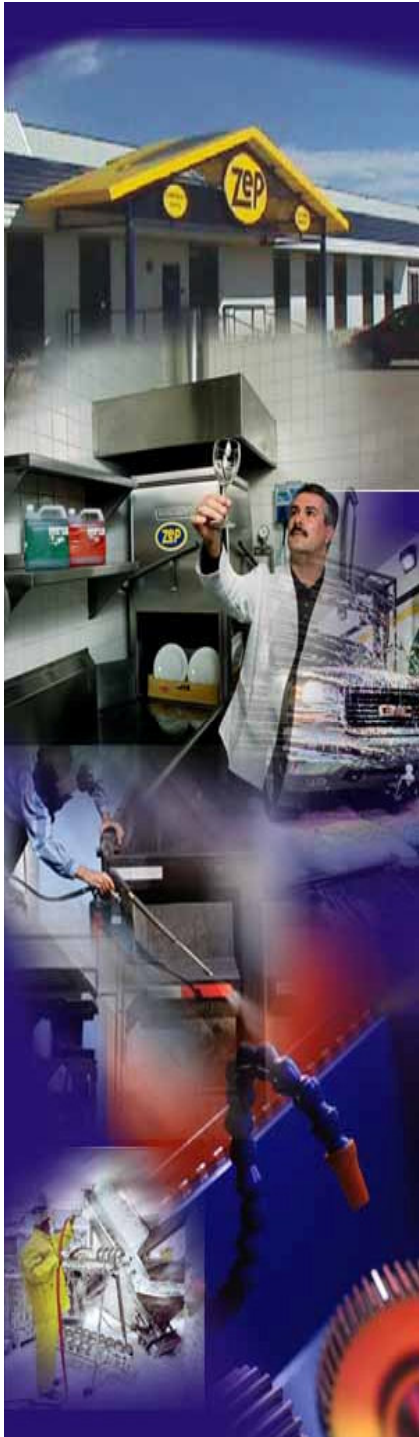
Agenda



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- Project Overview
- Characterization
- Process Evaluation
- Process Design
- Operation & Sampling Procedures
- Sustainability Benefits
- Conclusion

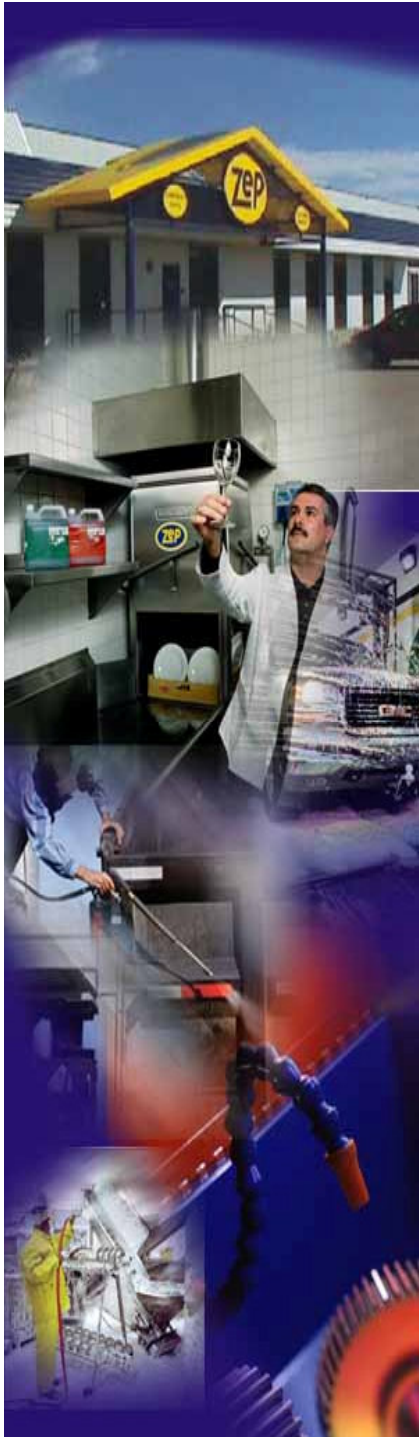




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Project Overview

- Large manufacturer of industrial cleaning products
- Produces over 1,000 different products
- No on-site wastewater treatment
- Method – segregation of streams
- Process wastewater – production surfaces, mixing equipment & tanks
- Contaminates – COD, BOD, hydrocarbons, oil/grease, Total Kjeldahl nitrogen, total phosphorous



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Project Overview

Main objective - 30% below City of
Edmonton Sewer Use Bylaw #9675
requirements

(City of Edmonton, 2006)

Table – Wastewater Parameters Exceeding Bylaw Limits

Parameter	Zep Effluent Average	Zep Effluent Range	Bylaw Requirement	Treatment Objective
BOD	9044 mg/L	2000 – 30000 mg/L	10000 mg/L	7000 mg/L
COD	19835 mg/L	8000 – 75000 mg/L	20000 mg/L	14000 mg/L
Total Phosphorous	137 mg/L	2 – 400 mg/L	100 mg/L	70 mg/L
Total Kjeldahl Nitrogen	196 mg/L	50 – 700 mg/L	500 mg/L	350 mg/L
Oil and Grease	435 mg/L	6 – 3810 mg/L	800 mg/L	560 mg/L
Hydrocarbons	184 mg/L	4 – 2090 mg/L	50 mg/L	35 mg/L
pH	n/a	5 – 13.5	6 – 11.5	6 – 11.5

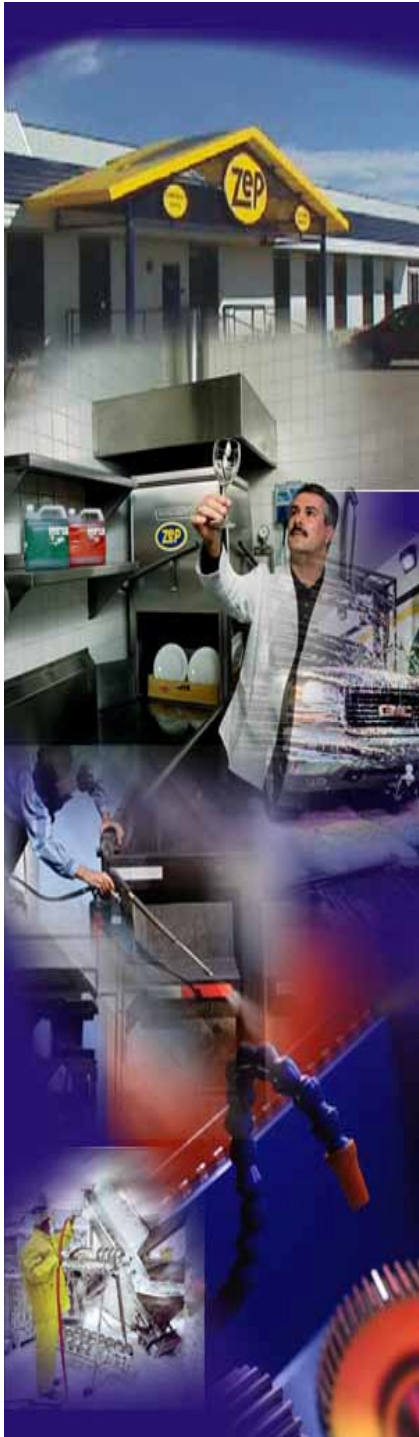


Characterization



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- Wastewater exhibits highly variable physical & chemical characteristics
- BOD, COD, & total phosphorous are routinely above discharge limits
- Other parameters (i.e. hydrocarbons) may only exceed limits during periodic spikes
- Characterization provides basis of design treatment options

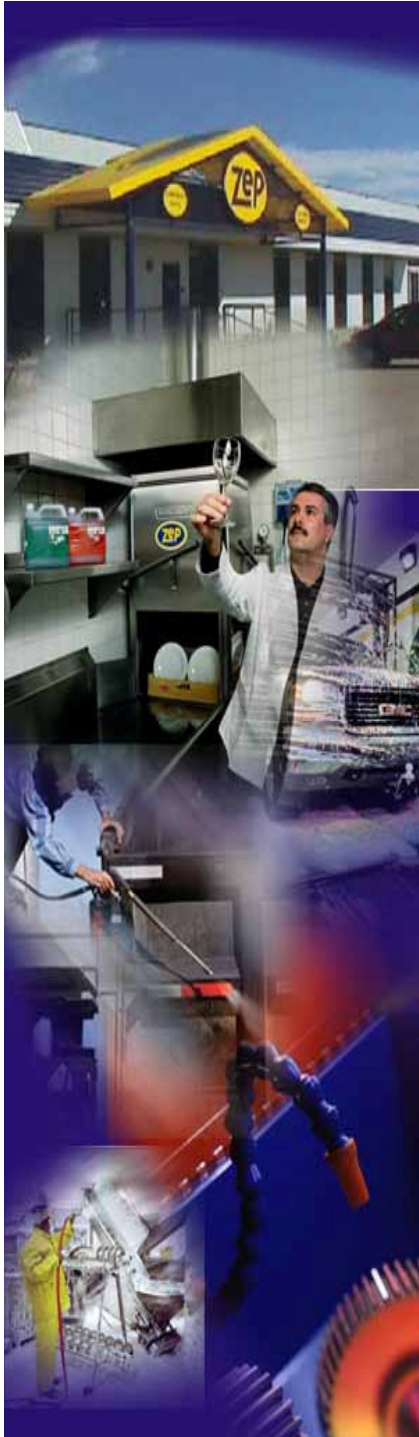


Process Evaluation



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- Design flow;
- Treatment objective;
- Treatability concerns;
- Environmental considerations;
- Water management

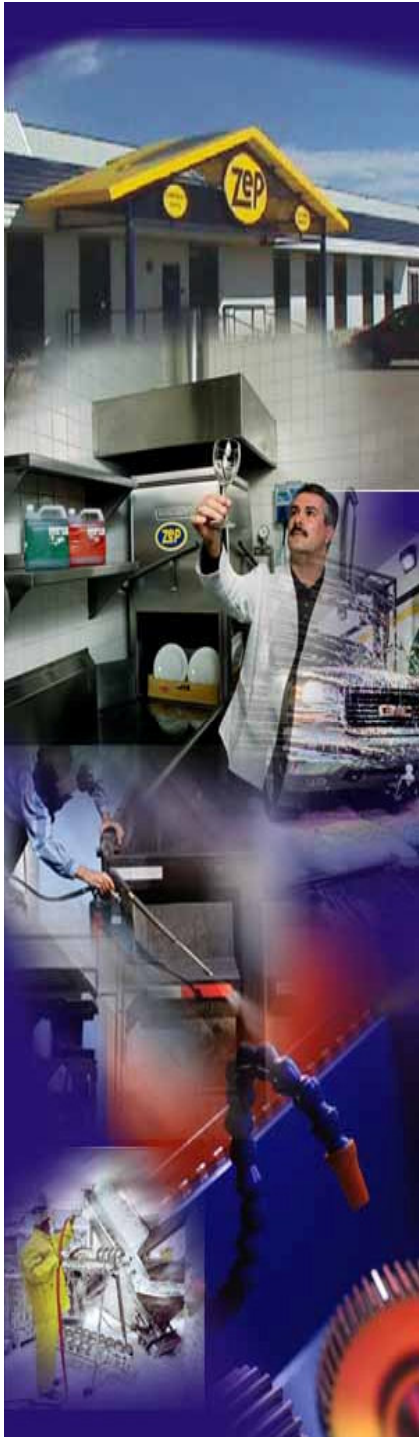


Process Evaluation



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- Evaluation criteria:
 1. Application
 2. Effectiveness
 3. Robustness
 4. Operation & maintenance
 5. Integration
 6. By-products
 7. Health & safety
 8. Capital cost
 9. Operational cost



Process Evaluation



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Table – Options Summary

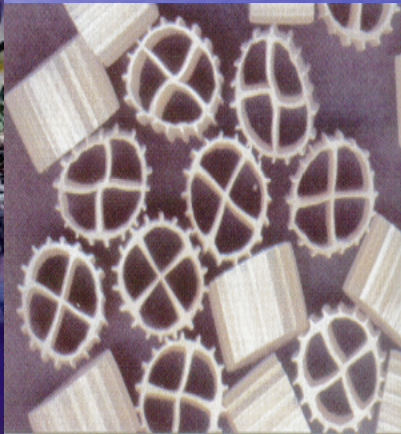
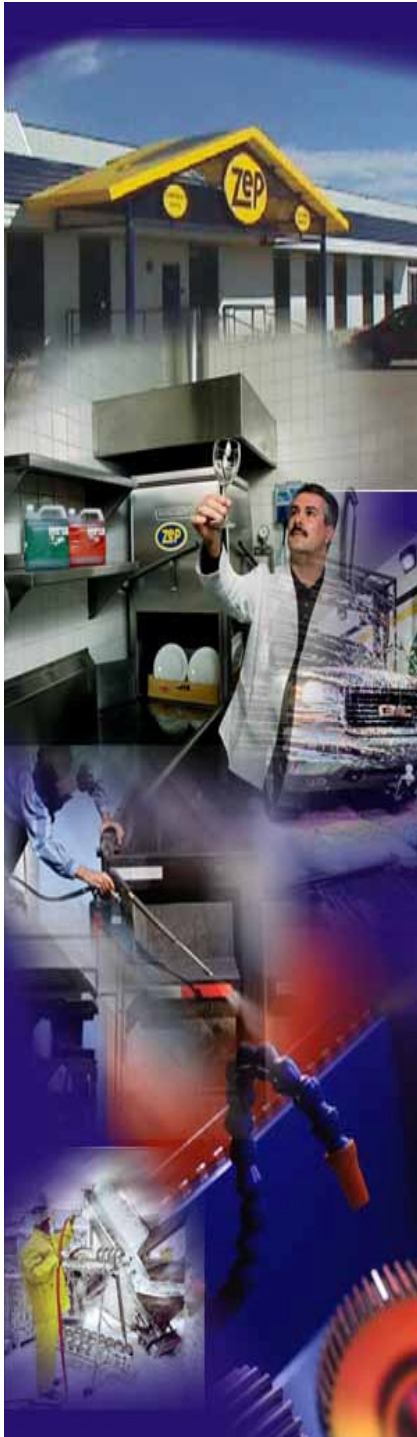
Option	Description	Capital Cost Estimate	Monthly Operational Cost Estimate	Advantages	Disadvantages
1	Flow Equalization with Hydrogen Peroxide Trim	\$ 117 000.00	\$ 26 650.00	Capital cost, space, operator attention	Operational cost, storage, pilot testing
2	Attached Growth Treatment (MBBR)	\$ 222 800.00	\$ 2 640.00	Operational cost, robustness.	Capital cost, operator attention, potential for upsets, pilot testing
3a	Down-hole Injection with Flow Segregation	\$ 135 000.00	\$10 000.00	Operational cost	Operator attention, pilot testing
3b	Down-hole Injection (100 % of Produced WW)	\$ 15 730.00	\$ 14 000.00	Capital cost, operator attention, pilot testing	Operational cost

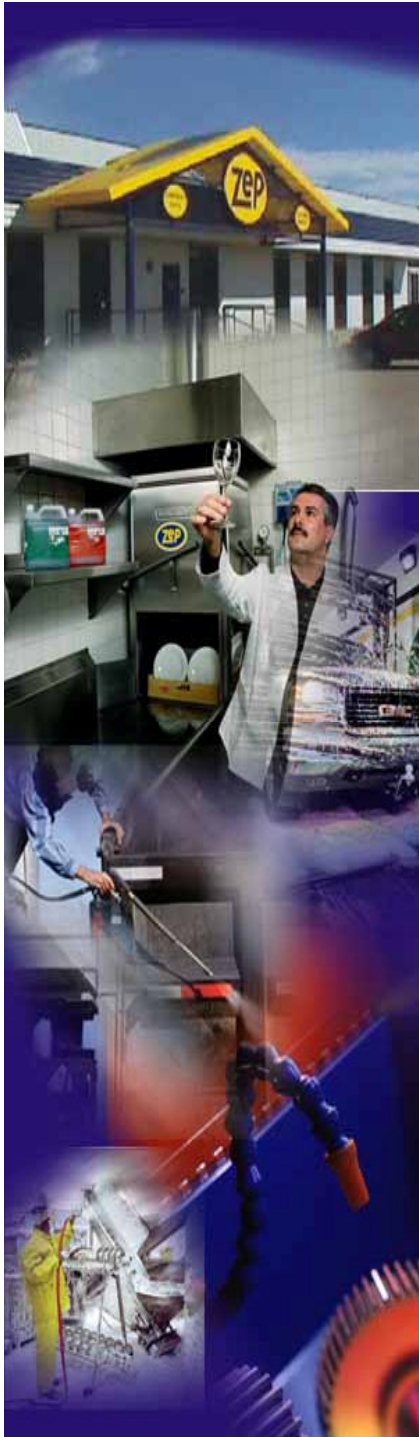
Process Evaluation



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Attached Growth Treatment (Chosen option)





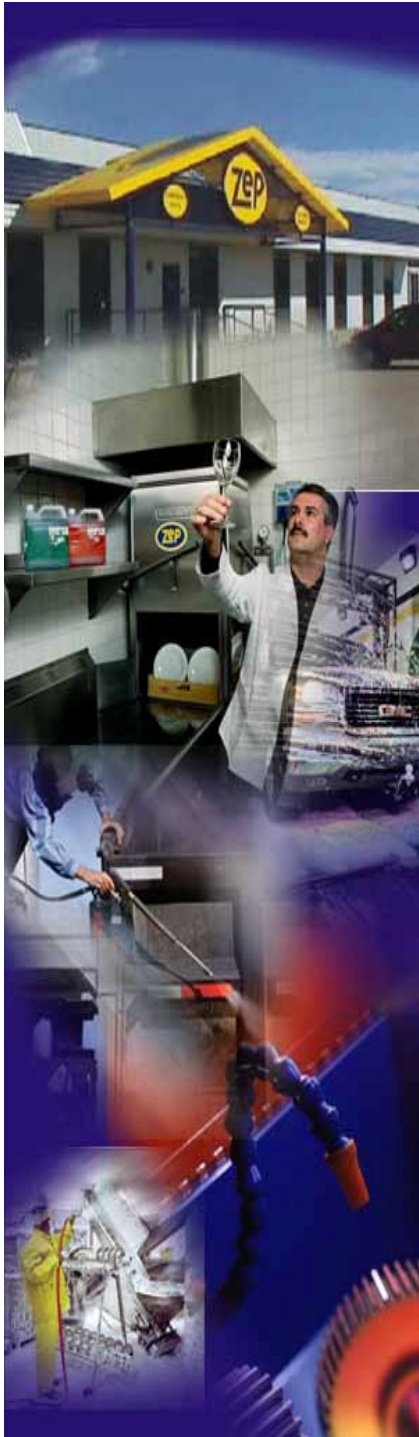
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Advantages:

- Most robust & adaptable biological treatment system;
- Some phosphorous removal through the biological process;
- Low operating costs



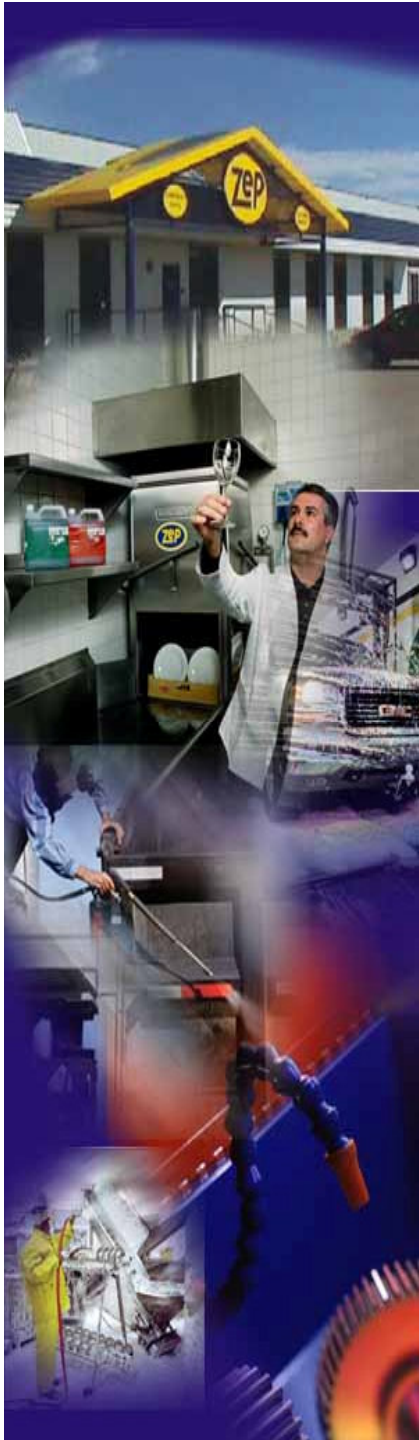
Process Evaluation



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Disadvantages:

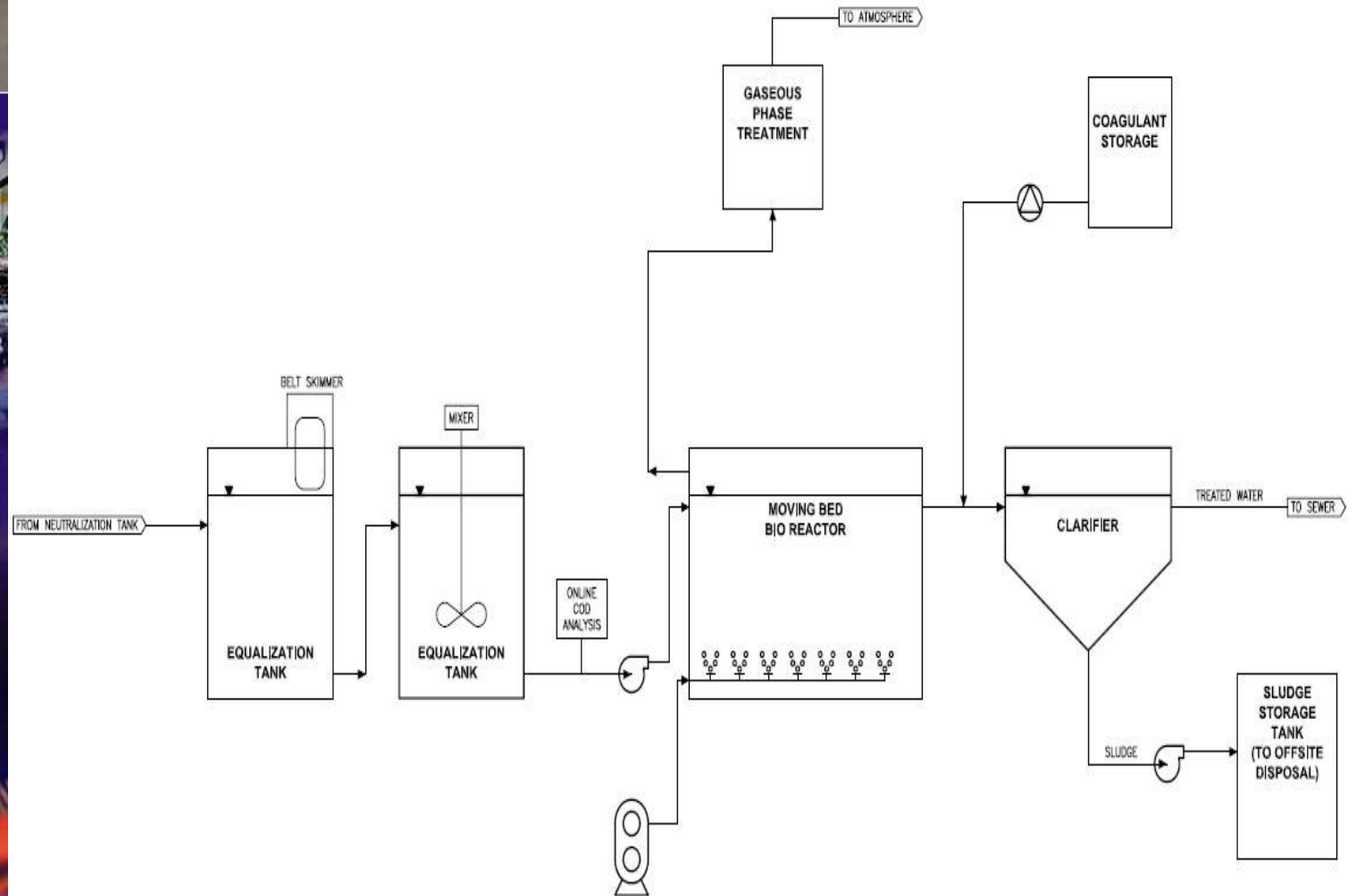
- Detailed pilot test to determine biological process;
- Large footprint;
- Potential system upsets due to influent characteristics;
- Operator intensive

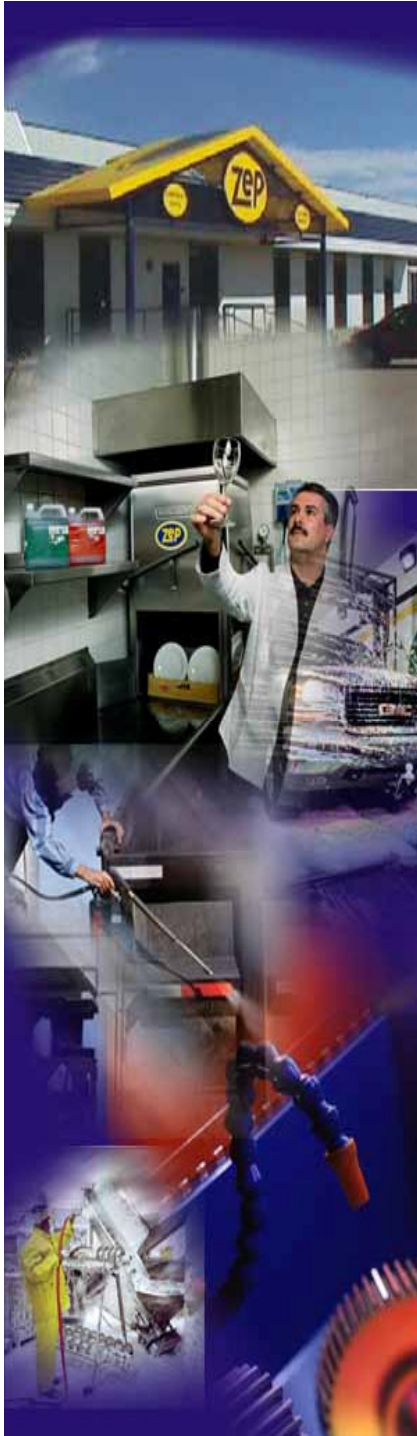


Process Design



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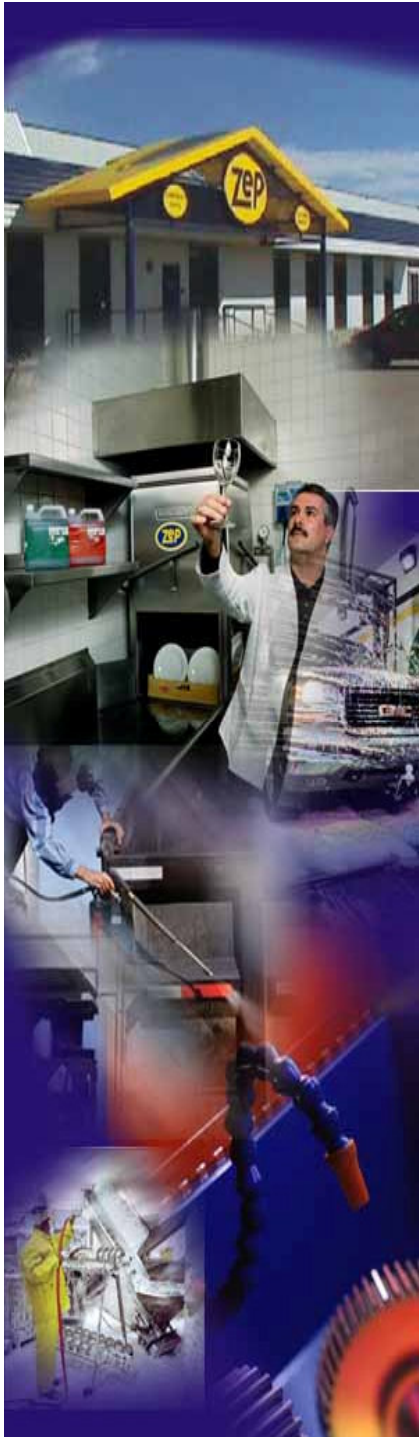


Process Design



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- **Required Equipment**
 1. Equalization tanks;
 2. Mixer;
 3. Belt skimmer;
 4. Online COD analyzer;
 5. Pump;
 6. MBBR system;
 7. Clarifier;
 8. Sludge transfer pump; and
 9. Sludge storage vessel



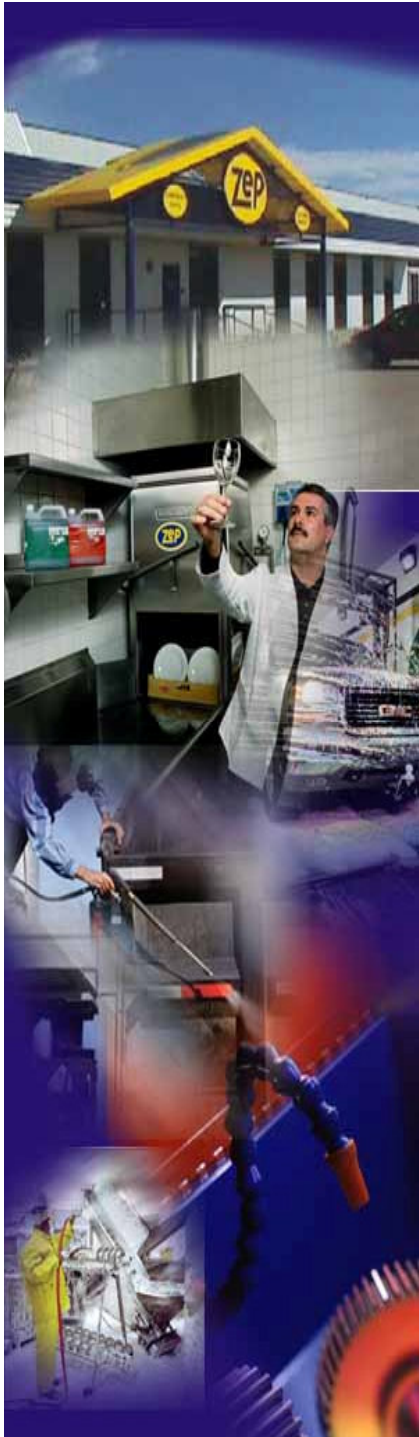
Process Design



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- **Optional Features**

1. Activated carbon could be used to remove volatile chemicals from gas phase; and
1. Sludge recycle from clarifier back to MBBR inlet may be used to increase solid retention time and ensure a healthy biomass



Process Design



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- **Construction**

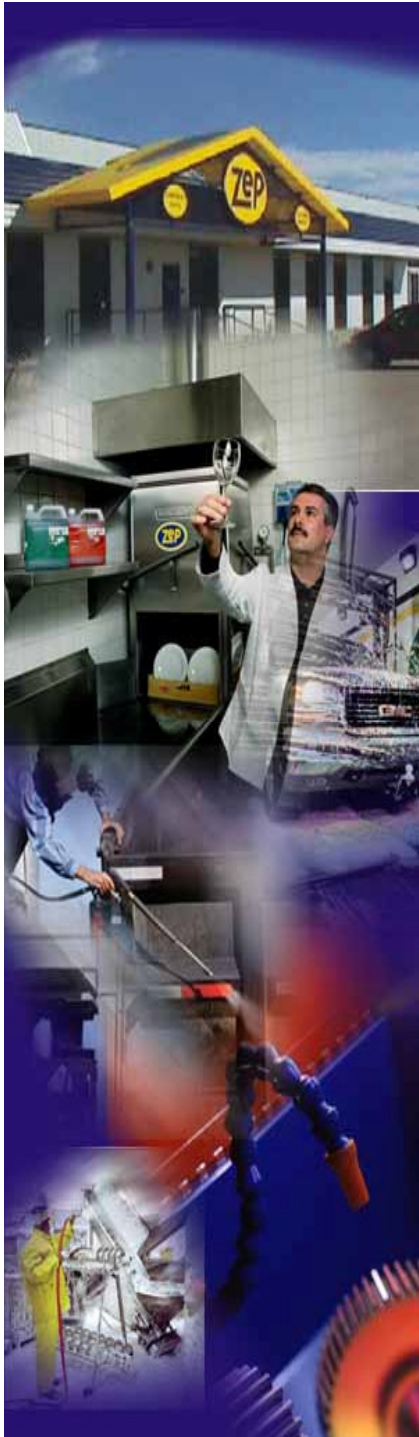
1. Preparation of MBBR media;
2. Installation of tanks, pumps, and diffuser;
3. Installation of piping and valves;
4. Verifying system flow rate & bioreactor operation

Operation & Sampling Procedures



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- Flow rate confirmation
- Dissolved oxygen
- Influent sampling
- MBBR sampling
- Effluent sampling
- Gas sampling

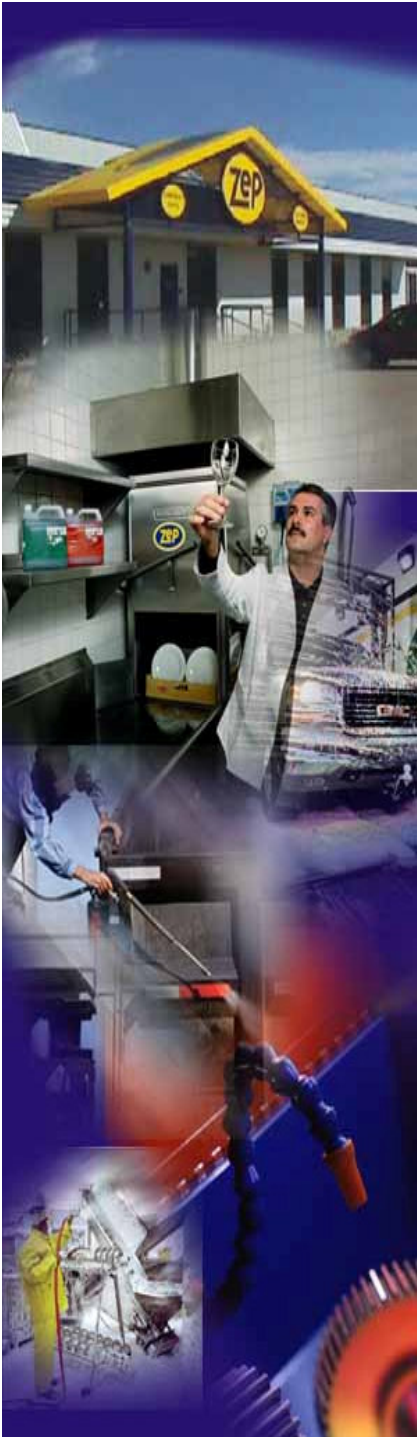


Sustainable Benefits



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- Renewable Energy Use/Energy Efficiency
- Lower operational costs
- Waste Minimization
- Above standard compliance
- Water Conservation
- Biological alternative to hazardous chemicals
- Ethical business decision

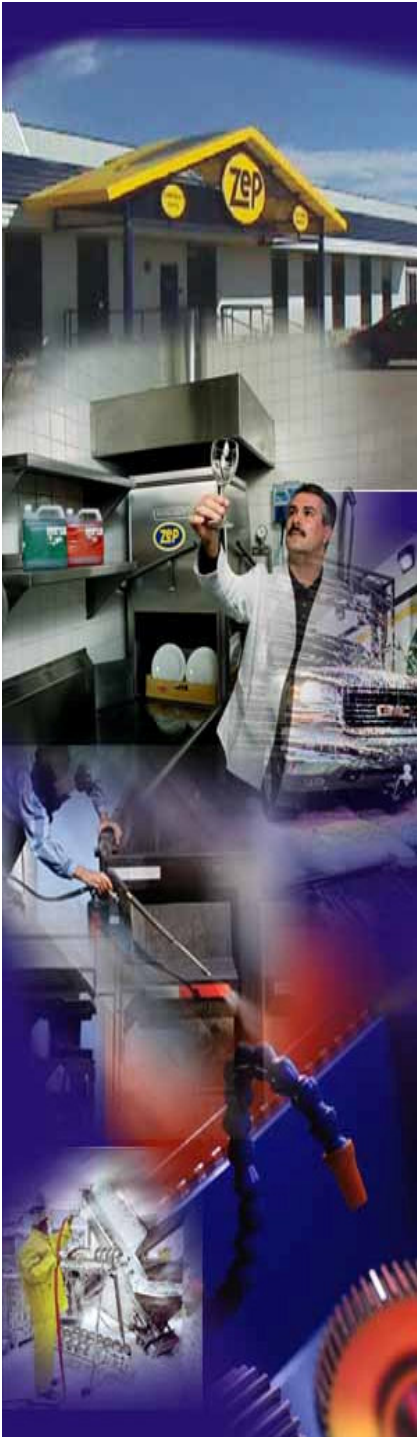


Conclusion



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- Current status is pilot system testing
- System commissioned & operational by April 15, 2009
- Investigating water recycling options for reuse into products
- Reformulating all phosphorous products
- Continually looking for sustainable business practices



Questions & Comments



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“Let every individual and institution now think and act as a responsible trustee of Earth, seeking choices in ecology, economics and ethics that will provide a sustainable future, eliminate pollution, poverty and violence, awaken the wonder of life and foster peaceful progress in the human adventure.”

— *John McConnell, founder of International Earth Day*

