

Water Intake & Thermal Discharge Control Technologies



Today's Presentation

- Overview
 - ◆ Facility
 - ◆ IM/E and Thermal Data
- Present Possible Control Alternatives and Costs
- Discuss Next Steps Regulatory Process

BSPP Location at Maumee Bay

Intake Pulls Water from Maumee River

Discharge to Maumee Bay



BSSP Cooling Water Intake

Coarse Bar Screens and Fine Screens (3/8 in)



Design Flow 810 MGD and Ave Annual Flow 638 MGD

BSSP Environmental Issues

Water Intake and Thermal Discharge

Impingement of Fish on Fine Screens

Entrainment of Fish Larvae and Eggs thru
Condenser

Temperature Impacts on Maumee Bay

BSSP Environmental Issues

Water Intake

Impingement of Fish on Fine Screens

Entrainment of Fish Larvae and Eggs thru
Condenser

Numbers of Larvae and Juvenile Fish Estimated to be Entrained and Numbers of Fish Impinged on an Annual Basis

Species	No. Larvae Entrained	No. Fish Impinged
Freshwater Drum	978 Million	226 Thousand
Rainbow Smelt/Clupeidae	536 Million	
Unidentifiable	466 Million	
Morone sp.	138 Million	
Emerald Shiner	23 Million	300 Thousand
White Bass	17.8 Million	1.6 Million
Walleye	8.2 Million	78 Thousand
Yellow Perch	3.1 Million	123 Thousand
Percidae	2.3 Million	
Carp	2.1 Million	
Walleye/Yellow Perch	512 Thousand	

Impact Of Impingement and Entrainment on Overall Fishery Difficult to Quantify

- Survival Rates of Larvae Low in Natural Environment
- Impingement and Entrainment Data Is a Snapshot
- Many Variables Such as River Flow, Weather, Fish Patterns Can Affect Fishery and Collection Data

Total Western Basin Harvest Numbers Walleye and Pounds Perch Ohio, Ontario, and Michigan Sport and Commercial Fisheries

Year	Walleye , Total Number	Perch, Total Pounds
2004	664 Thousand	2.9 Million
2005	438 Thousand	2.5 Million
2006	1.53 Million	2.4 Million
2007	1.61 Million	1.8 Million
2008	943 Thousand	1.0 Million

Thermal Discharge Issues



BSSP Environmental Issues

Thermal Discharge

Temperature Impacts on Maumee Bay

Thermal Discharge – Description

■ July & August BSPP Discharge Temperature From 2002 Study

- ◆ Daily Max ~ 94 F
- ◆ Daily Ave ~ 90 F



■ Lake Erie Water Temperature Standards Summer Months

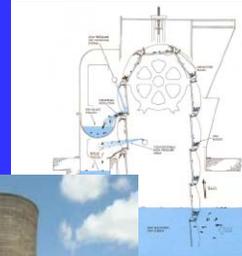
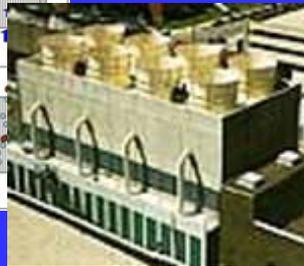
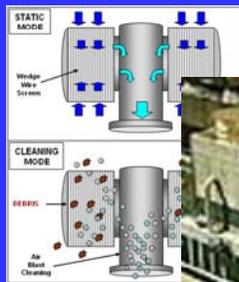
- ◆ Max 87 F
- ◆ Ave 83 F



Thermal Discharge

- Protective of Aquatic Communities
 - ◆ i.e. Aquatic Life Designated Uses
- Prevention Nuisance Conditions
 - ◆ e.g. Algal Blooms

Water Intake and Thermal Load Possible Control Strategies



Control Strategies -Water Intake

- Physical Barriers
 - Nets and Screens

 - Diversion or Avoidance Technologies
 - Velocity Reduction, Louvers, Light, Sound, Electrical

 - Operational Changes
 - Flow Reduction (cooling ponds/towers), Seasonal Reductions Flow, Intake Reversal with Discharge, Variable Speed Pumps
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Water Intake Technologies Feasible at BSPP

Feasible at BSPP

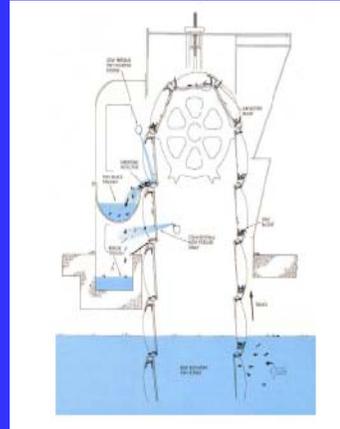
- Ristoph Screens
- Intake Velocity Reduction

Possibly Feasible

- Wedgewire Screens
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Ristoph Screens

- Fish Return System to Maximize Survival
- IM – 80-95%
- E – 0%
- Thermal – 0%
- Capital Cost ~\$13M



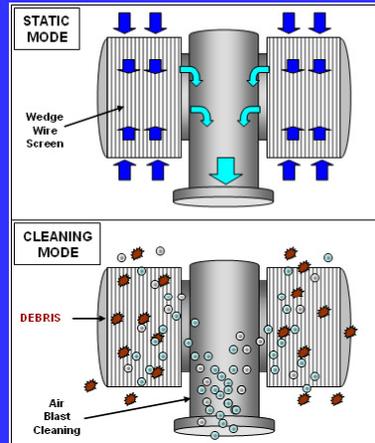
Intake Modifications to Reduce Velocity

- New Intake Bays
- IM/E Reduction – Not Quantified
- No Thermal Reduction
- Capital Cost Not Quantified



Wedgewire Screens Further Study Needed to Determine If Feasible Technology

- IM Reduction –
 - 90 to 95%
- E Reduction –
 - 85 to 90%
- No Thermal Reduction
- Capital Cost –
 - ~ \$17M



Possible Location Wedgewire Screens



Control Strategies – Thermal Load

- Diffusers
 - Cooling Tower
 - Mechanical Draft Cooling
 - Cooling Ponds
 - Dry Cooling
 - Discharge Relocation
 - Flow Reversal
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Thermal Load Feasible Technologies

Evaporative Cooling:
Mechanical Draft Cooling or Cooling
Ponds

- Reduces Heat Load 90%
 - Reduces Impingement Entrainment by 90% as Well
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Mechanical Draft Cooling

- 3 Units
 - Max Height ~ 75'
 - Capital Cost Estimate \$95M
 - Reduces Electrical Generating Capacity by ~ 3%
 - Total Annual Cost (O&M and Capital)
 - 15 to 30M Dollars/Year
 - Increase in Electric Bills of 3.2% to 6.4%
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Mechanical Draft Towers Possible Location



Cooling Ponds

- Less Expensive ??? Than Mechanical Draft Cooling
 - Lower Capital
 - Less Energy Cost
- Need 600 ac
- Reduces Heat Load 90%
- Reduces Impingement Entrainment by 90% as Well

Cooling Ponds Possible Location



Control Strategy Summary

- Wedgewire Screens – If Feasible at This Location
 - Reduces IM/E by 85 to 90%
 - No Thermal Reduction
 - Cost ~ \$17 Million
 - Ristoph Screens
 - Reduces IM by ~ 90%
 - Does Not Reduce Entrainment
 - No Thermal Reduction
 - Cost ~ \$13Million
-

Control Strategy Summary

- Mechanical Draft Cooling
 - Reduces IM/E by 90%
 - Reduces Thermal Load by 90%
 - Cost ~ 15 to 30M per year (Depends on How Value Cost Lost Power)
 - 3 to 6% Increase in Electric Bill if Entire Cost Borne by Rate Payers

Use of Cooling Ponds Could Possibly be a Lower Cost Alternative

Next Steps ... NPDES Renewal

- Water Intake IM/E
 - Best Technology Available Must be Employed
 - Higher Environmental Impact Requires Higher Level BTA
 - Use BPJ for BTA
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Next Steps ... NPDES Renewal

- Thermal Discharge
 - Must Be Protective Aquatic Communities
 - Not Cause or Contribute to Nuisance Conditions

Unclear Impact of Eliminating Thermal Load on Algal Blooms

Next Steps ... NPDES Renewal

- Should NPDES Require Intake or Thermal Controls
 - Wedgewire
 - Ristoph
 - Mechanical Draft Cooling or
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Next Steps ... NPDES Renewal

- Additional Studies
 - Extent Duration Thermal Plume Above Ambient Temperatures
 - Impact on Aerial Extent and Duration Algal Blooms
 - Can Wedgewire Screens be Effective
 - And/Or
 - No Action Now - Handle in Next Permit When New Federal Regulations on IM/E May Be Effective
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Next Steps ...

- All Reports Submitted by BSPP, TetraTech Will Be Posted On Our Website
 - Will Hold Another Public Meeting Before Any Initial Course Action
 - Comments Today's Meeting – Intake and Thermal Issues
 - Web Site - Mike McCullough
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Questions??

