DRSCW NPDES PERMIT

SPECIAL CONDITIONS:
PHOSPHORUS REMOVAL STUDIES

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OUTLINE

• PERMIT LANGUAGE

• OPERATIONAL OPTIMIZATION PLAN AND IMPLEMENTATION

• TREATMENT PLANT IMPROVEMENT STUDY TO MEET SPECIFIC EFFLUENT STANDARDS

• STUDY SCOPE / APPROACH
  • DATA COLLECTION
  • PLANT MODELING
  • ALTERNATIVE TECHNOLOGY EVALUATION
  • COST ESTIMATES
PERMIT LANGUAGE

• PHOSPHORUS DISCHARGE OPTIMIZATION PLAN (PDOP)
  • NOT UNIQUE TO DRSCW
  • INFLUENT REDUCTION MEASURES – RICK’S TALK
  • OPTIMIZING EXISTING TREATMENT PROCESSES WITHOUT CAUSING PROBLEMS
    • LIKELY PROBLEM #1: SOLIDS SETTLING (COMPLIANCE PROBLEM)
    • LIKELY PROBLEM #2: ELEVATED AMMONIA (STREAM HEALTH PROBLEM)
• ARE MEASURES PRACTICAL, OR NOT?
PERMIT LANGUAGE (CONTD)

• SPECIFIC OPERATIONAL MEASURES – ALL ASSOCIATED WITH ENHANCED BIOLOGICAL PHOSPHORUS REMOVAL (EBPR)
  • CHANGE SRT PER TYPICAL EBPR CONFIGURATION: SHORTER THAN FOR NITRIFYING-ONLY PLANT
  • ADJUST AIR RATES, LOW DO IN ANOXIC/ANAEROBIC ZONES (OR IN UPPER END OF PLUG FLOW BASIN)
  • IMPROVED AERATION FOR RECYCLE STREAMS
  • ADJUST FLOW PATTERN TO PROMOTE EBPR (NOT RE-PIPE)
  • INCREASE VFA PRODUCTION – KEY INGREDIENT FOR EBPR

• SCHEDULE: 24 MONTHS FOR PLAN, 36 MONTHS TO IMPLEMENT, REPORT ANNUALLY IN MARCH

• IF THESE MEASURES ARE IMPRACTICAL, REPORT NEEDS TO STATE WHY
PERMIT LANGUAGE (CONTD)

• FEASIBILITY STUDY
  • NOT UNIQUE TO DRSCW
  • TREATMENT PLANT IMPROVEMENTS
  • 3D METRIC OF OPTIONS TO EVALUATE:
    • 1.0, 0.5, 0.1 MG/L LIMITS
    • MONTHLY, SEASONAL, ANNUAL AVERAGE BASIS
    • TECHNOLOGIES: CHEM PRECIP, EBPR, COMBINATION
    • 27 TOTAL OPTIONS? SOME WILL DROP OUT AS NOT FEASIBLE, OR OVERLAP
  • EACH OPTION NEEDS A START-TO-FINISH IMPLEMENTATION DURATION
  • FINANCIAL EVALUATION: CAPITAL, O&M, IMPACT ON RATES
  • SCHEDULE: SAME AS PDOP, 24 MONTHS. NO IMPLEMENTATION REQUIREMENT.
PDOP

- KEY STUDY FOCUS: IS EBPR PRACTICAL WITH EXISTING FACILITIES?
ENHANCED BIOLOGICAL PHOSPHORUS REMOVAL

- PHOSPHORUS ACCUMULATING ORGANISM (PAO) METABOLISM

- CHALLENGES
  - TANKAGE – SEPARATION OF ANAEROBIC ZONE, LOSS OF NITRIFICATION SPACE
  - INHIBITORY CONDITIONS – NITRATES: LIKELY TO NEED DENITRIFICATION
  - SPECIFIC TYPE OF FOOD NEEDED: CARBON AS VOLATILE FATTY ACIDS: RBCOD
  - FILAMENTOUS CONTROL – SELECTOR, STRICT LOW SLUDGE AGE

Biological Phosphorus Removal Process
ENHANCED BIOLOGICAL PHOSPHORUS REMOVAL

- AO PROCESS
- A2O PROCESS
- MLE PROCESS
- UCT PROCESS
- OTHERS
ENHANCED BIOLOGICAL PHOSPHORUS REMOVAL

- AO PROCESS
- A2O PROCESS
- MLE PROCESS
- UCT PROCESS
- OTHERS
CONSIDERATIONS FOR EBPR SUCCESS

• TANKAGE AND PIPING
• SEWAGE CHARACTERISTICS – C/N/P, IN PARTICULAR RBCOD
• SLUDGE TREATMENT AND HANDLING
PDOP

• SIX ITEMS TO CONSIDER (FREE TO LOOK AT OTHERS)
  • SRT
  • REDUCE DO TO PROMOTE EBPR
  • TURN OFF AIR AT INLET SIDE OF PLUG FLOW BASINS
  • IMPROVE RECYCLE STREAM AIR
  • ADJUST FLOW THROUGH BASINS
  • INCREASE VOLATILE FATTY ACIDS

• IDENTIFY WHAT IS PRACTICAL

• MAKE IMPLEMENTATION SCHEDULE OF PRACTICAL ITEMS

• ROOM FOR ADAPTIVE MANAGEMENT

• ANNUAL PROGRESS REPORTS
FEASIBILITY STUDY

• MORE TRADITIONAL ENGINEERING STUDY

• ASSURANCE FROM ENGINEER THAT RECOMMENDED IMPROVEMENTS WILL MEET TARGET PERFORMANCE CRITERIA

• UP TO 27 OPTIONS PER METRICS IN PERMIT

• FOR EACH OPTION: BASIS OF DESIGN, COSTS, IMPLEMENTATION SCHEDULE
OVERALL SCOPE OF SERVICES: 2 STUDIES IN 1

- PDOP EVALUATION IS A SUBSET OF FEASIBILITY STUDY: EBPR USING EXISTING PLANT
- STUDY STEPS
  - DATA COLLECTION
  - PLANT MODELING
  - ALTERNATIVE TECHNOLOGY EVALUATIONS
  - COST ESTIMATES
DATA COLLECTION

• P DATA: P IS IN SEVERAL FORMS, NEED TO UNDERSTAND VARIOUS FRACTIONS TO EVALUATE EBPR AND CHEM PRECIP OPTIONS: INFLUENT, EFFLUENT, RECYCLES

• EBPR SUPPORT DATA: VARIOUS FORMS OF CARBON, ALKALINITY, PH, NITROGEN

• MONITORING PLAN SHOULD SPAN REPRESENTATIVE PERIOD, ADEQUATE AMOUNT OF DATA TO CONDUCT MODELING
PLANT MODELING

- DESKTOP COMPUTER MODELS
- COMPUTATIONAL ENGINES – PROPRIETARY OR OPEN SOURCE
- PROPRIETARY USER INTERFACES
- SPREADSHEET MODELING: SIMPLIFIED CALCULATIONS
ALTERNATIVE TECHNOLOGY EVALUATIONS

• EBPR
• CHEMICAL PRECIPITATION
• COMBINING THESE TECHNOLOGIES
• LOWER LEVELS WILL LIKELY INCLUDE IMPROVED FILTRATION
CHEMICAL PRECIPITATION

JAR TESTING

OPTIONAL FEED POINTS

ADDITIONAL SLUDGE
OTHER CONSIDERATIONS

- OPPORTUNITIES FOR CAPACITY EXPANSION
- SLUDGE QUANTITIES AND CHARACTERISTICS
- RETROFIT VS NEW FACILITIES
- OPERATIONAL IMPACTS
  - I&C
  - STRUVITE FORMATION/CONTROL/RECOVERY
  - STAFF
  - FILAMENTOUS CONTROL
  - ENERGY
  - ODORS
  - SOLIDS DEPOSITION
  - OTHER PARAMETERS – AMM-N
COST EVALUATION

• CAPITAL – NEED TO DEVELOP ALTERNATIVES TO A PLANNING LEVEL
• O&M – DON’T FORGET SLUDGE
• REVENUE REQUIREMENTS/BILLING RATES
QUESTIONS

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