NOTICE
OF
MEETING

A BOARD OF DIRECTORS MEETING

OF THE

Inland Empire Utilities Agency

A MUNICIPAL WATER DISTRICT

WILL BE HELD ON

WEDNESDAY, JUNE 4, 2014
10:00 A.M.

AT THE OFFICE OF THE AGENCY
6075 KIMBALL AVENUE, BUILDING A
CHINO, CA 91708

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

AGENDA

MEETING
OF THE
BOARD OF DIRECTORS

WEDNESDAY, JUNE 4, 2014
10:00 A.M.

INLAND EMPIRE UTILITIES AGENCY*
AGENCY HEADQUARTERS
6075 KIMBALL AVENUE, BUILDING A
CHINO, CALIFORNIA 91710

CALL TO ORDER
OF THE INLAND EMPIRE UTILITIES AGENCY BOARD OF DIRECTORS MEETING

FLAG SALUTE

PUBLIC COMMENT

Members of the public may address the Board on any item that is within the jurisdiction of the Board; however, no action may be taken on any item not appearing on the agenda unless the action is otherwise authorized by Subdivision (b) of Section 54954.2 of the Government Code. Those persons wishing to address the Board on any matter, whether or not it appears on the agenda, are requested to complete and submit to the Board Secretary a "Request to Speak" form, which are available on the table in the Board Room. Comments will be limited to five minutes per speaker. Thank you.

ADDITIONS TO THE AGENDA

In accordance with Section 54954.2 of the Government Code (Brown Act), additions to the agenda require two-thirds vote of the legislative body, or, if less than two-thirds of the members are present, a unanimous vote of those members present, that there is a need to take immediate action and that the need for action came to the attention of the local agency subsequent to the agenda being posted.

1. **BOARD WORKSHOPS**

   A. **NON-RECLAIMABLE WASTEWATER SYSTEM FY 2014/15 PROPOSED RATES WORKSHOP**

   B. **ASSET MANAGEMENT WORKSHOP**

2. CLOSED SESSION

A. PURSUANT TO GOVERNMENT CODE SECTION 54956.9 – CONFERENCE WITH LEGAL COUNSEL - ANTICIPATED LITIGATION

One (1) Case

3. ADJOURN

*A Municipal Water District

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact the Board Secretary (909) 993-1736, 48 hours prior to the scheduled meeting so that the Agency can make reasonable arrangements.

Proofed by: CR

Declaration of Posting

I, April Woodruff, Board Secretary of the Inland Empire Utilities Agency*, A Municipal Water District, hereby certify that a copy of this agenda has been posted by 5:30 p.m. at the Agency's main office, 6075 Kimball Avenue, Building A, Chino, CA on Thursday, May 29, 2014.

for [signature] #853

April Woodruff

Inland Empire Utilities Agency

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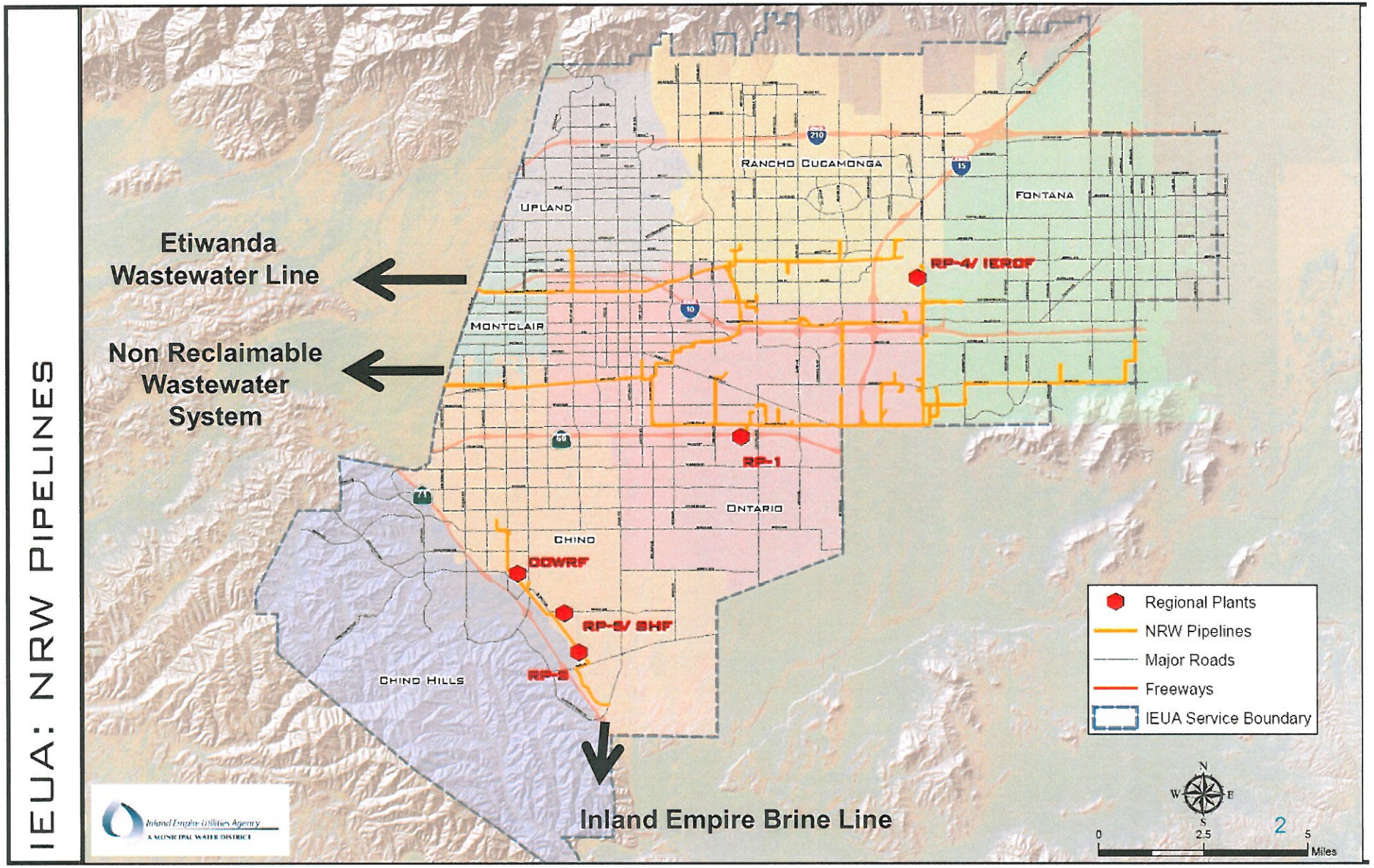
Non-Reclaimable Wastewater System FY 2014/15 Proposed Rates

June 4, 2014

NRWS


IEUA: NRW PIPELINES
Etiwanda Wastewater Line
Non Reclaimable Wastewater System
Inland Empire Brine Line
RANCHO CUCAMONGA
FONTANA
UPLAND
MONTCLAIR
ONTARIO
CHINO
CHINO HILLS
RP-4/ IEROF
RP-1
DOWRF
RP-2/ SHF
RP-3
Regional Plants
NRW Pipelines
Major Roads
Freeways
IEUA Service Boundary
Inland Empire Utilities Agency
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0
2.5
5
Miles

CSDLAC-IEUA Agreement

- **Effective date: July 1, 2014**
- **30 Years plus up to 4 additional 5 year options (50 years)**
- **15,000 New Capacity Units (CU) for IEUA**
  - Capacity Unit (based on flow and strength)
- **New Rates**
  - Volume
  - Strength (COD & TSS)
  - Peak Flow

What is different?

Pass-Through Components	CURRENT	NEW
4R Capital Charges	✓	✗
Flow	✓	✓
Peaking Factor (PF) ($PF = 2\ x\ Avg.\ gpm$)	✗	✓
COD	✓ (Above threshold)	✓ (No threshold)
TSS	✓ (Above threshold)	✓ (No threshold)
Solids Discrepancy	✗	✓
Ad-Valorem Tax	✗	✓

CSDLAC Proposed Rates FY 14/15

- **All Inclusive CSDLAC Expenses**
  - 5% Ad Valorem Tax

Parameter	FY 13/14 Rates	FY 14/15 Proposed Rates
Flow	$1,437.49 / MG	$836 / MG
COD	$110.81 / klb (>725 mg/L)	$147.84 / klb
TSS	$294.21 / klb (>308 mg/L)	$418.22 / klb
Peak	None	$317.54 / MG

Capacity Unit (CU) Allocation

- **CU based on Flow, COD and TSS**
- **Existing Industry allocated CU at no cost based on:**
  - 2013 data and/or request by Industry up to Historical Maximum
  - Minimum of 25 CU
  - Industry able to adjust CU up to June 2018
- **Purchase or Lease Options available for both existing and new industries**
- **No instantaneous discharge limit***

*** Instantaneous limit maybe applied if there is a safety risk or surcharge conditions of the NRWS.**

IEUA Program Costs

- **Determined by dividing total costs by allocated CU**
  - **O&M charges**
    - Labor, chemical, utilities, special projects, etc.
    - Proposed for FY 14/15: **$2.8 Million**
    - IEUA charges based on **13,057** allocated CU:
      $ 17.87 / CU / month
  - **Deferred 4R charges**
    - Proposed for FY 14/15: **$1.2 Million**
    - Deferred charges based on 470 current CU:
      $212.60 / Current CU / month
- **Deferred CIP costs recoverable over the next 5 years**
- **SRF loan of $4.1M to be paid from the NRWS reserve**

NRW FY 2014/15 IEUA Capital Outlay Recovery

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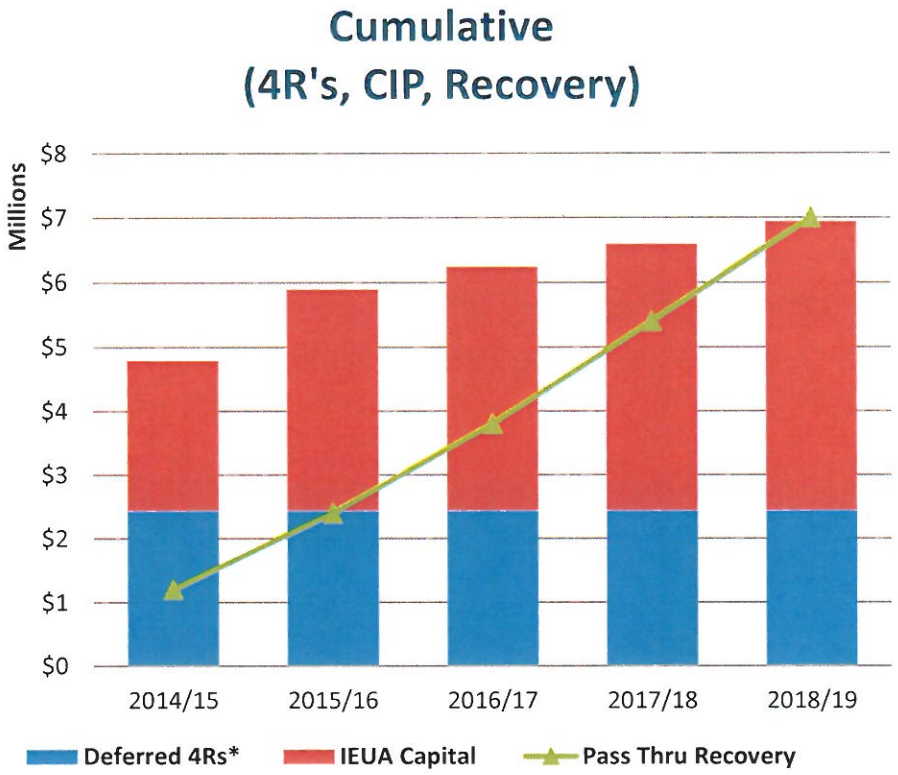
- **Full recovery estimated by FY 2018/19**
  - Deferred CSDLAC 4Rs $2.4M
  - IEUA Capital Projects $4.5M

  - 5 years recovery for $7M (4Rs and IEUA Capital) to mitigate impact on industries



** Deferred 4RS is FY 2011/12 to FY 2013/14 amount billed from CSDLAC for $5,487,722 less industry payments for $3,048,695*

NRWS Solids Discrepancy

- **Imbalance between industries and East End is significant**
- **IEUA retained Trussell Technologies to study and help develop formula to distribute charges fairly based on:**
  - Alkalinity,
  - BOD5, and
  - Calcium (Dissolved)

IEBL and EWL

- **Rate Structures basically unchanged**
  - **SAWPA pass-through rates increase**

Parameter	FY 2013/14	FY 2014/15 Proposed	% Change
Capacity	$318.49	$334.43	5.0%
Flow	$736.00	$777.00	5.6%
BOD5	$266.00	$295.00	10.9%
TSS	$395.00	$411.00	4.1%

  - **EWL pass-through rates billed Sep-Oct**
    - No significant changes in rates

Recycled Water Usage Credit

- RW usage credit program to end no later than June 30, 2024
- Credit to start at 50% of IEUA's direct sale of recycled water rate for FY 14/15 at $890.04 per MG used (rate *locked* throughout the program)
- Credit to decline in 5% intervals every year thereafter
- Credit based on actual RW usage

Fiscal Year	RW Credit	Credit per MG RW Used
14/15	50%	$445.00
15/16	45%	$400.50
16/17	40%	$356.00
17/18	35%	$311.50
18/19	30%	$267.00
19/20	25%	$222.50
20/21	20%	$178.00
21/22	15%	$133.50
22/23	10%	$89.00
23/24	5%	$44.50

Questions

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Asset Management Presentation

June 2014

Jeff Noelte

Deputy Manager of Technical Services

Agenda

- Asset Life Cycle Cost
- 2013 America's Infrastructure 2013 Report by ASCE
- Asset Management Plan
- Asset Health Management Program
- Capital Improvement Projects Optimization
- Summary

Asset Life Cycle Cost

Capital Cost

- Design
- Construction
- Start-up

O&M Cost

- Operations
- Replacement and Rehabilitation
- Condition Assessment
- Energy Usage
- Environmental Compliance
- Disposal

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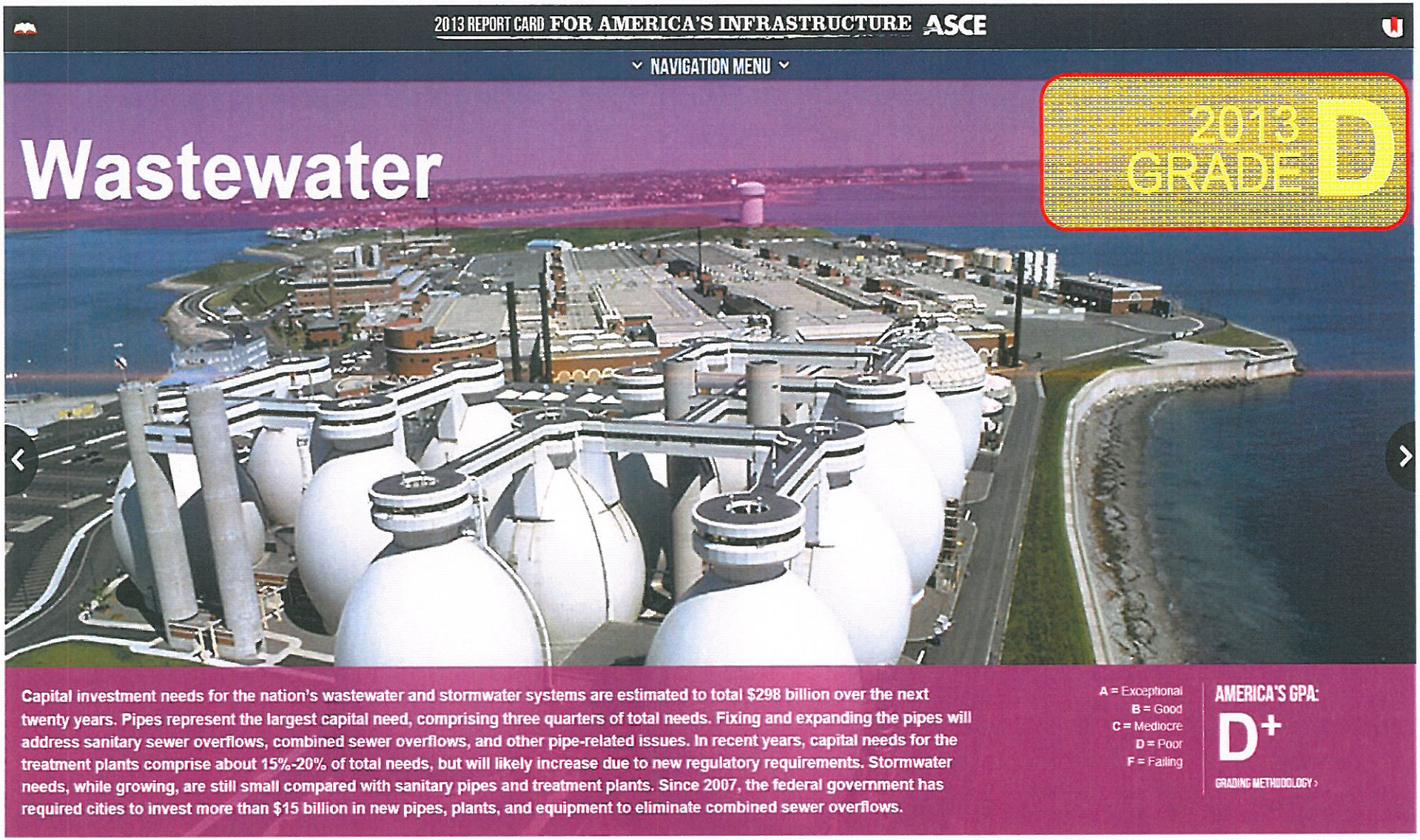
2013 America's Infrastructure Report Card

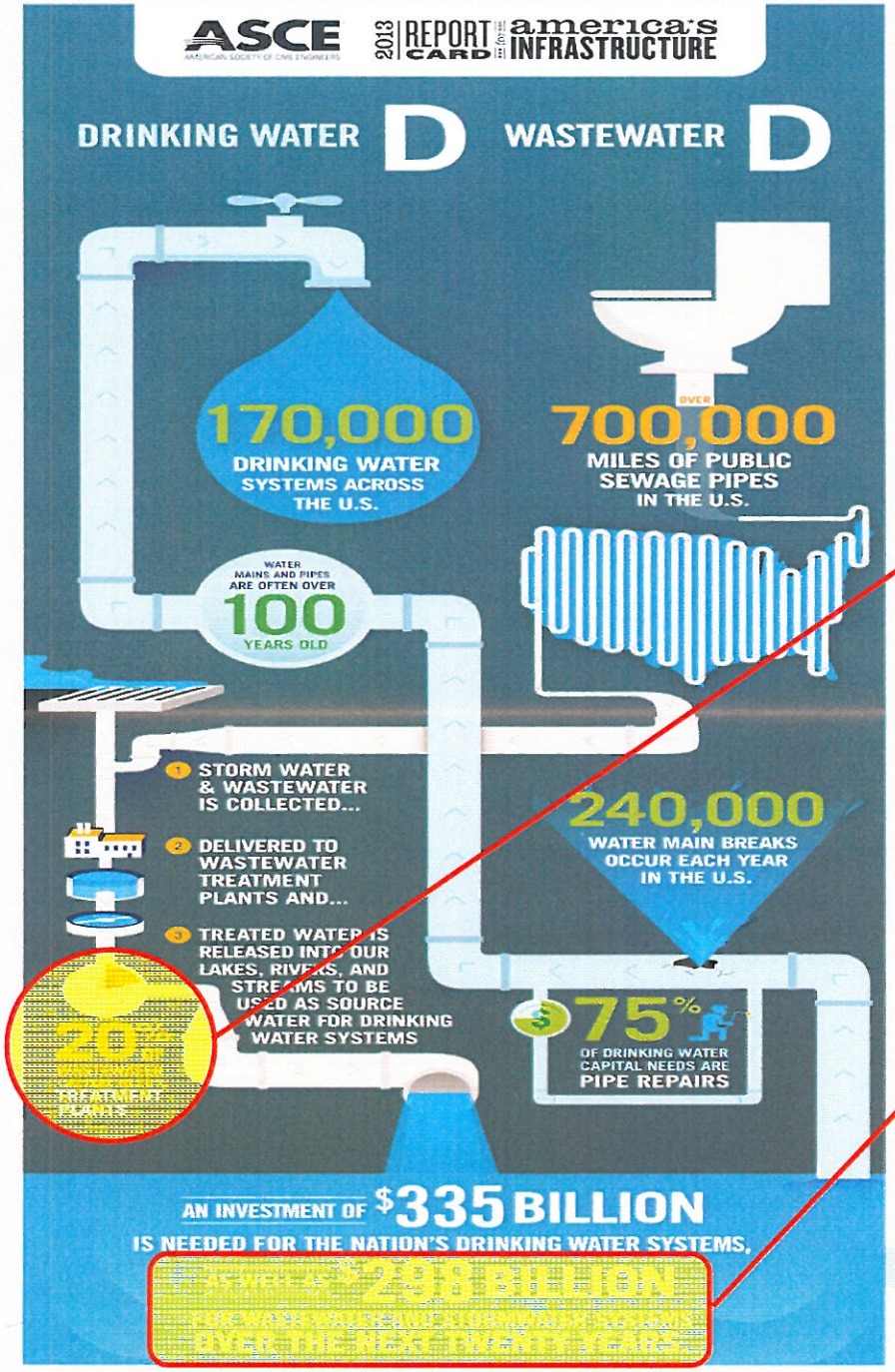
2013 REPORT CARD for America's INFRASTRUCTURE

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Every 4 years, the American Society of Civil Engineers releases a Report Card for America's Infrastructure that depicts the condition and performance of the nation's infrastructure in the familiar form of a school report card by assigning letter grades to each type of infrastructure.

ASCE 2013 Report for America's Infrastructure





Report Highlights

20% of Capital Needs will be spent on treatment plants over the next 20 years.

$298B of total investment is needed to rehab the country's wastewater and storm water systems over the next 20 years.

Report Card for **IEUA**

Example of Recent System Failures

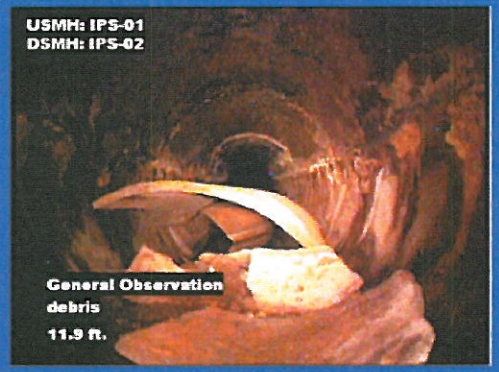
RP-1 Recycled Water Pipeline Break

Pipe leakage due to corrosion

RP-1 Primary Effluent Pipe Failure

Pipe External Damage

Pipe Internal Damage



RP-1 Influent Splitter Box

Weakened concrete, exposed aggregate

Corrosion and section loss on valve stem support bracket

What needs to be done?

- **Plan to manage risk**
- **Quantify**
- **Communicate**
- **Fully fund Repair and Rehabilitation (R&R) projects**

AMP Development Cost

- In-house: about 2,500 hours of staff time – corresponds to about $250k
  - Six staff members were key AMP authors

- Estimated effort to outsource: $1-3 million for consultant fees, plus $100k for internal staff time

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Asset Management Plan

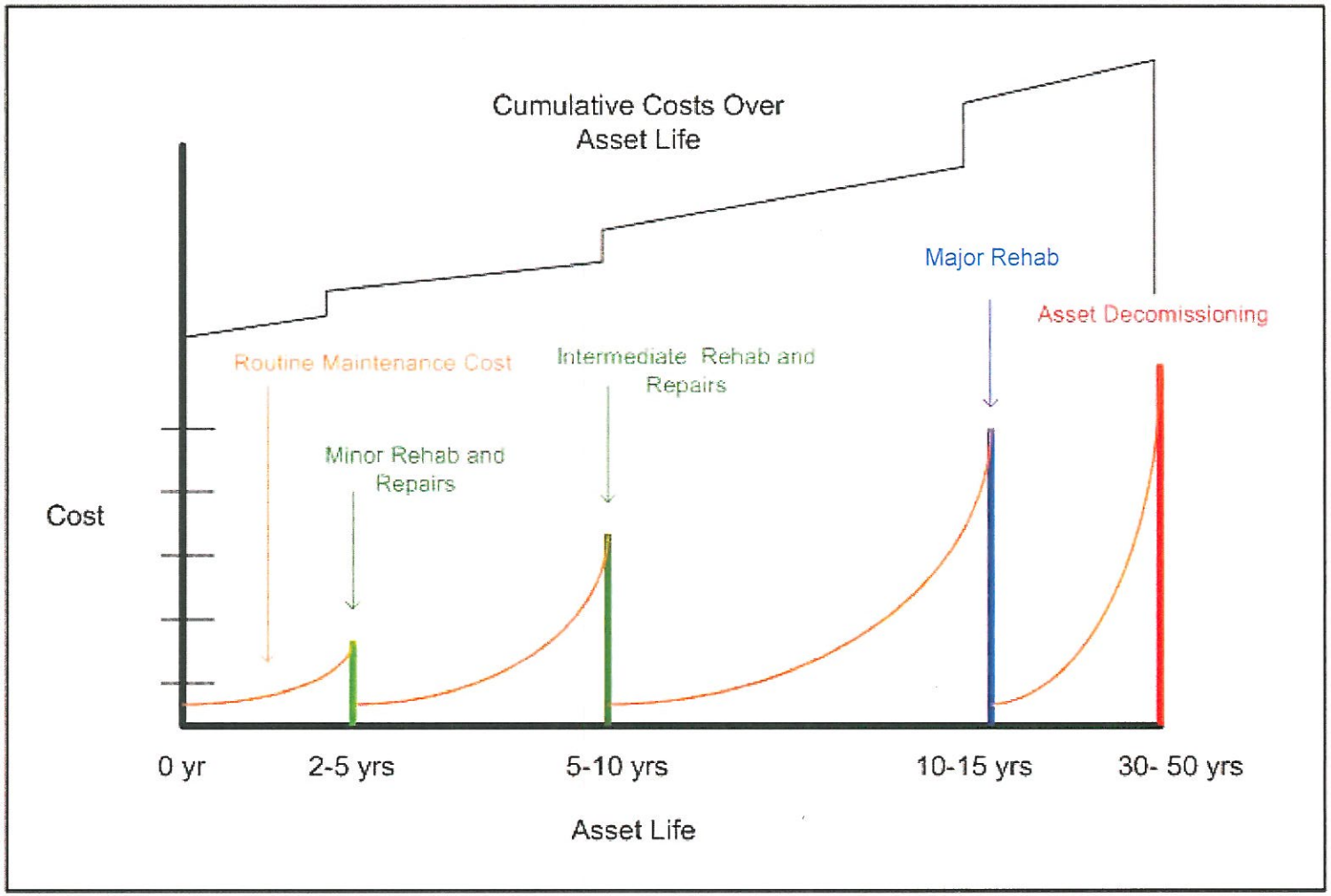
Presentation Overview

- Asset Management (AM) Terms and Definitions
- Asset Management Plan (AMP) Development
- AM System Summaries – TYCIP and Condition Assessment
- AMP Schedule

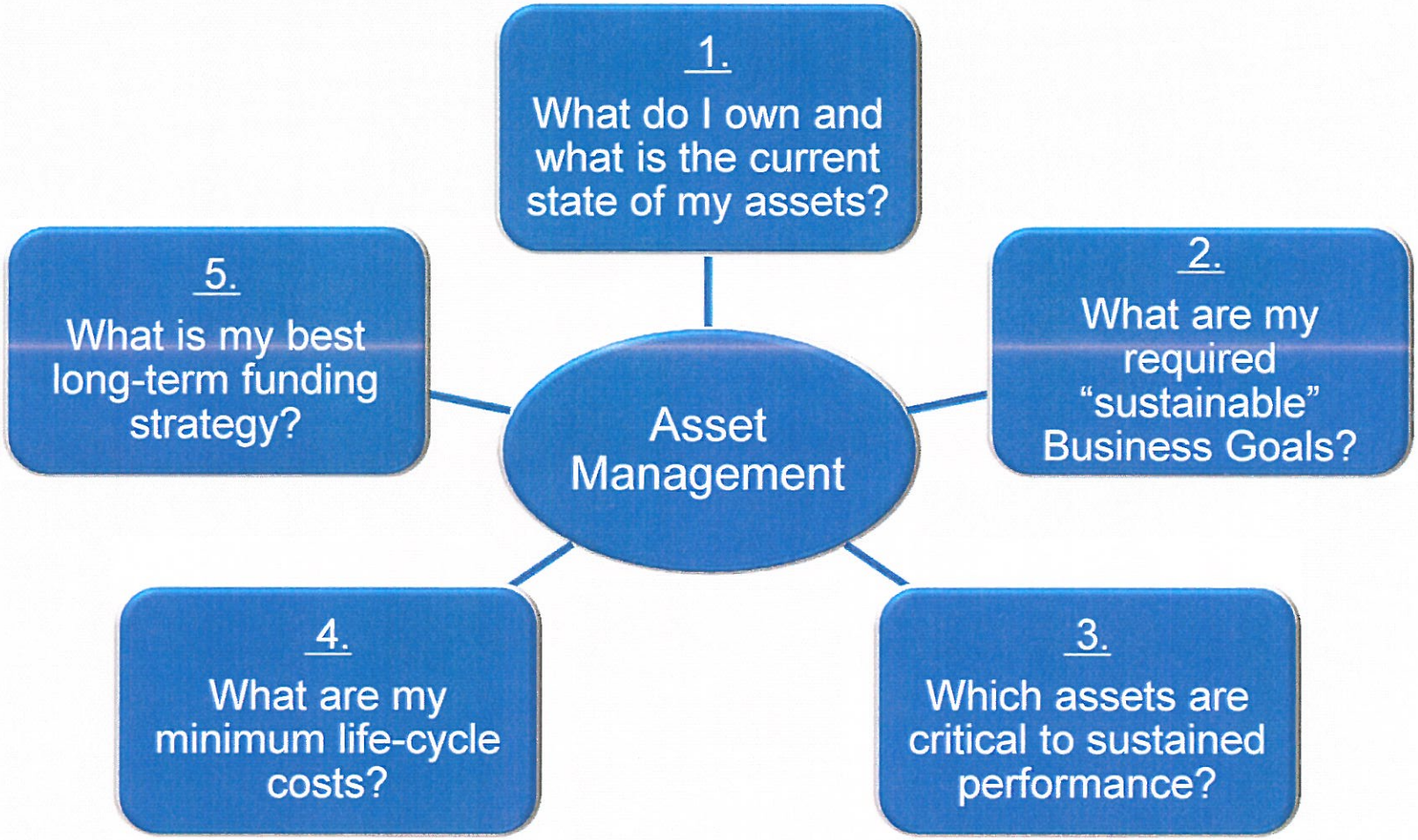
Asset Management Definition

"An integrated set of processes to minimize the life-cycle costs of infrastructure assets, at an acceptable level of risk, while continuously delivering established levels of service."

Life Cycle Cost of an Asset



Asset Management: Five Core Questions



Asset Management Drivers

- Improve decision making
- Understand and manage risk better
- Lower costs
- Better planning of projects

Purpose of Asset Management Plan (AMP)

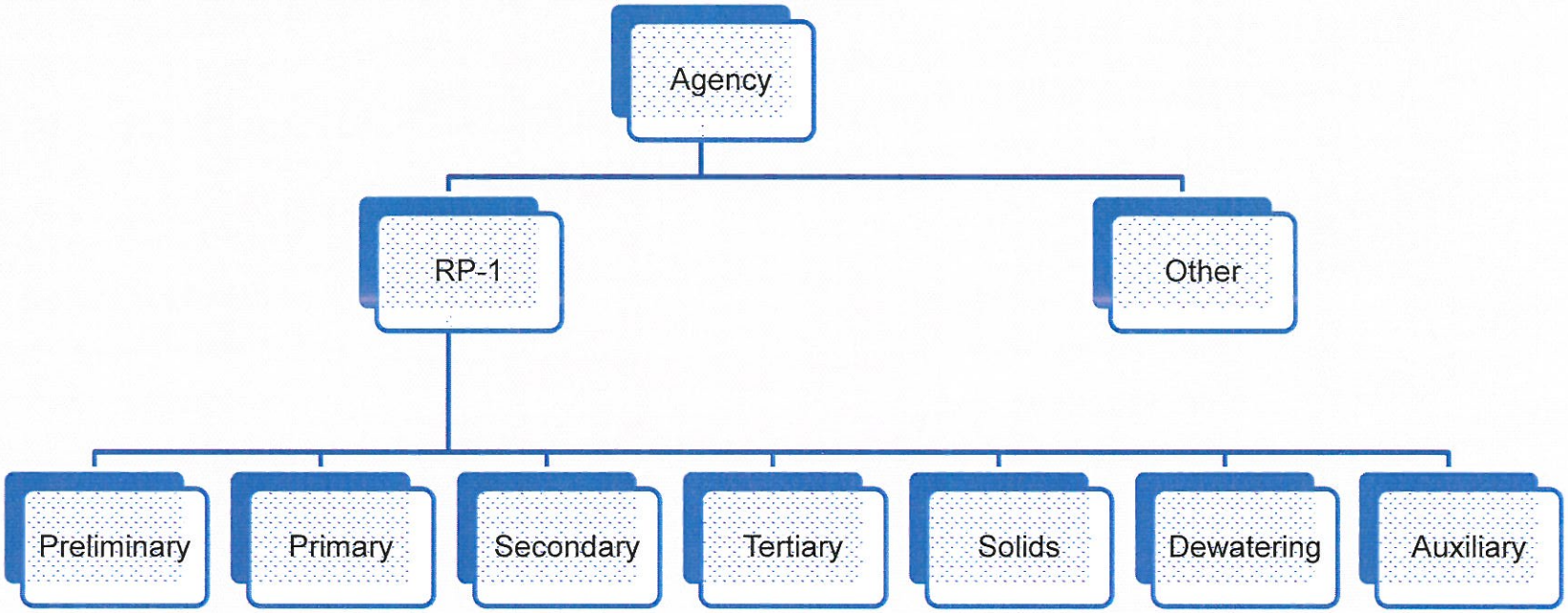
- Communicate to external as well as internal stakeholders
- Accurately describe Agency assets and their condition (Condition Assessments)
- Communicate future funding requirements and projects to manage assets in a manner appropriate for meeting Business Goals

AMP Content

1. Introduction
2. Agency Overview
3. Business Goals
4. Future Demand & Growth
5. Asset Management System Summaries
6. State of the Assets Summary
7. Long Term Asset Management

AM System Summaries

Hierarchy of Assets



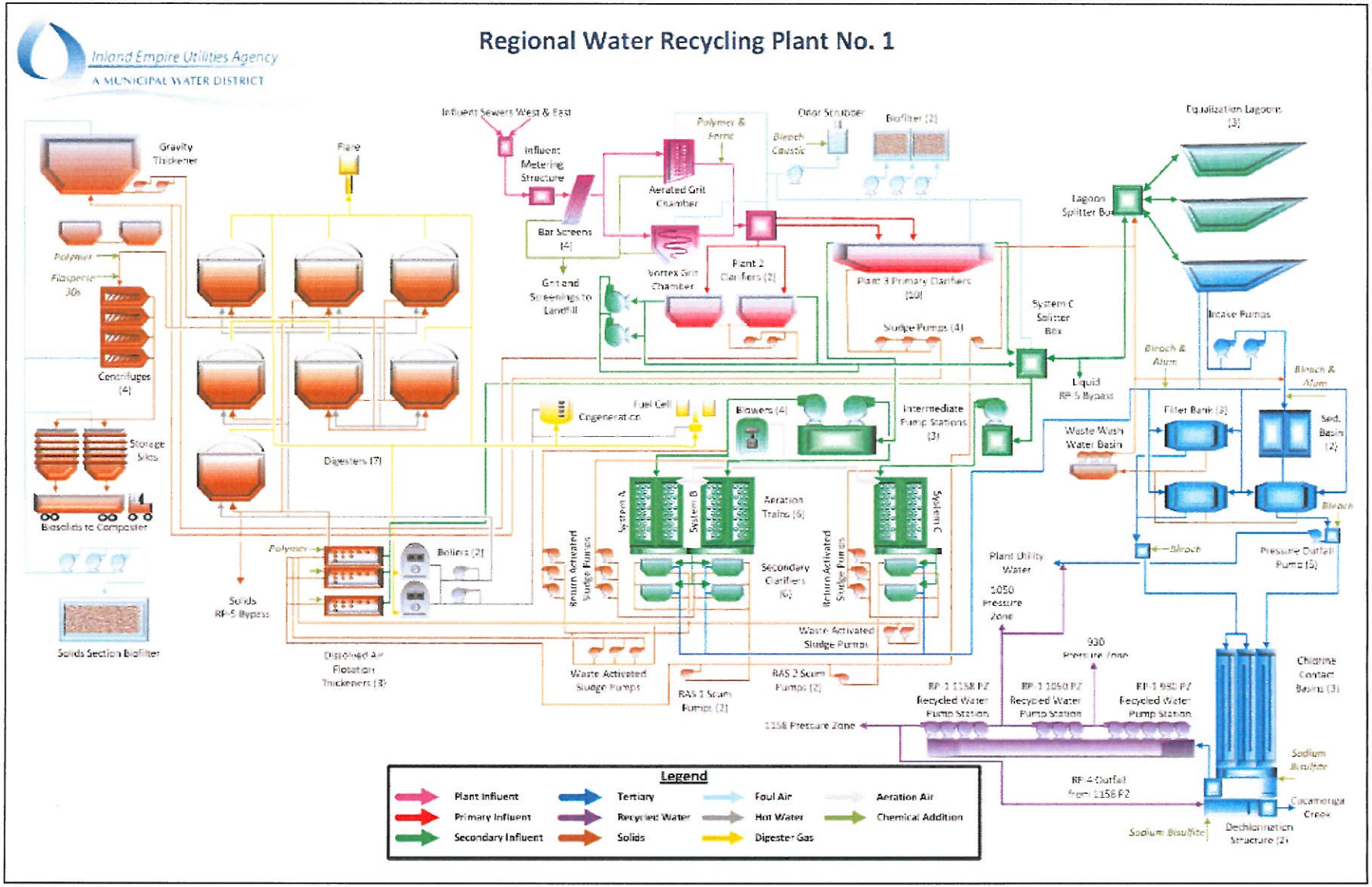
AM System Summaries

Organization of Information

- Overall Process Flow Schematic
- Table of Projects relevant to System
- Summaries "sheets" for each treatment process
  - Asset Profile
  - Capacity Profile
  - Asset Ratings
  - Key Issues
  - History of Select Assets
  - Potential Projects

RP-1 Process Flow Schematic

- Refer to handout



RP-1 List of Projects

- Refer to handout

Table 5-2: Regional Water Recycling Plant No.1 – Project Summary Table

#	Project Number[1]	Project Name	Project Description	Project Type[2]	Fund[3]	Fiscal Year Budget (Dollars)										
						14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	Ten Year Total
1	EN11039	TP-1 Disinfection Pump Improvements	Engineering project to upgrade dosing facilities at OES and NES to allow full post filtration chlorination.	RP	RC	95,000	225,000	0	0	0	0	0	0	0	0	320,000
2	EN12022	RP-1 Aeration Ducting Rehab	Project to repair leaks in aeration ducting system	RP	RC	25,000	0	0	0	0	0	0	0	0	0	25,000
3	EN13046	RP-1 Flare System Improvements	Project to upgrade the flare control system and increase flare capacity. Evaluation being done to determine design intent.	RP	RC	0	0	1,550,000	1,850,000	0	0	0	0	0	0	3,400,000
4	EN14019	RP-1 Headworks Rehab (aka Headworks Gate Replacement)	Engineering project to comprehensively rehab and upgrade the Preliminary Treatment Process. Start design in FY18/19.	CC	RC	0	0	210,000	1,500,000	6,000,000	2,800,000	0	0	0	0	10,510,000
5	EN14020	RP-1 Sludge Thickening Upgrades	Project to upgrade the sludge thickening processes for primary and secondary sludge. Start design in FY18/19.	CC	RC	0	0	0	0	240,000	1,250,000	3,478,000	3,478,000	0	0	8,446,000
6	EN15019	RP-1 Odor Control Improvements	Odor control improvements (clarifier covers, foul air equipment, etc)	CC	RC	100,000	550,000	0	0	0	0	0	0	0	0	650,000
7	EN19007	RP-1 Flow Equalization Upgrade and Odor Control	Scope will be determined by findings of Master Plan update. Potential project to address odor related to equalizing primary effluent.	CC	RC	0	0	0	0	1,000,000	0	0	0	0	0	1,000,000
8	EN15020	RP-1 Plant 3 Primary Scum Well Upgrade	Potential project to address scum pumping capacity issues, as well as, evaluate MCC in primary pumping gallery.	CC	RC	75,000	325,000	0	0	0	0	0	0	0	0	400,000
9	EN18004	RP-1 IPS System Improvements	Project to address deficiencies in system (e.g., replace eddy clutches with VFDs)	CC	RC	0	0	0	250,000	750,000	0	0	0	0	0	1,000,000
10	EN20006	RP-1 Digester Mixing Upgrade	Potential Engineering project to upgrade the digester mixing systems. Start design in FY19/20.	CC	RC	0	0	0	0	0	250,000	500,000	500,000	500,000	500,000	2,250,000
11	EN15012	RP-1 East Primary Effluent Pipe Rehab	Rehab of the east primary effluent piping between the rectangular primary clarifiers and the Intermediate Pump Station wet well.	CC	RO	600,000	150,000	0	0	0	0	0	0	0	0	750,000
12	EN15013	RP-1 TWAS and Primary Effluent Piping Replacement 2014	Failures in the TWAS and primary effluent piping require pipe to be replaced.	CC	RO	400,000	100,000	0	0	0	0	0	0	0	0	500,000

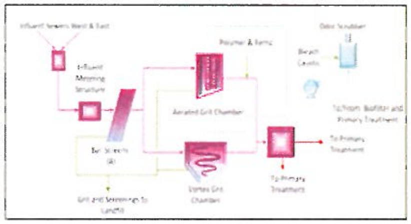
(1) Project Number – from Ten Year Capital Improvement Project: Final Capital Project List 03-17-2014
(2) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)
(3) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RCA), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)

Asset Condition Summary and Ratings

Asset Management System Summary – RP-1

Preliminary Treatment Process

1. Asset Profile



Influent Channel and Metering Station
Two main trunk lines (east and west) bring influent sewer flows into RP-1 through the influent structure with gates to divert flow to either of two Parshall flume flow meters. Flow from the Influent Metering Station enters a common channel before the Bar Screening Structure.

Screening Equipment
Gates divert flow to six channels, four mechanical climber bar screens, one manual bar screen and one bypass channel. The 5/8 inch spaced bar screens hold large debris from flowing to downstream processes. A mechanical climber rake collects debris and drops the screenings on the Screening Conveyance/Disposal System. Liquid flow passes through the bar screen into a common channel that feeds the grit removal systems.

Aerated Grit System
Flow enters a series of three square Aerated Grit Chambers (AGC) through five gates. Three air lift pumps, supplied by two air blowers, pump collected grit up to the Grit Washing/Disposal system. Air from the blowers also provides air for agitation. Liquid flows pass through gates to a common channel and then to the Headworks Splitter Box.

Vortex Grit System
Flow from the Bar Screens is directed to the influent of the circular Vortex Grit Chamber. A paddle mixer pushes flow in a circular path; grit collects at the bottom where it is pumped to the Grit Washing/Disposal System.

Grit Washing/Disposal System
Grit pumped from the AGC and Vortex Grit Chamber enter the Headworks building where it flows to two grit classifiers. The grit sinks to a submerged screw which pulls the grit out of the water and drops grit into two Screw conveyors. The conveyors lift and transport the grit to a roll off bin. The excess liquid spills out of the grit classifiers and is directed back to the Bar Screen Structure effluent channel.

Screenings Conveyance/Disposal System
Screenings collected by the Bar Screens are transported by a conveyor and dropped into a hydraulic compactor. The compactor compresses the collected screenings, squeezes out excess water and pushes the screenings to the roll off bin.

Ferric Chloride System
Ferric Chloride is added to the liquid flow after grit removal to enhance Primary Treatment and to control sulfide emissions. Ferric Chloride can also be valved to the Digesters. The ferric station consists of a truck filling station, storage tank, three chemical metering pumps and associated piping.

Polymer System
Polymer is added the liquid flow after grit removal to enhance Primary Treatment. The Polymer System includes a tote stand, chemical metering pump, mixing chamber and associated piping.

Headworks Splitter Box
The Headworks Splitter Box receives flow from both grit systems, the bar screens structure bypass and the overflow from the Solids Section gravity thickener. Flow can be diverted to the Plant 3 rectangular clarifiers or to the Plant 2 circular clarifiers for Primary Treatment.

Odor Scrubber
Foul air collected in the preliminary and primary treatment processes is forced through the odor scrubber tower with plastic porous media where a solution of bleach and caustic soda trickles against the air flow to oxidize hydrogen sulfide and other compounds. The Odor Scrubber is used to supplement the foul air treatment provided by the Biofilter.

2. Capacity Profile

Table 1 Capacity by System

System Sub System(s)	Design Capacity (Dry Weather Average)	Notes
Preliminary Treatment Process	44 MGD	
Influent Channel and Metering Station East Sewer West Sewer Parshall Flumes Gates	 42 inch 42 inch 2 @ 55 MGD 2 units	 Per Unit
Screening Equipment Mechanical Screen Manual Screen Gates	 4 @ 27.5 MGD 2 @ 27.5 MGD 15 units	 Per Unit
Aerated Grit System Chambers Pumps Blowers Gates	 1 @ 44 MGD 3 @ 150 gpm 2 @ 360 scfm 10 units	 Per Unit Per Unit
Vortex Grit System Chamber Pump Gates	 1 @ 20.4 MGD 1 @ 300 gpm 4 units	
Grit Washing/Disposal System Classifiers Conveyors	 2 @ 300 gpm 2 @ 3 wet tons per hr	 Per Unit Per Unit
Screening Conveyance/Disposal System Conveyor Compactor	 5.0 hp 5.0 hp	
Ferric Chloride System Tank Pumps	 13,000 gallons 3 @ 37.4 gph	 Per Unit
Polymer System Pump	 1 @ 4.5 gph	
Headworks Splitter Box Gates	 3 units	
Odor Scrubber Blowers Valves	 2 @ 8,000 scfm 2 units	 Per Unit > 18 inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent 5 = Poor			
	Condition	Redundancy	Function	Reliability
Influent Channel and Metering Station	3	2	3	3
Screening Equipment	3	2	3	3
Aerated Grit System	3	3	4	3
Vortex Grit System	3	3	4	3
Grit Washing/Disposal System	3	3	3	3
Screening Conveyance/Disposal System	4	3	3	5
Ferric Chloride System	3	3	3	3
Polymer System	3	3	3	3
Headworks Splitter Box	3	5	3	3
Odor Scrubber	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues

Influent Channel and Metering Station
The east isolation gate leaks. In addition, there is currently no odor control directly tied into the influent channel. A project is being planned by Maintenance under EP14002 to replace the isolation gates.

Screening Equipment
The bar spacing allows a significant amount of debris to reach downstream processes. A substantial number of the gates are broken and inoperable. In addition, the foul air containment leaks, as evident by internal smoke tests. Project EN14018 will replace the broken and inoperable gates.

Aerated Grit System
The AGC allows large amounts of grit to pass through to downstream processes. Many of the gates are broken and inoperable. Project EN14018 will replace the broken gates and upgrade or replace the AGC.

Vortex Grit System
The Vortex grit chamber is not operated because the grit piping clogs frequently when it is in operation. A potential Maintenance project will rehab the system.

Grit Washing/Disposal
Recent failures of the classifier and the conveyor screws have indicated excessive wear from heavy use. The availability of spare parts results in parts from both systems being pieced together to have one working system. A potential Maintenance project will rehab the system.

Screenings Conveyance/Disposal
The conveyor equipment is corroded and has limited accessibility for cleaning and repair. The compactor needs to be replaced regularly (3-4 times per year). The Maintenance Project EP14002 will replace the screenings conveyor and compactor in 2014.

Ferric Chloride System
Ferric chloride system operates effectively but the equipment is approaching the end of its useful life. Project EN14018 will rehab the system.

Polymer System
This system will be rehabbed by Project EP14002 or EN14018.

Headworks Splitter Box
Many of the gates are broken and inoperable. Project EN14018 will replace these gates.

Odor Scrubber
The odor scrubber is a viable alternative if the Primary section biofilter needs to be taken offline. Project EN14018 will rehab the system.

Table 3 History of Select Assets

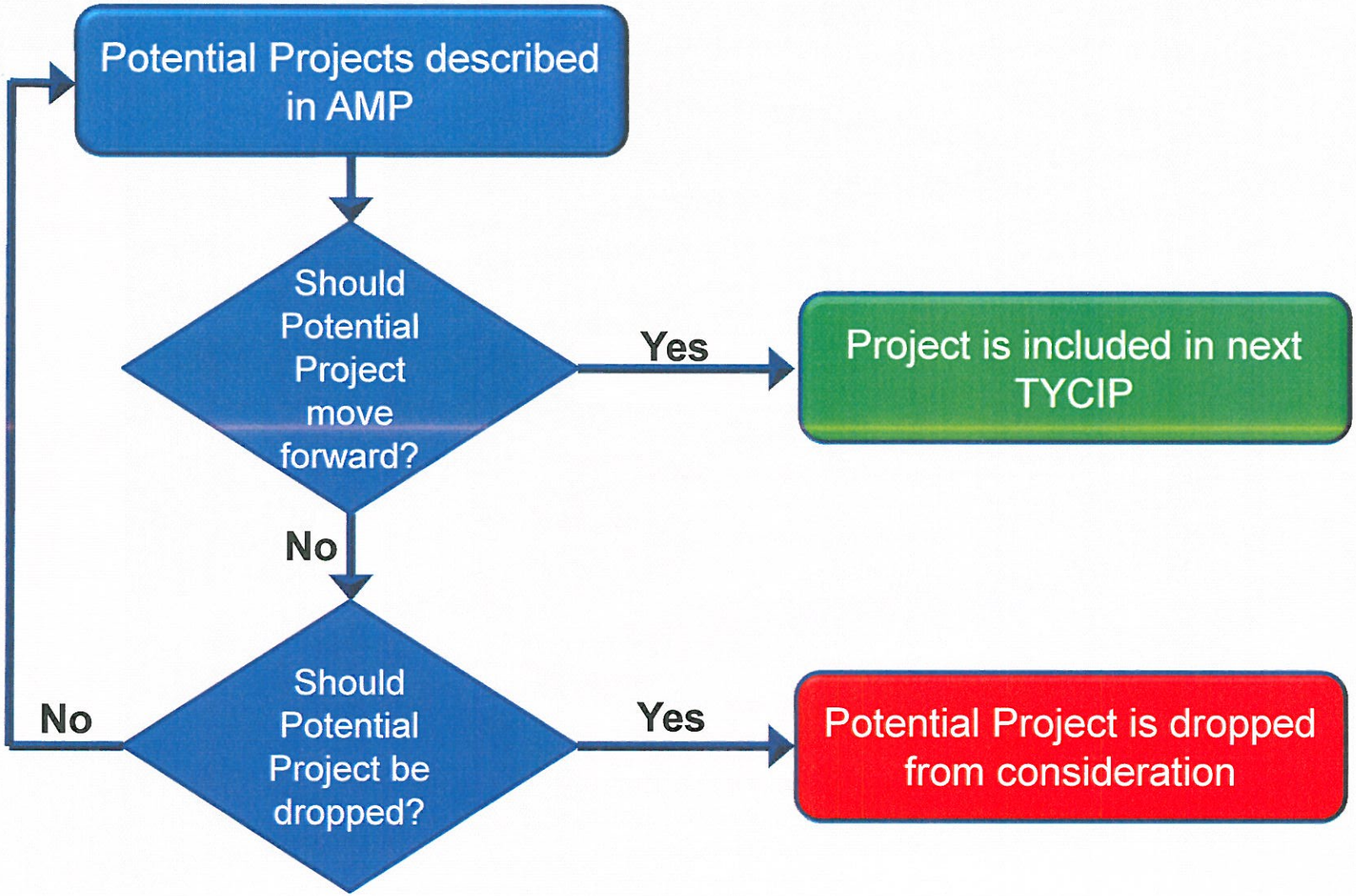
System	Capital Improvement Project Activity	Condition Assessment Report
Influent Channel and Metering Station	1977 1987	Planned 2014
Screening Equipment	1977 1987	Planned 2014
Aerated Grit System	1987	Planned 2014
Vortex Grit System	1987	
Grit Washing/Disposal System	1977 1987 2009	
Screening Conveyance/Disposal System	1977 1987	
Ferric Chloride System	1987 1992	
Polymer System		
Headworks Splitter Box	1977	Planned 2014
Odor Scrubber	1995	Planned 2014

Table 4 Potential Projects

System	Project Name	Project Description
Vortex Grit Chamber	RP1 Vortex Grit Chamber Rehab	Rehab and upgrade the Vortex Grit System

System Summary Continued on Next Page

AMP and TYCIP



AMP Schedule

- FY 2014-15 AMP is complete
- Development of FY 2015-16 AMP will begin October 2014

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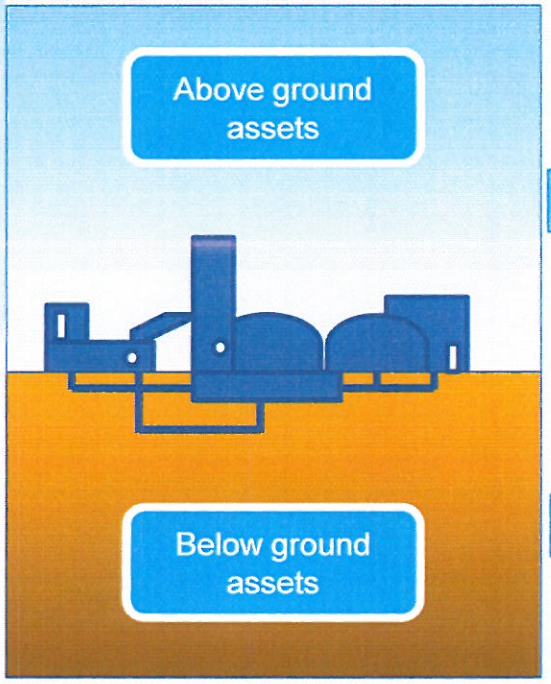
Asset Health Management Program

Asset Health Management as a Key Element of Asset Management Plan

Physical Assets



Asset Health Management Program

Condition Monitoring

- Vibration Analysis
- Lubrication Management and Analysis
- Motor Circuit Analysis
- Infrared Thermography
- Corrosion Assessment/Ultrasonic Testing

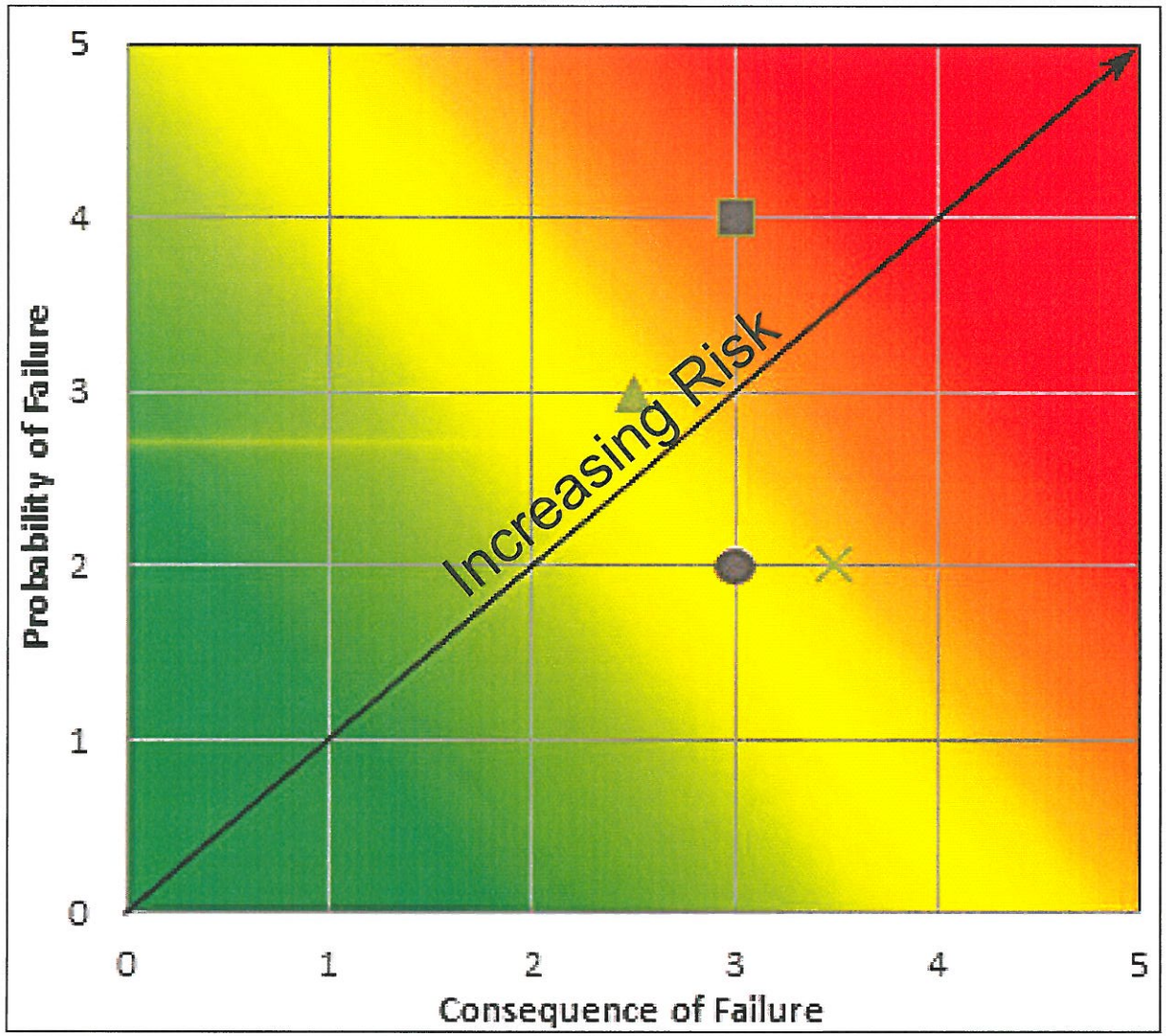
- Visual Inspection
- Corrosion Assessment
- Structural Condition Assessment

Asset Management Plan

- Repair and Rehabilitation Project Identification
- Capital Improvement Projects Prioritization
- Financial Planning

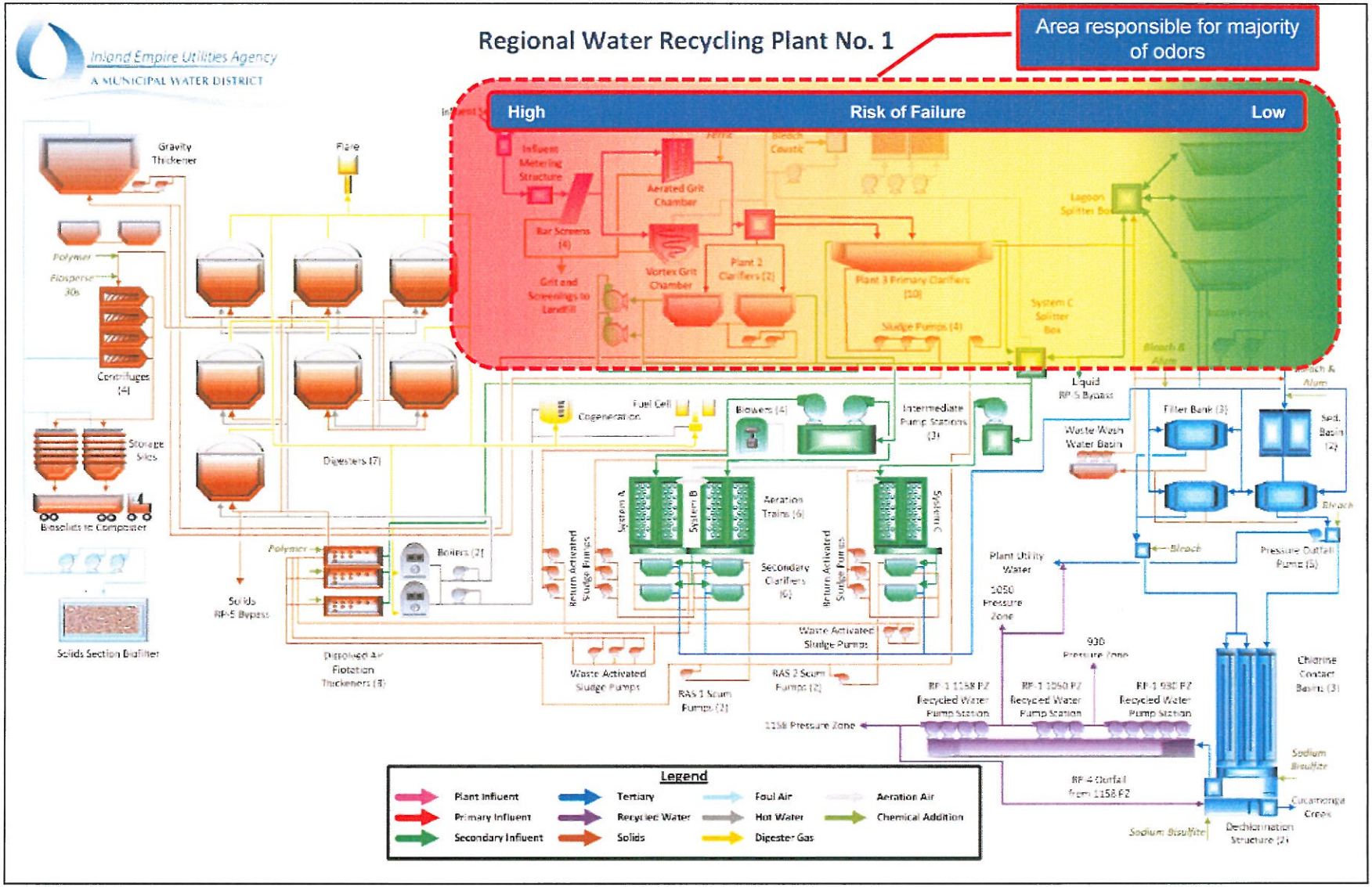
Condition Assessment Planning

Risk = (Probability of Failure) x (Consequence of Failure)



RP-1 Process Flow Schematic

- Refer to handout



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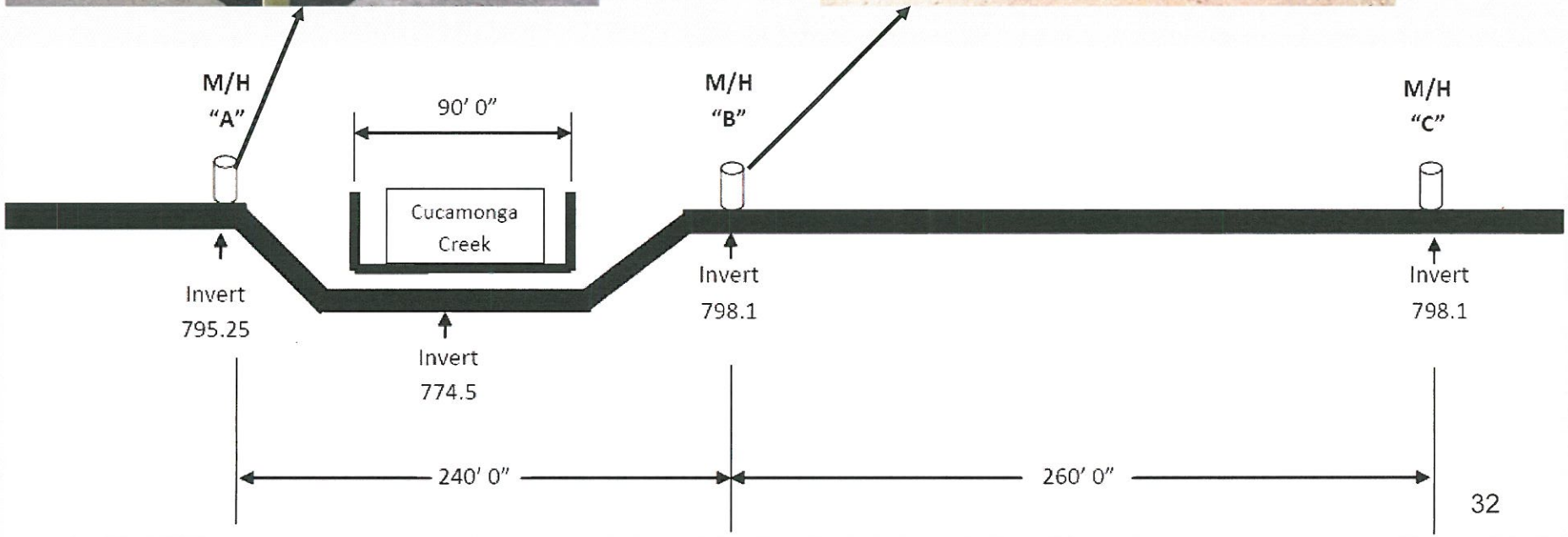
Below Ground Asset Condition Assessments

RP-1 Secondary Effluent Pipe Condition Assessment



RP-1 Secondary Effluent Pipe Condition Assessment (Cont.)

- **35-year-old cement mortar-lined & coated 60" Pipe**
- **Risk exposure**
  - Probability of Failure: High
  - Consequence of Failure: High
- **Inspection results**
  - Pipe in good condition
  - Expected to last another 30 years

RP-1 Primary Effluent 36-inch Pipe Condition Assessment

Figure 3 - Severe corrosion of welded steel cylinder at bladder valve vault pipe access point

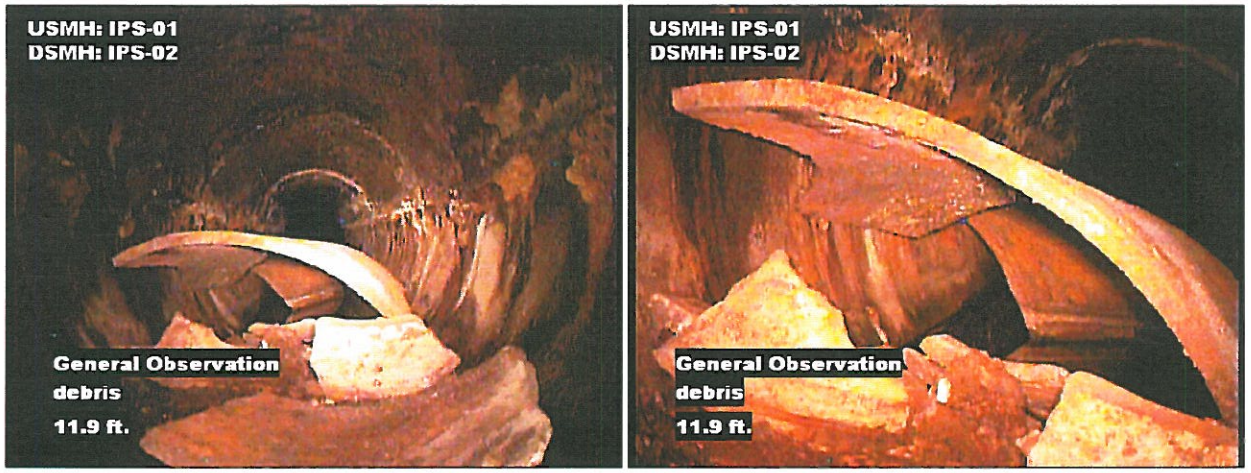
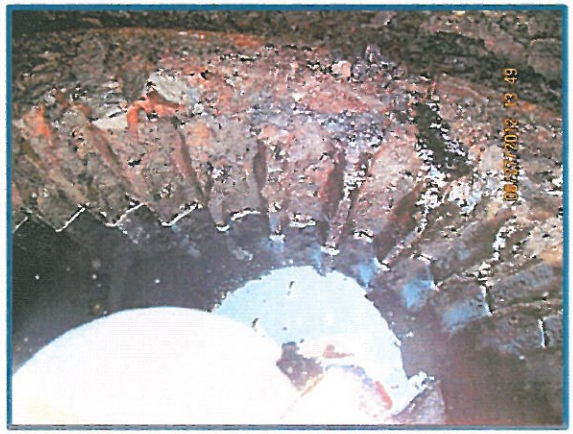


Figure 4 - Failed mortar lining debris encountered in pipeline

RP-1 Gravity Thickener Clarifier Condition Assessment

Clarifier tank interior

Clarifier drive main gear condition

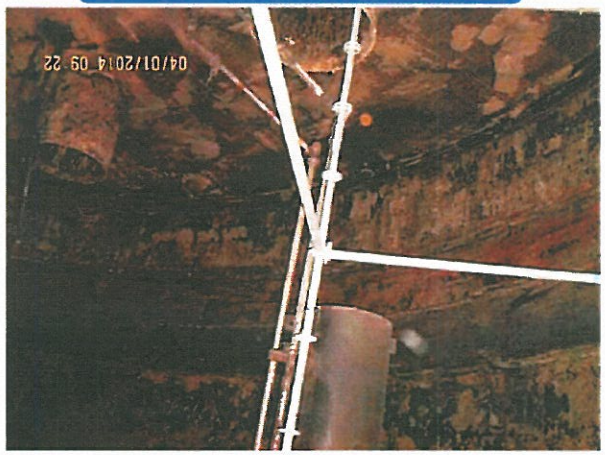


Ultrasonic thickness testing

Clarifier drive pinion gear condition

RP-1 Digester 4 Condition Assessment

Dome interior



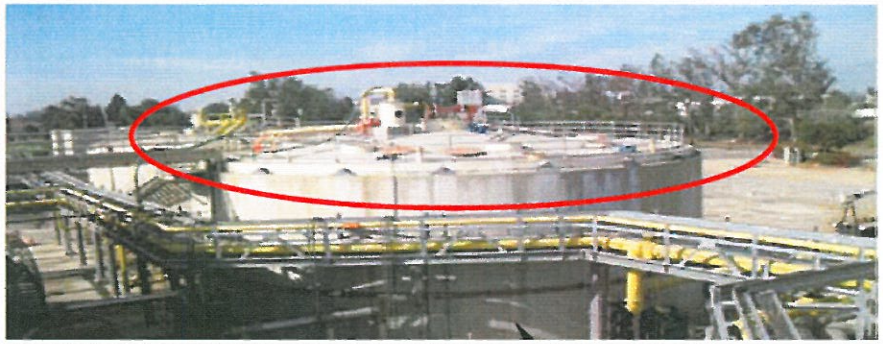
Dome interior

Digester interior wall

Digester manway

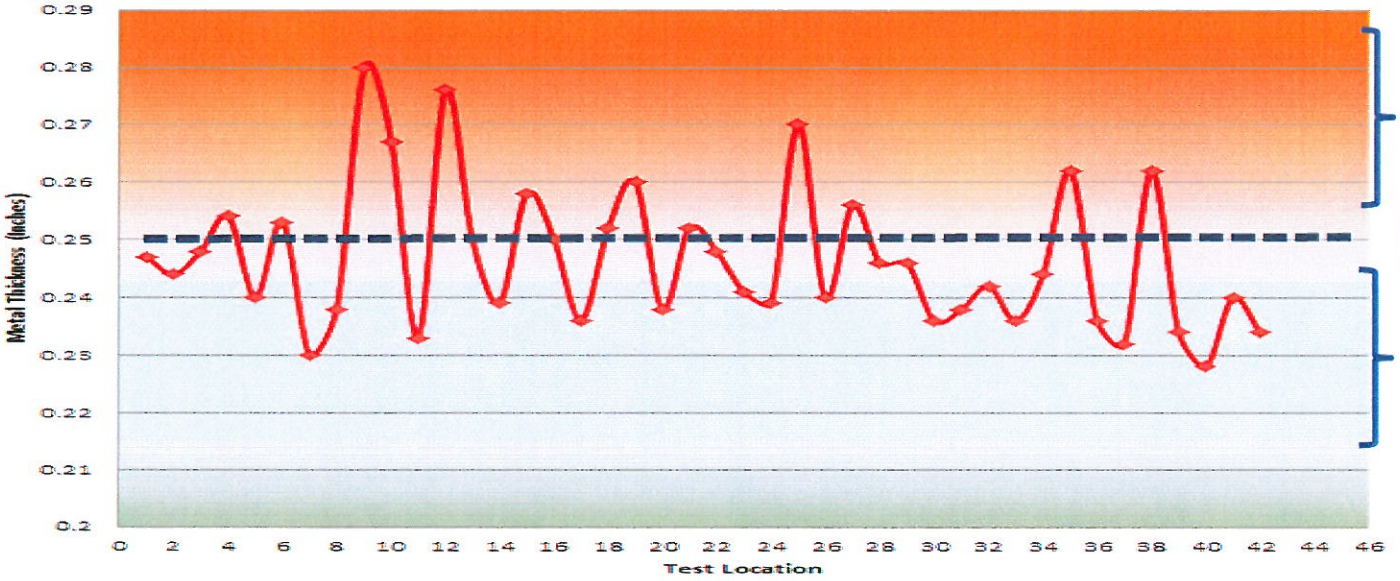
RP-1 Digester 4 Ultrasonic Testing

RP-1 Digester No. 4 Dome



Ultrasonic Thickness Gage

Digester #4 Dome Ultra Sonic Measurements



Blistered metal from undercoat corrosion

Original metal thickness (.25-inch)

Pitted metal from corrosion attack

Planned Condition Assessments

Facility	Process Area
RP-1	• Headworks • Grit chamber • Primary influent pipes • Primary effluent diversions structure. • IPS wet well
RP-4	• Headworks • Primary diversion structure and piping • Vortex grit chambers • Aeration basin (1train only)
RP-5	• Primary influent IPS (east/west) • Headworks • Primary effluent diversion structure
CCWRF	• Primary effluent well and piping • Mixed liquor return piping • Aeration basin

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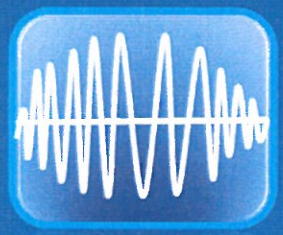
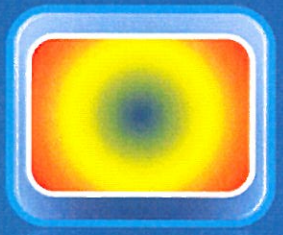
Above Ground Asset Condition Monitoring

Condition Monitoring Technology Used

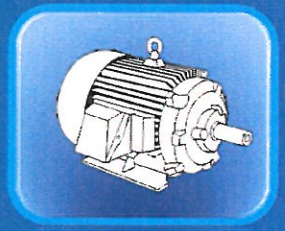


VIBRATION ANALYSIS

LUBE OIL ANALYSIS



INFRARED THERMOGRAPHY

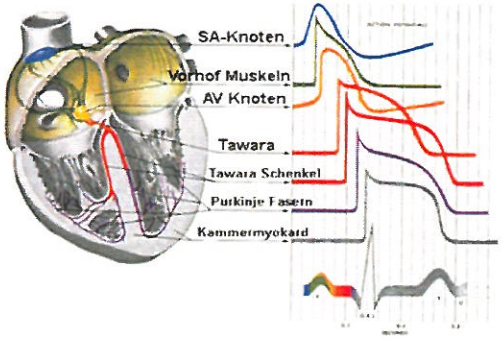


MOTOR CIRCUIT ANALYSIS

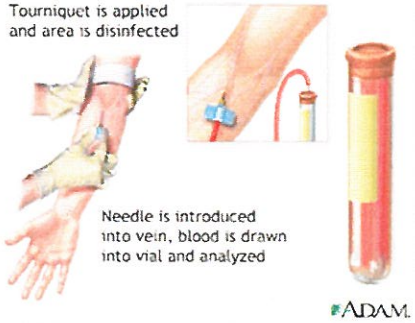
LASER ALIGNMENT

Medical Analogy for Condition Monitoring

EKG

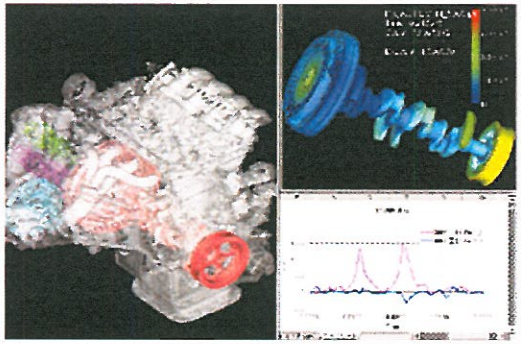


Blood Analysis



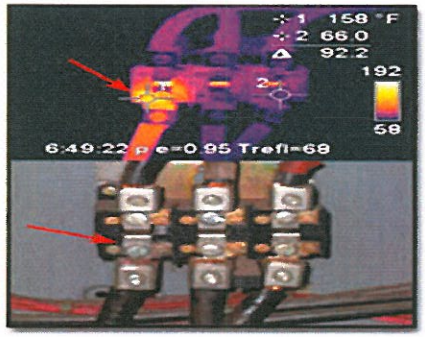
Thermal Imaging

Vibration Analysis

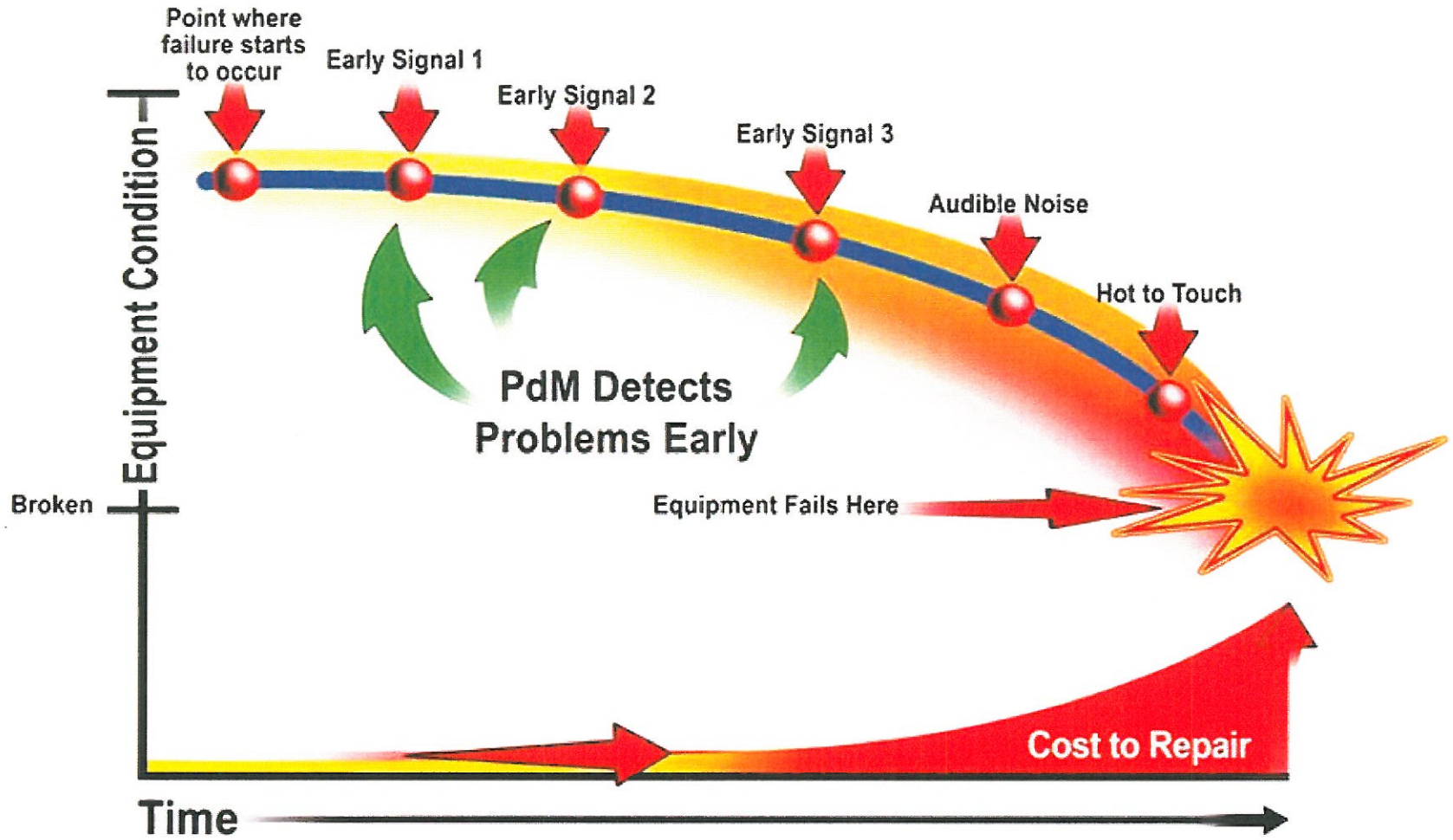


Oil Analysis

Thermography



Potential Failures – Where to Detect them?



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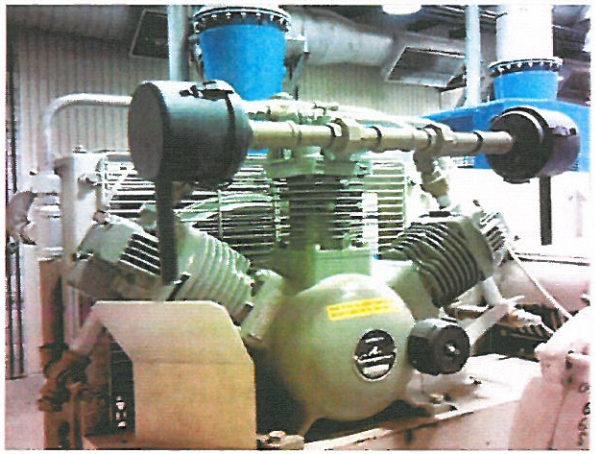
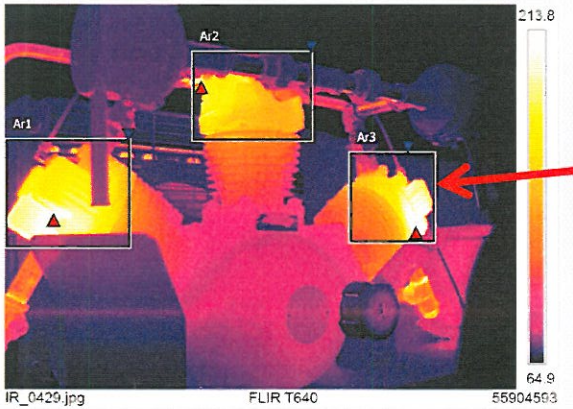
Condition Monitoring Success

- Implementation of Infrared Thermography lead to the discovery of a failed cylinder head for an air compressor at RP-1 aeration blower building.
- This critical equipment supplies control air to actuate valves in the aeration basins.

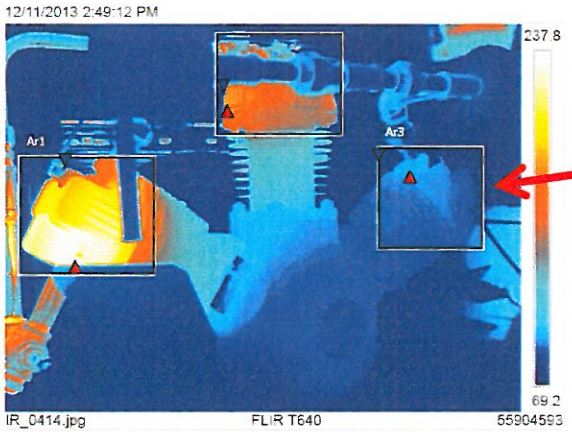
Digital image of air compressor



Infrared image of air compressor



Properly working Cylinder head



Failed Cylinder head

Condition Monitoring Success (Continued)

- Implementation of Lube Oil Analysis Program lead to the discovery of bearing wear on Aeration blower 1A at RP-5.
- The early detection of bearing wear allowed maintenance department to perform rebuild service prior to failure.

Lube Oil Analysis Report

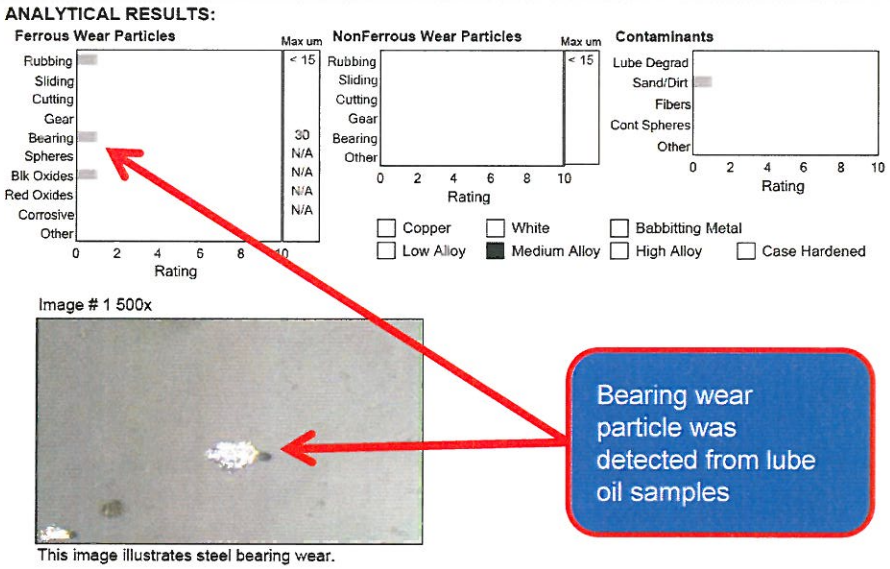
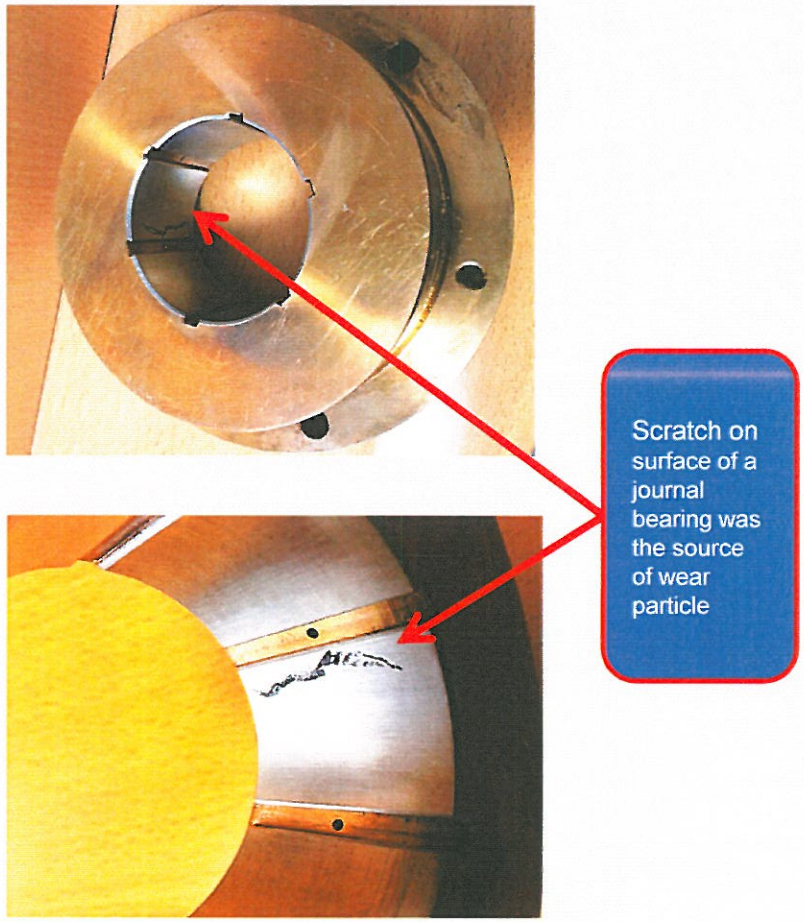


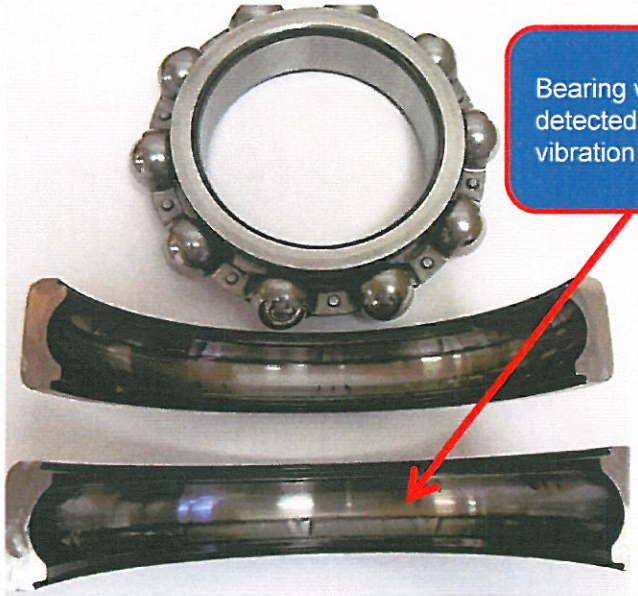
Image of actual bearing parts



Condition monitoring Success (Continued)

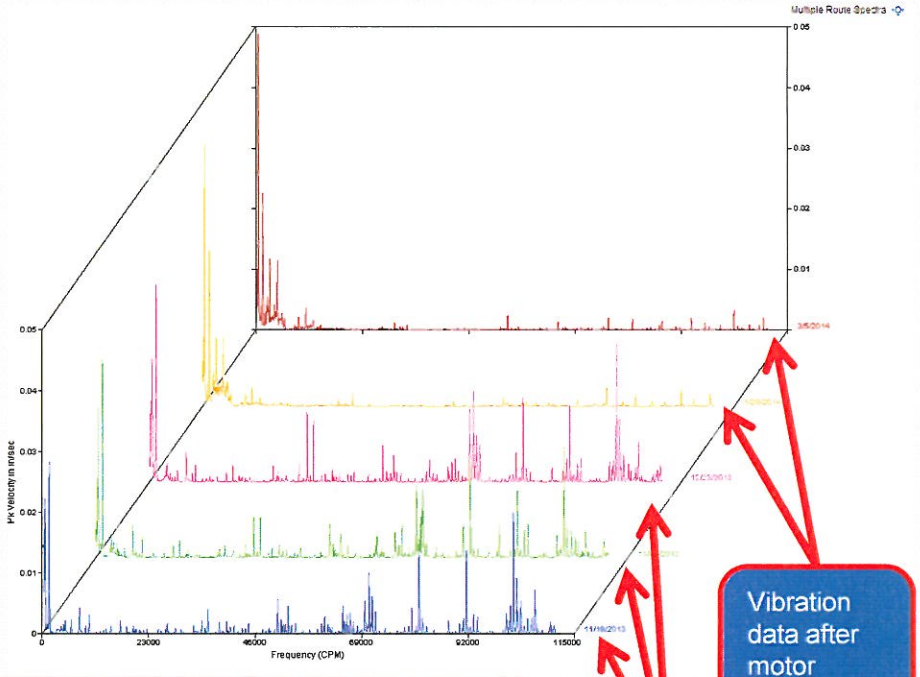
- Implementation of Vibration Analysis lead to the discovery of bearing wear on RO feed pump #1 at the Desalter 1 facility.
- The early detection of bearing wear allowed maintenance department to perform pump motor repair service prior to failure.

Picture of actual bearing damage

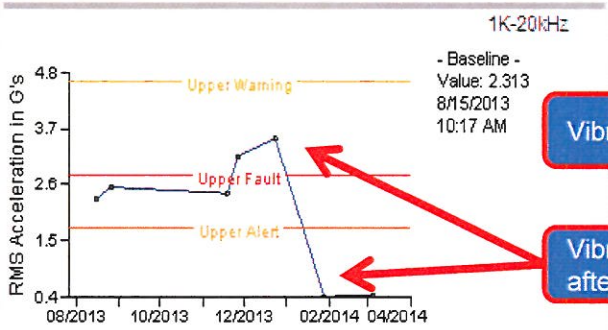


Bearing wear detected from vibration analysis

Image of vibration report



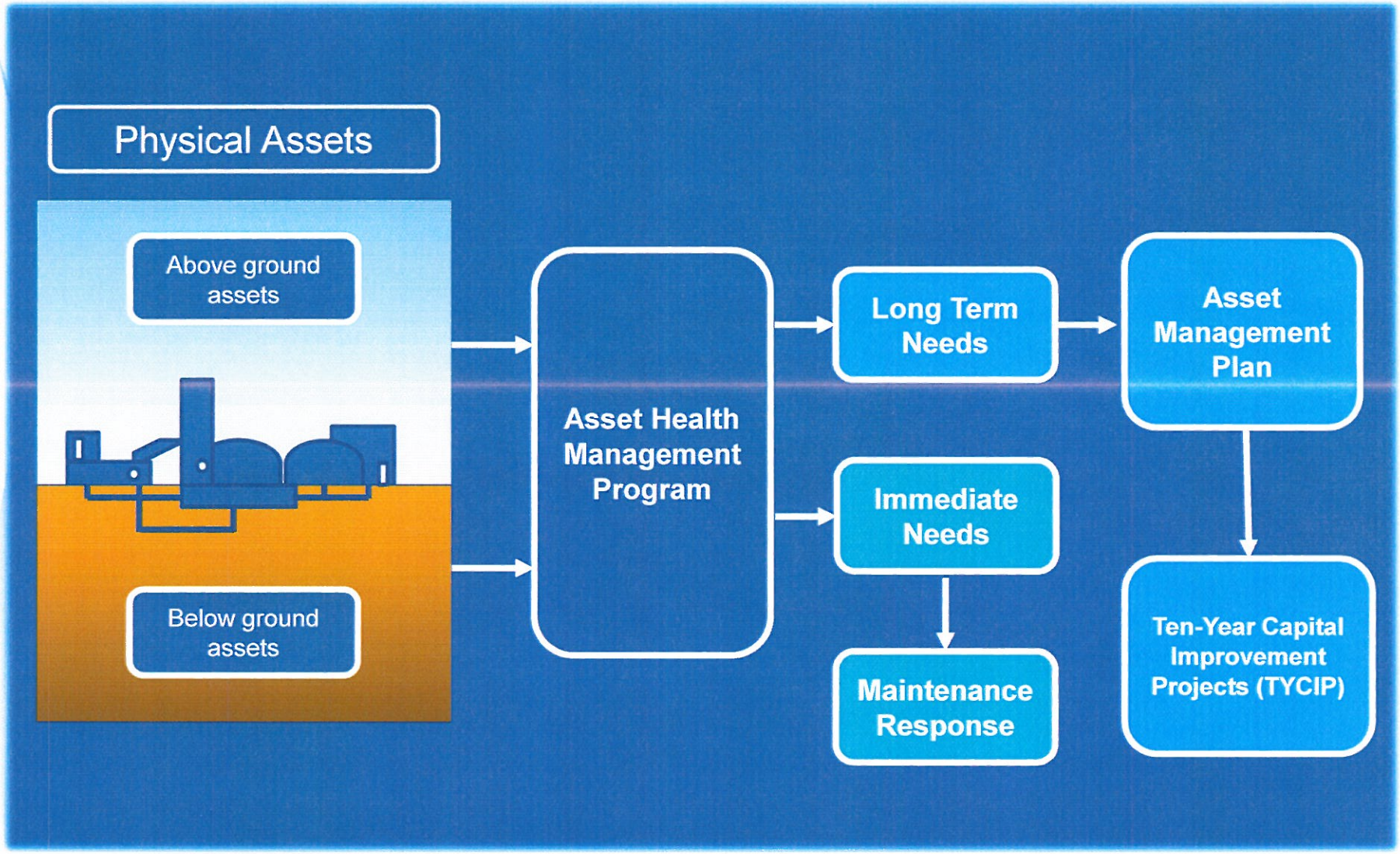
Vibration data after motor repair



Vibration data prior to repair

Vibration levels before and after motor repair

Capital Improvement Projects Optimization



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Questions?