

# RECLAMATION

*Managing Water in the West*

*Managing for Excellence*

## Action Item 18

### Processes or Measuring Tools for Major Repair Projects

## Table of Contents

|   |           |
|---|-----------|
| <u>Executive Summary .....</u>  | <u>3</u>  |
| <u>Introduction.....</u>  | <u>6</u>  |
| <u>Actual Performance .....</u>                                       | <u>7</u>  |
| <u>Predicted Performance .....</u>                                    | <u>7</u>  |
| <u>Process for Determining Need for a Major Repair .....</u>          | <u>10</u> |
| <u>Major Repair Process.....</u>                                      | <u>10</u> |
| <u>Findings and Recommendations .....</u>                             | <u>16</u> |
| <u>Appendix A - Team Members .....</u>                                | <u>18</u> |
| <u>Appendix B - Tools and Measures.....</u>                           | <u>19</u> |
| <u>Appendix C - Outreach Activities.....</u>                          | <u>27</u> |
| <u>Appendix D - PowerPoint Presented at Stakeholder Meeting .....</u> | <u>36</u> |

# MANAGING FOR EXCELLENCE

## Major Repair Challenges

### Team 18

## Executive Summary

### Background

The Bureau of Reclamation (Reclamation) asked the National Academy of Sciences' (NAS) National Research Council (NRC) to review Reclamation's organization, business practices, culture and capabilities for managing construction and infrastructure in the 21<sup>st</sup> Century. As a result, the NRC published a report, *Managing Construction and Infrastructure in the 21st Century, Bureau of Reclamation* (NAS Report). Reclamation's *Managing for Excellence (M4E) Action Plan* was initiated to address the recommendations provided by the NAS Report. Reclamation's Action Plan identified 41 action items within eight functional areas. Action Item 18, or Team 18, within the functional area – Major Repair Challenges – is charged with developing processes or tools to determine whether major repairs are warranted.

### Scope

The team identified primary drivers underpinning many of the recommendations in the NAS report. They can be summarized in two major areas that are directly linked: They are communication and customer involvement. Based on this observation, our team concentrated on developing a process to identify and justify major repairs to include customers and stakeholders in the decision-making process. For the purposes of this report, a customer is defined as any party that holds a contract with Reclamation for a product or service. A stakeholder is an entity with some form of interest in the facility or the products provided by the facility. A “major repair” is defined as a repair whose cost is greater than 10 percent of normal annual O&M expenditures, or the cost is greater than \$100,000, or the repair cost cannot be funded in one year.

### Related Activities

Many of the activities and outcomes related to Action Items identified in M4E are related. The Major Repair Challenges functional area includes three action items or teams. These include Team 17, “Seek/Obtain legislative authority for loan guarantees to facilitate private financing for water users’ share of major repair/extraordinary O&M costs, prepare for subsequent program implementation” and Team 19, “Working with stakeholders, develop innovative processes that can add value to major repair projects.” Loan guarantees or amortization of project costs and the processes to bring ingenuity to add value to major repair projects are incorporated into the decision process proposed within this report. In addition, the activities and outcomes from Team 4, “**Identify structured decision-making process gaps and potential remedies, with**

particular attention to the recommendations from “Review of Decision Making in Reclamation”, are incorporated by reference.

### **Approach**

Team 18’s approach to developing a decision-making process was to:

1. Research and inventory existing processes and measuring tools.
2. Develop a process designed to build in transparency and customer and stakeholder involvement into major repair decision making, and develop a description of tools.
3. Conduct internal outreach to obtain feedback on the effectiveness of the process and tools, including suggestions for improvement.
4. Conduct external outreach to obtain feedback on the effectiveness of existing processes and measuring tools, including suggestions for improvement.
5. Compile feedback, establish findings, and develop recommendations for improvement.

### **Findings**

The findings of this effort can be summarized as follows:

1. The tools for identifying and prioritizing major repairs exist and are generally available. We did not identify a need for additional tools. The extent to which various tools are utilized to assess any particular major repair project depends upon technical considerations, as well as the cost, complexity, and level of controversy involved.
2. Many customers are satisfied with current processes and working relationships.
3. Most offices have some type of process to identify and justify major repairs.
4. Reclamation conducts many different types of reviews at various times for each facility which are confusing to our customers. The cost effectiveness of these multiple reviews has also been called into question.
5. Funding and cash flow may be significant impediments to performing major repairs. There is wide consensus that a loan guarantee program will help. Another financial tool suggested was the formation of a non-profit corporation to establish an escrow account to fund major repairs.
6. The definition of a major repair varies significantly among customers and stakeholders.

### **Recommendations**

1. Each Area Office should have a documented major repair process in place that is generally in accordance with the process chart included in this report, recognizing the need for flexibility to account for differing project-specific conditions. The process should:
  - Stress customer involvement including performing analysis of options and even performing the major repair.

- Consider stakeholder partnerships (Team 19) when new benefits accruing from a major repair may lead to non-traditional funding opportunities (e.g., recreation, environmental, or fish and wildlife interests partnering to fund a repair that results in significant water savings – while keeping traditional customers whole). May consider evaluating title transfer when a major repair is needed. This could help secure private financing through private collateral.

2. All review teams – including Comprehensive Facility Review (CFR) and Periodic Facility Review (PFR) – should include an invitation for at least one customer representative and all review team members should be involved in the review process from start to finish.

3. The Reclamation O&M team should consider the possibility for combining some of the many different facility reviews. The frequency of reviews is not as much of an issue as the overlap of various reviews. An example would be the overlap of equipment reviewed during a safety of dams inspection and a power O&M inspection. Some of the same equipment would be reviewed under both inspections and at different times. If it would be possible to combine the reviews, the reports could be combined as well, and the managers would only be working from one set of recommendations. Essentially, an Asset Management Plan may be the overriding program with the various facility reviews falling within that program. The assessment tools (i.e. HydroAMP, Facility Reliability Rating, etc.) could be incorporated into the reviews and one annual asset management document would cover each facility. There may be subsections for Safety of Dams and other reviews.

4. Recommendations contained in this report should be implemented through revision to appropriate policies, directives and standards (FAC 01-04, FAC 01-07, and FAC 04-01).

# MANAGING FOR EXCELLENCE

## Major Repair Challenges

### Team 18

## Process for Determining Whether a Major Repair Project is Warranted

### Introduction

The NAS report and Family Farm Alliance's Customer perspective include a number of recommendations to improve Reclamation's performance. The primary driver underpinning each recommendation can be summarized in two major areas that are directly linked and they are communication and customer involvement. Based on this observation, the team assigned to "determine the need for major repairs" is concentrating on developing a process to include customers and stakeholders in the decision-making process. Although we will do an inventory of some of the conventional tools used to determine the need for a major repair, developing a good process seems to be more fruitful at this juncture.

For purposes of this report, a major repair is defined as a replacement of existing equipment or a repair that exceeds what is normally considered routine maintenance. Reclamation normally refers to these maintenance activities as RAX (replacements, additions, and extraordinary maintenance). Through internal outreach to O&M managers and discussions with some external customers, **we define a major repair to be any repair whose cost is greater than 10 percent of normal annual O&M expenditures, the cost is greater than \$100,000, or the repair cost cannot be funded in one year.** This definition is offered as a starting point. There was wide variation from all of those interviewed on the definition. We settled on the one mentioned as a compromise that to some extent covers small facilities as well as large facilities. When soliciting dollar thresholds, we received suggestions ranging from \$10,000 to more than \$300,000. The threshold, as might be expected, depended to a great extent on the size of the facility. Small facilities view \$10,000 as a major expenditure where larger facilities do not consider an expenditure to be major until it reaches \$300,000 or more. We recommend that the facility operating agency, in cooperation with its customers, define their own definition for a major repair. The definition offered here is offered as a starting point to stimulate discussion and aid in finding a definition that is acceptable to the appropriate parties.

We make a primary assumption that assets are developed, purchased or constructed to provide products (i.e., water and power) that depends upon the performance of Reclamation facilities and equipment. The need for repair, then, is determined primarily by the actual or expected failure or lack of performance or in some cases the expectation that performance can be enhanced with a repair or modification. For purposes of discussion, performance is going to be divided into two components: (1) actual, and (2) predicted. The indicators for problems with actual performance are degraded operations through observation and history, failure, increased maintenance costs, or a regulatory change that creates a safety or environmental concern. The indicators for problems

with predicted performance are related more towards the probability of failure or the probability of increased maintenance costs. Generally, we use experience and condition assessments to predict the probability of failure or increased maintenance costs. Inspections, reviews and knowledge of technology are used to make the assessments.

### **Actual Performance**

The performance of equipment, machines, or structures is readily known by the operating agent as it relates to the original desired standard of performance. The standard of performance was designed into the original function of the asset. John Moubray in his book titled Reliability Centered Maintenance, defines the strategic framework for maintenance as “ensuring that an asset continues to perform as its users want it to perform.” The goal of maintenance then becomes the task of ensuring that physical assets continue to fulfill their intended functions.

Three general maintenance philosophies exist, (1) breakdown, (2) preventative, and (3) condition based. Breakdown maintenance can best be employed on assets that have little consequence of failure or can be fixed or replaced within a very short time period or where preventative actions or conditions show no evidence of preventing a failure. Preventative maintenance relies on scheduled prescribed maintenance including overhauls and relies heavily on maintenance systems for planning and controlling work. Condition-based maintenance relies heavily on both monitoring continuous performance and inspections.

The different philosophies are only presented because their basis may cause disagreement when deciding whether a major repair is necessary. Modern plants incorporate all three philosophies in maintenance programs. The degree to which each philosophy is incorporated will need to be generally agreed upon by interested parties, including customers and stakeholders to keep disagreements to a minimum.

There will probably be widespread agreement on the need for a major repair if there is a functional failure. A functional failure is defined as the inability of a physical asset to meet a desired standard of performance. Defining the desired standard of performance may be the difficult task.

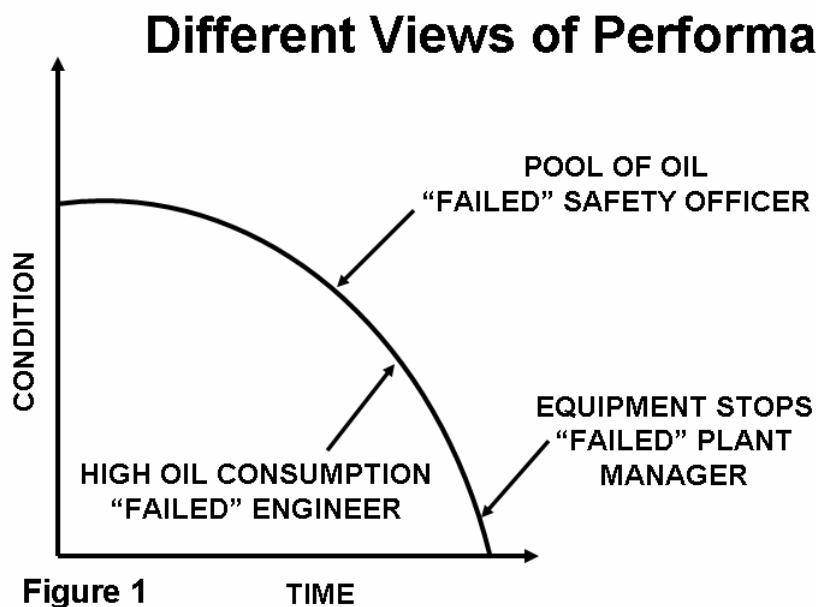
### **Predicted Performance**

Actual performance of an asset may meet desired standards but, because of the condition of an asset, failure may be expected. As pointed out earlier, condition based maintenance relies on monitoring. Continuous monitoring may discover a degradation of actual performance or it may raise the possibility of a future failure. Condition assessments may be another means of predicting a potential performance failure.

Condition Assessments are probably the greatest potential source of disagreement among people tasked with maintenance and that disagreement likely becomes amplified when people have

different responsibilities. Three examples will be presented for discussion purposes. The first example is from Moubray, the second and third are from experience within the organization.

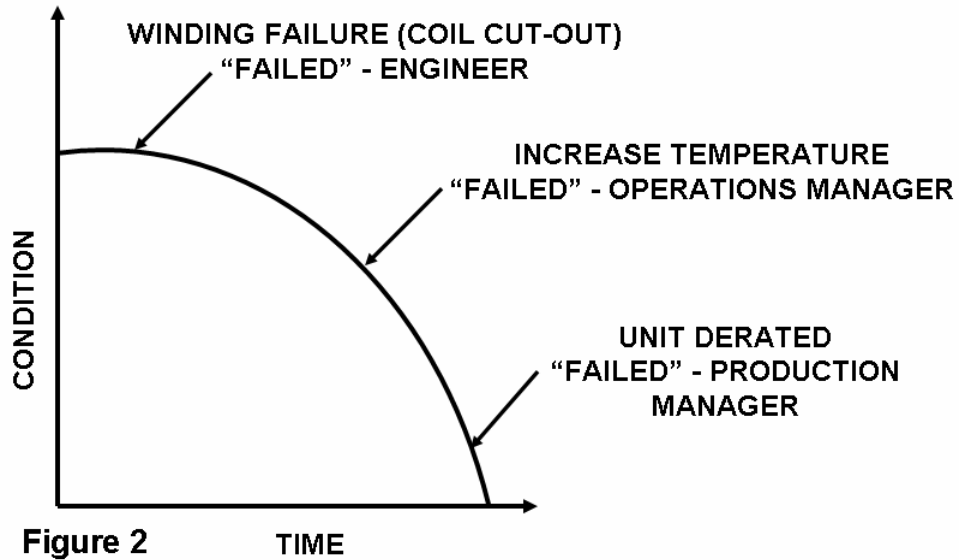
Example 1: Refer to Figure 1. An isolation valve is leaking oil. As soon as a pool of oil is observed, the safety officer and the hazardous materials coordinator would probably classify the valve as failed. It no longer performs to their expected standard. The engineer probably classifies the valve as failed when oil consumption becomes fairly high. The production manager probably classifies the valve as failed when it can no longer be operated without some type of maintenance intervention. Depending on a person's responsibility, the condition may warrant repairs at different times.



Example 2: Refer to Figure 2. A generator winding is exhibiting coil failure. As soon as the first coil fails and must be cut out of the circuit, the engineer may classify the generator as failed and schedule a rewind. However, the generator is still capable of producing the nameplate capacity. A second failure occurs and another coil must be removed. The operations manager now observes that although the nameplate capacity can still be obtained, stator temperatures may rise and the nameplate capacity may only be available for four hours or less during a 24-hour period. The operations manager may classify the unit as failed and schedule a rewind. The plant manager may observe that the unit rarely is called upon to run at capacity and may continue to run the unit since the operating standards are still being met. When a third coil fails and the unit is derated by five percent, the plant manager may declare the unit as failed and schedule a rewind in the near future. Depending on one's perspective, responsibilities, business conditions, and perceived risks, major repairs may be needed at different times.

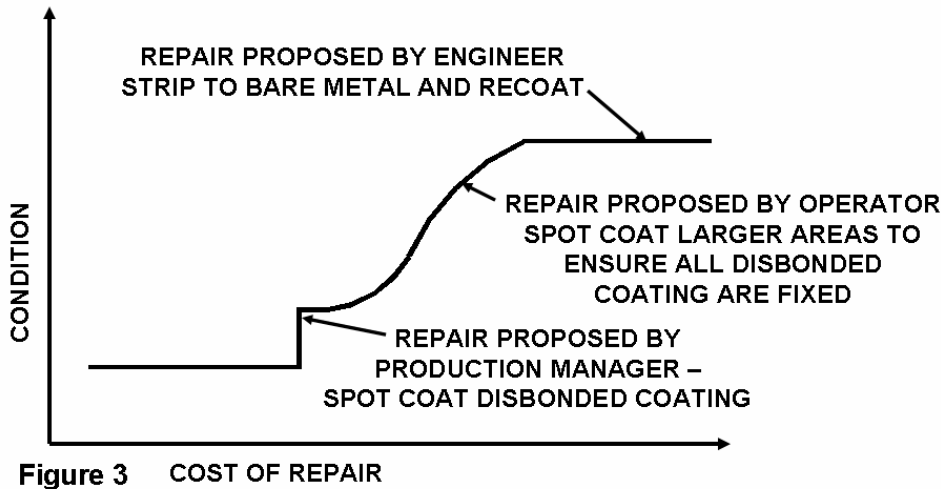


## Generator Windings



Example three: Refer to Figure 3. Many times disagreement may occur more because of the nature of the repair as opposed to the need for the repair. Depending on one's perspective and responsibilities, the type of repair may vary. The point is that a thorough understanding of the problem and options for repair are necessary for all parties to agree on a solution that fits everyone's needs.

## Different View of Protective Coating Repair Techniques



An example of this concept is portrayed in Figure 3. A penstock may need some recoating due to areas of disbonding. One alternative may be to strip the existing coating to bare metal and recoat the entire penstock. This may be a good alternative, but is also the most expensive option. A less costly option may be to spot repair, but incorporate a somewhat larger area to ensure that all disbonded coating is removed. The last option for this example is to perform spot repairs only on the obvious disbonded areas. The chosen solution may depend on maintenance philosophy, budget, cash flow and other considerations. The final solution will require a common understanding of the problem and the ramifications of the alternatives.

### Process For Determining Need For A Major Repair

As shown by the previous examples, maintenance is to some degree a subjective process that depends upon philosophies, business conditions, environmental and political climate as well as financial conditions. There is no one correct way of defining the need for a major repair. For that reason, we propose a process that involves not only different levels within the organization but also provides the opportunity for customers and stakeholders to be involved in the decision-making process. The suggested process is very similar to the existing process used within Reclamation but differs in the involvement of customers. We should recognize that projects within Reclamation serve different customers in differing business and political environments. Whatever we derive as an agency should reflect the differences between projects and regions. The structure of the process should be broad enough to allow flexibility needed by individual offices. Probably more important than the process, is the need to establish customer and stakeholder boards or committees to assist in the decision-making process (**note the decision**

**always rests with Reclamation, but others can be involved in the decision process**). We also need an organization set up to handle inevitable disagreements to avoid as much as possible jumping the chain of command and going through a political process. We are leaving this structure to other teams and focusing on our original scope, keeping in mind that our process can only work effectively with these other structures put in place.

We suggest a decision or process chart that incorporates regular O&M activity and asset assessment (See Figure 4) to cover actual and predicted performance of the assets or facility.

### **Major Repair Process**

The process defined in Figure 4 is designed to build transparency and customer involvement into the major repair decision making process. Performance is used as the basis for determining the initial need for a major repair. Any time performance does not meet expected standards there may be a presumed need for a major repair. The colors on the chart denote involvement from either customers (**yellow**) or customers and stakeholders (**red**). A customer is defined as any party that holds a contract with Reclamation for a product or service. A stakeholder is an entity with some form of interest in the facility or the products provided by the facility. The circled numbers on the chart are placed for discussion purposes. The following discussion refers to the process chart.

Performance is split into two categories for our purposes: (1) actual performance, and (2) predicted performance.

1. Through daily O&M activity, the operating agent observes actual performance and through maintenance management system prepares a work order if an asset is not performing to standard.

For reserved works, the operating agent is Reclamation. In this case, Reclamation staff identifies lack of performance and prepares a work order to correct or repair the problem. Normally maintenance will be able to correct the problem and bring the asset back to operating standard.

In the event that maintenance is not able to bring the asset back to standard performance, a major repair is identified based on actual observed performance.

For transferred works, the operating agent is a non-Federal entity operating a Federal facility. In this case, the operating agent identifies lack of performance and prepares a work order to correct or repair the problem. The process remains the same regardless of who is operating the facility. Only the roles of Reclamation and the non-Federal entity change. Once a potential major repair is identified, an analysis must be performed to determine if the repair is justified. Before discussing the analysis stage (4), the asset assessment leg of the process will be described.

# MAJOR REPAIR PROCESS

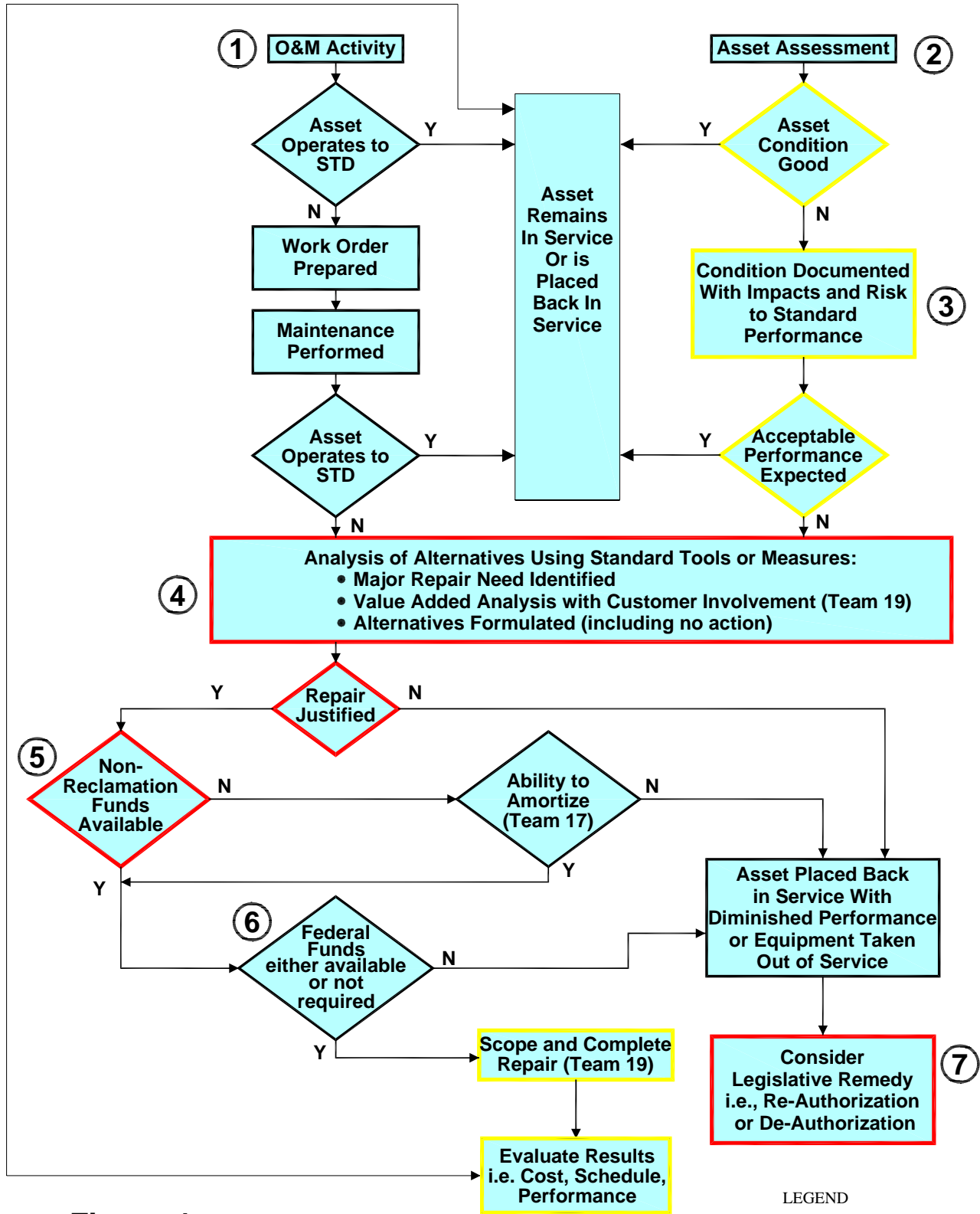


Figure 4

LEGEND  
 Yellow = includes customers  
 Red = includes customers and other stakeholders

2. Asset assessment is used to predict future performance. All Reclamation-owned facilities are subjected to a number of reviews. These reviews are conducted to assess the condition of the assets within the facility and recommend repairs that will prevent future failures and keep the assets performing to their expected standards. While Reclamation is always the lead on these reviews, we recommend that all review teams include at least one non-Federal customer with a funding responsibility for the facility under review. The asset assessment leg of the process is color coded yellow to denote customer involvement throughout the asset review process. While the opportunity to be involved in facility reviews should be extended to our customers, it is possible that some may choose not to participate due to funding or capability limitations. Stakeholders are not included in this part of the process to reflect that the non-Federal parties need to have a financial interest in the facility to help assess the condition.
  
3. Each review should document the facility's assets and recommendations for improved or continued performance. Beyond observed conditions, the reviewers examine historical data and trend analysis to help determine condition and predict future performance. Customers should be involved in reviewing the data and preparing the report. It is critical that customers review and provide comments to the recommendations prior to finalizing the report. The reviews include:

- Annual Facility O&M Reviews
- Periodic Facility Reviews
- Comprehensive Facility Reviews
- Associated Facility Reviews
- SEED and SOD Activities
- Monitoring and Instrumentation
- Customer Reviews
- Security Reviews
- Other Informal Reviews

Tools such as Facility Condition Index (FCI), Facility Reliability Rating (FRR), asset priority indexes, and other asset management tools can be used to help predict performance and should be coordinated with or incorporated into other facility reviews.

Decisions related to recommendations resulting from facility review are commonly documented in decision documents. The decision document should follow the recommendations from Team 4 to ensure consistent format across Reclamation as well as transparency of the decision.

Both internal and external outreach discussions indicated a strong sense that an effort should be made to consolidate as many reviews as possible, keeping in mind that the overall objective of the reviews are similar, that is, to ensure the facilities perform in accordance with accepted standards and are safe and secure for employees and the public.

Further, it is recommended that the reviews incorporate the asset management measures so that one annual document contains all relevant information regarding asset condition and the resulting expected performance.

4. Alternative analysis (see Appendix B for an inventory and description of analysis tools) is probably the most critical step in the process for making good decisions that all parties agree to or at least can understand from the critical information used to make the decision.

Notice that alternative analysis follows the identification of a major repair based on either actual performance or predicted performance.

The problem or major repair need is identified prior to performing analyses, but now the problem must be fully explored as to cause, importance, alternatives, consequences of various actions, etc. A thorough understanding of the problem and all of the assumptions used in defining the problem are critical. At this point, Team 19's product ("**Adding Value to Major Repairs**") would be used, together with the application of other tools, to ensure that innovation becomes a part of the process, that the analysis is value added, and that costs or adverse consequences of a proposed action are minimized. The extent of the analysis and required documentation depends on the size of the repair, the potential consequences, and the customer group. Although the decision node follows this analysis, the decision is probably already made with the active involvement of the customers and possibly stakeholders at this point. One of the alternatives must always be a no action alternative.

Notice that the analysis box is in red indicating that customers, and perhaps stakeholders, should be heavily involved in this part of the process. At times it may be appropriate for the customers to perform the analysis rather than Reclamation.

We found that the tools and analysis techniques for making good maintenance decisions already exist and are being used throughout Reclamation. Appendix B contains a listing and explanation of the tools that were inventoried in our research and outreach efforts. The selection of the appropriate tools for any analysis should be left to the discretion of the analyst along with the facility management and customer base. If stakeholders are involved at this point, it is assumed that they also would have an interest in defining the tools for performing the analysis. At the very least, the analysis box is color coded red to denote stakeholder involvement associated with NEPA compliance, in the event that a Federal action is warranted.

We found concerns internally and externally about involving stakeholders in the decision-making process. The primary concern centered on the philosophy that stakeholders do not have a financial stake in the decision to perform a major repair and therefore may support decisions because they have no financial responsibility. We support including stakeholders because they may represent taxpayers for any portion of a project that involves nonreimbursable appropriations. In addition, they may be a strong ally and may voluntarily

take on a funding role. Environmental groups may also assist in moving projects through the environmental clearance process. The decision to involve stakeholders should be agreed upon by Reclamation and the customer base for the facility in question.

Deciding on whether or not a repair is justified should be done through collaboration with customers and stakeholders. An important point, however, is that Reclamation ultimately is responsible for making the decision and at times may make decisions that do not coincide with the interests of some or even all of the customers and stakeholders. This may happen because of the Federal ownership and stewardship responsibility held by Reclamation.

Usually, the interests will be aligned and it should be rare that Reclamation makes major repair decisions that are misaligned with customers' desires.

5. This node is red not only to illustrate that non-Reclamation customers have some or all of the funding responsibility, but that there may also be opportunities for non-traditional funding partnerships (Contributed Funds Act) with stakeholders that may benefit from a major repair.
6. Some projects or facilities do not rely on any Reclamation Funds (e.g., some single purpose power projects), while others rely on a combination of Reclamation and non-Reclamation funds. For those projects that rely to some extent on Reclamation funding, a decision document will be required for review by the appropriate Regional Director (RD) and the Budget Review Committee (BRC). Most of the critical information will be readily available from the alternative analysis stage of the process. Customer participation and buy-in throughout the analysis and justification stages of the process may weigh heavily in support of favorable funding decisions by the RD and BRC. Results from Team 4 ("**Identify structured decision-making process gaps and potential remedies**") will provide additional guidance on format and procedure for making and documenting decisions that will be applicable to the major repair process. This will assist in the transparency objective.

There may be instances where non-Reclamation funds are not available because of cash flow considerations, but customers are willing to provide funds if the repair cost could be amortized over multiple years. For example, a loan guarantee may allow customers to secure sufficient non-Federal funding to perform the repair. We found a lot of support for the loan guarantee program. The results of Team 17 ("**Seek/Obtain legislative authority for loan guarantees to facilitate private financing for water users' share of major repair/extraordinary O&M costs**") could have a significant impact at this stage of the major repair process. Another suggestion was for customers to form non-profit corporations to establish escrow accounts in anticipation of future major repair funding needs. It would have the effect of setting up a sinking fund to keep assets up to standards. This is similar to a conventional reserve fund but may offer additional advantages based on how the organization is established under State law.

7. We anticipate that there may be some major repairs that do not meet the justification criteria or that are justified but lack funding from either non-Federal or Federal sources,

or both. In these cases, there may be other reasons (e.g., politics or social factors – Tribal considerations) why a major repair should be undertaken. This may lead to consideration of legislative remedies that may include de-authorizing a facility or project, or re-authorizing it with different purposes to enhance benefits and access different funding sources. Subsidies may be considered for social or political reasons. Notice this block is red, indicating that this remedy generally requires customer or stakeholder action, and Reclamation would not be involved in these activities.

## **Findings and Recommendations**

### **Findings:**

The findings of this effort can be summarized as follows:

1. The tools for identifying and prioritizing major repairs exist and are generally available. We did not identify a need for additional tools. The extent to which various tools are utilized to assess any particular major repair project depends upon technical considerations, as well as the cost, complexity, and level of controversy involved.
2. Many customers are satisfied with current processes and working relationships.
3. Most offices have some type of process to identify and justify major repairs.
4. Reclamation conducts many different types of reviews at various times for each facility which are confusing to our customers. The cost effectiveness of these multiple reviews has also been called into question.
5. Funding and cash flow may be significant impediments to performing major repairs. There is wide consensus that a loan guarantee program will help. Another financial tool suggested was the formation of a non-profit corporation to establish an escrow account to fund major repairs.
6. The definition of a major repair varies significantly among customers and stakeholders.

### **Recommendations:**

1. Each Area Office should have a documented major repair process in place that is generally in accordance with the process chart included in this report, recognizing the need for flexibility to account for differing project-specific conditions. The process should:
  - a. Stress customer involvement including performing analysis of options and even performing the major repair.
  - b. Consider stakeholder partnerships (Team 19) when new benefits accruing from a major repair may lead to non-traditional funding opportunities (e.g., recreation, environmental, or fish and wildlife interests partnering to fund a repair that results in significant water savings – while keeping traditional customers whole). May consider evaluating title transfer when a major repair is needed. This could help secure private financing through private collateral.



2. All review teams – including Comprehensive Facility Review (CFR) and Periodic Facility Review (PFR) – should include an invitation for at least one customer representative and all review team members should be involved in the review process from start to finish.

3. The Reclamation O&M team should consider the possibility for combining some of the many different facility reviews. The frequency of reviews is not as much of an issue as the overlap of various reviews. An example would be the overlap of equipment reviewed during a safety of dams inspection and a power O&M inspection. Some of the same equipment would be reviewed under both inspections and at different times. If it would be possible to combine the reviews, the reports could be combined as well, and the managers would only be working from one set of recommendations. Essentially, an Asset Management Plan may be the overriding program with the various facility reviews falling within that program. The assessment tools (i.e. HydroAMP, Facility Reliability Rating, etc.) could be incorporated into the reviews and one annual asset management document would cover each facility. There may be subsections for Safety of Dams and other reviews.

4. Recommendations contained in this report should be implemented through revision to appropriate policies, directives and standards (FAC 01-04, FAC 01-07, and FAC 04-01).

# **MANAGING FOR EXCELLENCE**

## **Major Repair Challenges**

### **Team 18**

#### **Appendix A - Team Members**

- Brian Becker, Deputy Chief, Dam Safety, SSLE
- Greg Gere, Deputy Area Manager, Dakotas Area Office, GP
- Larry Hieb, O&M Manager, Snake River Area Office, PN
- Karl Stock, Economist, Contract Services Office, OPSS
- Tim Ulrich, Area Manager, Lower Colorado Dams Office, LC
- Executive Sponsor: Mike Ryan, Regional Director, GP

# MANAGING FOR EXCELLENCE

## Major Repair Challenges

### Team 18

## Appendix B -Tools/measures to be used in justifying major repairs to or rehabilitations of Reclamation facilities

### ECONOMIC AND FINANCIAL

**Net Present Value (NPV)** – The standard criterion for deciding whether a government program can be justified on economic principles is NPV. The NPV method reduces a stream of benefits and costs to a single number. The flow of benefits over time is reduced to a single discounted value. Costs are likewise discounted. Discounted costs are subtracted from discounted benefits to yield the NPV.

This methodology is identified in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (March 10, 1983) and is used in selecting the National Economic Development (NED) plan in the plan formulation process. The NED plan is a plan that reasonably maximizes net national economic development benefits consistent with the Federal objective. Although the use of this method for this purpose varies from the intent of this activity, it follows the same reasoning.

An issue that may arise as a result of the need to discount future costs and benefits is the correct interest rate to use: nominal or real. Future inflation rates are highly uncertain and assumptions regarding inflation rates should be avoided. However, use of the proper type of discount rate may vary depending on the analysis that is being undertaken. Water resource project studies or evaluations that are being guided by Federal planning guidelines (P&G's) will use the Federal discount rate for planning established annually by the Treasury Department. This is in reality equivalent to a nominal rate, but in this case is considered a social discount rate. Whenever possible, economic analyses exempted from the P&G's (asset valuation and sale, lease vs. purchase, life cycle analyses) should be made using real dollars (constant value). In this case, a real discount rate that does not include the effect of inflation should be used. If inflation is considered in future costs, then a nominal rate which reflects the effects of inflation should be used.

**Benefit Cost Analysis (BCA)** - Benefit Cost Analyses are similar to a NPV analysis in that the future benefits and costs are calculated to a common point in time (usually discounted to a current year) in monetary values, oftentimes in average annual values. Where NPV is expressed as a difference – Benefits minus Costs, BCA is expressed as a ratio – Benefits divided by Costs. A benefit cost ratio of less than one means that the cost of the project is greater than the benefits and should not be pursued based on measured benefits and costs.

This method is most often used by Reclamation in planning and feasibility studies to assist in the evaluation of alternatives. Usually alternatives that have a BC ratio equal to or greater than 1 are considered further for analysis. This methodology can be used as a “go” or “no go” or as a prioritization mechanism, with a larger BC ratio exhibiting a greater efficiency or effectiveness of expenditure.

**Internal Rate of Return (IRR)** – The IRR, also called the rate-of-return method, is a technically sound method and, when properly applied, should give the same results as the BCA. This method also requires the use of the discounting process. The objective of this method is to identify the interest rate that will yield a net present value of \$0 or a benefit cost ratio of 1:1. This is done by a trial and error procedure which requires a significant amount of calculation and may be done in either present value or annual equivalent configuration. With this method, an interest rate must be selected that is the least attractive or minimum rate of return, before the analysis begins, and against which the calculated IRR will be compared. If the IRR is greater than the minimum rate of return, then the project is one that justifies further analysis.

This type of analysis is used more frequently when dealing with the World Bank or foreign countries where an established interest rate may not be known. In these cases, if the alternatives can be arrayed according to their IRR it is easier to see the relative attractiveness of each of the proposals.

**Payback Period Analysis** – This methodology is a means of determining the project which best pays back all of its costs in the shortest amount of time. A minor variation of this that is often used is the shortest amount of time that it takes for a project’s benefits to equal costs. This is accomplished by comparing annualized costs against annual benefits.

**Life Cycle Cost Analysis** - Life cycle cost analysis is most often used in Reclamation in regards to improvements or upgrades (rewinding or replacement of generators, replacement of turbine runners, etc.) to hydropower facilities. The object of the analysis is to determine whether additional generation above the current level is worth the cost of investment. Life cycle cost is the discounted total cost of an improvement over its expected life, including purchase price and operation and maintenance expenses. This cost is compared against the additional benefit (beyond the original equipment’s capability) derived from the improvement, often measured in the resultant additional hydropower generation or capacity of a facility.

**Cost Effectiveness Analysis** – Often used when the benefits of a particular action are mandated or the benefits of all alternatives are equal in quantity, quality, and delivery point. This is often considered a method of selecting the least cost way of providing benefits if the level of output is considered sufficient. It is measured by dividing the cost of the alternative by the mandated measure of output to get a cost per unit of output. These unit costs per alternative can then be compared against each other to determine the most cost effective alternative.

**Economic Risk Analysis** – While Risk Analysis is considered an economic analysis tool, for purposes of this report it is treated separately, below.

**Summary of Economic Measures** – NPV is the base economic measure, and is prescribed by the P&G's in most cases. With the exception of Risk Analysis and Cost Effectiveness Analysis, all of the subsequent measures basically amount to variations in how the relationship of Net Present (Capitalized) Costs and Net Present (Capitalized) Benefits is displayed. The results of each should all be proportional to each other, and so the decision on which to use in the decision process probably depends more on what makes sense or is useful to the customers.

**Financial Analysis - Cash Flow** - An additional aspect which must be analyzed in determining whether a major repair project is feasible is the cash flow situation of those project beneficiaries which are required to repay the costs of major O&M expenditures prior to their incurrence. In addition to annual water assessments and tax levies, project beneficiaries may have a number of mechanisms to assist in amortizing or otherwise spreading the costs of major repairs across multiple years. For example, many of the repayment and water service contracts between Reclamation and its customers require that the customer maintain a reserve fund to pay for major or unexpected expenditures. Some of these customers may also have access to financing assistance from larger organizations of which they are a part, or which also receive benefits from the project. State and local government entities also may provide financing mechanisms in many cases. All of these should be considered in analyzing the cash flow situation of the customer(s) that will be required to repay all or part of the costs of the major repair.

## TECHNICAL

Reclamation and its managing partners utilize many different technical tools to determine the need for, and the engineering and operational feasibility of, performing major facility repairs. Specific tools are too numerous to describe in this report and are often facility or equipment specific. Technical tools are used at various stages throughout the repair process to identify, assess, justify, design and carry out major repair work. The extent to which these tools may be utilized depends to a great degree on the complexity, cost, and level of controversy associated with the particular repair under consideration. The application of any specific technical tool should add value to the decisions that are required throughout the repair process, as highlighted in the flow chart presented in this report.

Various engineering analyses may be conducted to evaluate alternatives and determine specific repair requirements. Reclamation maintains engineering capabilities that are uniquely qualified to operate, maintain, and replace Reclamation facilities. Meetings with external customers gave a strong indication that many still prefer that Reclamation conduct the technical analyses necessary to identify, justify, and implement major facility repairs. However, some customers would prefer the option to complete the technical work themselves or to contract the work out to A&E consultants. Agreeing who performs the technical aspects of the repair work should be an integral part of the discussions that must take place between Reclamation and its customers throughout the repair process. Contracting work to customers or their consultants should be given strong consideration, particularly when the customer has demonstrated the capability to

perform the work, when a contractual relationship exists and the customer is paying for the majority of the repair, and when a cost savings can be realized.

Another important set of technical tools that received considerable discussion during meetings with both internal and external customers include condition assessment tools. For example, the tools may include Facility Reliability Ratings (FRR), Facility Condition Indexes (FCI), and HydroAMP condition assessment tools for power facilities. Condition assessments are analytical tools that evaluate facility and equipment condition to enhance asset management and investment decision-making. Condition assessments support prioritization of capital investments (i.e., funding of major repairs), development of long-term investment strategies, coordination of O&M budgeting processes and practices, and identification and tracking of performance goals.

Because FCIs have little relevance for Reclamation's mission-critical assets, Reclamation uses the FRR as an indicator and for trending. The FRR was designed to capture information on dams and associated facilities to indicate a relative reliability condition and to develop trending data over time. It was designed as an alternative to the FCI, since it not only evaluates maintenance factors, but encompasses operations and maintenance factors as well that contribute to the overall reliability condition of these more complex assets for which Reclamation has responsibility. Based on the scoring of Reclamation assets under this FRR system, the assets are categorized as being in good, fair, or poor condition.

- Good condition - Facility/equipment condition meets established maintenance standards, operates efficiently, and has a normal life expectancy. Scheduled maintenance should be sufficient to maintain the current condition.
- Fair condition - Facility/equipment condition meets minimum standards but requires additional maintenance or repair to prevent further deterioration, increase operating efficiency, and to achieve normal life expectancy.
- Poor condition - Facility/equipment does not meet most maintenance standards and requires frequent repairs to prevent accelerated deterioration and provide a minimal level of operating function. In some cases, this includes condemned or failed facilities.

Reclamation is introducing Hydro Asset Management Partnership (HydroAMP) into its power program which involves a comprehensive monitoring of key components of the power generation train, and comparison against an industry-developed scorecard to aid in maintenance, repair and replacement decision-making.

While condition assessment tools can be useful for asset management and investment decision-making at any one particular facility, caution must be exercised in using these tools to compare the relative condition from one facility to another. It may serve as a general frame of reference, but additional data should be considered when it becomes necessary to prioritize major repair funding at one particular facility instead of another. It is also important that the application of condition assessment tools be coordinated with other established reviews to ensure that the condition (e.g., good, fair, poor) is consistent with actual observed performance.

## RISK

Risk is the perceived extent of possible loss and is defined by the equation:

$$\text{RISK} = \text{PROBABILITY OF EVENT} \times \text{COST OF EVENT}$$

The general procedures for a risk-based approach or risk analysis is first to define the system or equipment in question, determine failure modes and probability of failure, and determine consequences (repair/replacement cost, loss of production). The next step is to compute risk values, rank the risk levels, and finally prioritize and justify maintenance based on these risk rankings.

In Reclamation, the primary user of a risk-based approach is the Dam Safety program. This approach helps the Dam Safety Office categorize and evaluate information with regard to multiple objectives such as public safety, economics, resource protection, and social concerns. The results of the risk analysis are reasonable options or courses of action for each project. Nearly all of Reclamation's major decisions made in recent years concerning dam safety have had risk analysis input.

Just recently, the Bonneville Power Administration implemented a new asset planning process for power facilities within the Federal Columbia River Power System. The purpose of the process is to develop and document a long-term action plan for each project that maximizes the value of project output relative to low-cost power, reliability, and stewardship. One step in this planning process is a risk analysis which summarizes the key risks to the power mission. This risk analysis identifies equipment at risk, defines the risk type such as financial, safety, legal, etc., establishes the consequences and probability, and lays out a mitigation plan for the particular piece of equipment.

Risk reduction is, in most cases, analogous to increased reliability. Risk analysis is not an exact science; however, it can be undertaken to successfully evaluate options, establish mitigation, and reduce costs by extending the life of structures or equipment. Risk analysis results are used effectively to perform maintenance or replacement at the right time.

## ENVIRONMENTAL

Many of Reclamation's existing facilities were built during an era when potential impacts on the human, cultural, and natural environment were not significant factors in project decision-making. With enactment of the National Environmental Policy Act (NEPA), Clean Water Act (CWA), Endangered Species Act (ESA), National Historic Preservation Act (NHPA), and others, environmental considerations now play a significant role in decision-making processes as the need for major facility repairs are identified, justified, and implemented. These considerations can be thought of from two different perspectives:

**Environmental Compliance and Environmental Needs or Benefits.** At the very least, every major repair action undertaken by Reclamation must comply with all of the various

environmental and cultural resource laws. In addition, the need for a major repair may actually be driven entirely, or to a great extent, by recognition of certain environmental or cultural resource needs. Each of these perspectives, and its influence on major repair decisions, are briefly described in the following paragraphs.

**Environmental “Compliance”** - Reclamation has determined that there are many activities carried out by the agency that do not have the potential for significant environmental impacts. This list of activities is categorically excluded from further consideration under the National Environmental Policy Act. There are four areas of categorically excluded activities, including: A. General Activities, B. Planning Activities, C. Project Implementation Activities, and D. Operations and Maintenance Activities (Reclamation Draft NEPA Handbook-2000).

Most major repair work on existing facilities that is categorically excluded from further NEPA consideration falls into one of the following two categories:

- *C. Project Implementation Activities* and the following categorical exclusion - C-3. Minor construction activities associated with authorized projects which correct unsatisfactory environmental conditions or which merely augment or supplement, or are enclosed within existing facilities; or
- *D. Operations and Maintenance Activities* - D-1. Maintenance, rehabilitation, and replacement of existing facilities which may involve a minor change in size, location, and/or operation.

While completion of a categorical exclusion checklist (CEC) is not overly time consuming or expensive, it must be completed before major repair work can begin, and should therefore be considered early on in the planning and decision-making process. Routine and recurring O&M is usually covered by “programmatic” NEPA compliance, often in the form of a CEC. However, major repair work frequently requires action-specific NEPA compliance. If, in the course of preparing a CEC, it is determined that a major repair could result in significant impacts, an Environmental Assessment (EA) must be prepared. If significant impacts will indeed result from the proposed action, an Environmental Impact Statement (EIS) will be required. Environmental Assessments and Impact Statements can become costly and time consuming, which often becomes a source of concern or disagreement between Reclamation and our customers. NEPA is a public disclosure process and therefore typically does not preclude a major repair from proceeding. However, the NEPA process can result in modifications to the proposed action to accommodate environmental considerations, and/or to implement mitigation measures required to offset adverse impacts.

Environmental compliance may affect how or when major repair work is undertaken, as follows:

- Delays associated with securing permits, clearance, and/or Section 401 water quality certification as a required component of a Nationwide or Individual Permit under Section 404 of the CWA.



- Changes in approach to accommodate environmental commitments, such as timing of repair work to avoid impacts to endangered species or migratory birds.
- Environmental commitments or mitigation that typically requires or invokes specific coordination and consultation with U.S. Fish & Wildlife Service, and others, to avoid adverse environmental impacts.
- Modifications to major repair designs. For example, the McClusky Canal inlet channel required dredging and new dike construction after 10 years of operation to restore the channel capacity which had declined over the years as a result of excessive deposits of wind- and wave-driven sediment. As a condition of the Section 401 water quality certification (required by CWA), the North Dakota Department of Health prohibited dredge material from being discharged back into the lake to create a waterfowl nesting island, as originally planned. The dredge material was required to be discharged onto adjacent upland areas. This environmental requirement resulted in project delays and significant cost increases.
- If a facility scheduled for a major repair exceeds 50 years of age and the physical appearance or historical integrity would be affected, then the Section 106 process of the National Historic Preservation Act (NHPA) could result in a delay while mitigation is identified and undertaken if consultation with the State Historic Preservation Office (SHPO) is not accomplished early in the planning stage.

**Example:** A NHPA mitigation plan took more than four years to complete before a water control structure could be replaced at Arrowwood National Wildlife Refuge. This work was being done to bring project operations into “compatibility” with the original purposes and objectives of the National Wildlife Refuge.

- Previously undetected cultural resources discovered during major repair work could result in delays while the consultation process is completed and a resolution found.
- Major repair activities may be deferred until performance becomes impacted to such an extent that the expense and/or time associated with NEPA compliance can be justified (i.e., cost of NEPA overrides benefits of repair).

**Example:** Glen Canyon Dam downstream sandbar removal project has been continually delayed rather than undertake an EA or EIS in order to obtain Section 401 water quality certification from the state.

While NEPA is intended to be a public disclosure process and does not prevent a proposed action from proceeding, other environmental laws are more regulatory in nature and may put repair work on hold indefinitely or until specific criteria can be met or processes can be completed

(e.g., ESA consultations, CWA 401 certification and 404 permitting). These types of delays and added costs can only be expected to increase as facilities continue to age and major repairs become more frequent, coupled with growing environmental awareness and an ever-expanding list of threatened and endangered species. Many Reclamation facilities have undergone major repairs (some might argue “retrofits”) in response to Biological Opinions rendered by the U.S. Fish & Wildlife Service under the Endangered Species Act (implementation of “Reasonable and Prudent Alternatives”). There are many examples of this throughout the west (particularly in PN Region) relative to Salmon Recovery efforts.

When customers weigh the cost of major repairs that they must repay, they frequently overlook the time and expense associated with environmental compliance. This is true regardless of whether facility O&M has been transferred or reserved by Reclamation.

**Environmental Needs or Benefits** - Occasionally, major repairs to existing facilities are driven solely by the identification of environmental needs or benefits. Reclamation facilities may be found to be responsible for creating a particular set of environmental conditions that, once identified, need to be rectified. This situation is most often related to project operations which affect water quality and/or quantity resulting in degradation of critical fish or wildlife habitat. For example, major repairs are being considered to the diversion dam for the Lower Yellowstone Project which has been determined to impact the endangered pallid sturgeon. Such repairs are not always a result of adverse impacts resulting from project operations, but may also be justified by a project’s capability to “enhance” particular environmental conditions of importance.

## SOCIAL

Social value recognizes that an asset has an intrinsic value beyond the basic cost of their acquisition, construction or replacement that distinguishes them from other assets. Assets which are iconic have significant social value. In some cases, the treatment of social value is governed by Historic Preservation programs, either through federal law, such as the National Historic Preservation Act (NHPA) and the Archaeological Resources Protection Act (ARPA). In other cases, social value may be governed by the intrinsic value a stakeholder community places on it. In still other cases the social value may be more directly related to a cultural value of an asset. What is the value of preserving a “way of life”? In all cases, the social value of an asset is difficult to determine at best and may be impossible in many cases. The true social value of an asset may only be qualitatively assessed through stakeholder involvement.

# MANAGING FOR EXCELLENCE

## Major Repair Challenges

### Team 18

## Appendix C – Outreach Activities

### I. INTERNAL OUTREACH (May or early June)

- Objective: Ensure that we have captured the process and tools that are currently available for use

Introduce suggestions that could provide the transparency and customer/stakeholder involvement

- Target Audience: O&M Managers within each Region

Suggest one Team Member be assigned to each Region and have one meeting per Region

- Pre-defined draft PowerPoint presentation

Introduce Draft Product

- Inventory of Process
- Inventory of Tools or Measures

- Product: Record Reactions and Suggestions  
Modify Draft Product Accordingly

### II. TARGETED PARTIAL OUTREACH (July)

- Objective: Obtain reaction from select group of customers to draft process, tools, and measures

Determine if goal of transparency and customer/stakeholder involvement is accomplished adequately.

- Target Audience:

Each team member will work with local O&M managers to select a number of customers within each Region. We may want to combine this outreach with Teams 17 and 19.

- Pre-Defined Draft PowerPoint Presentation (Revised from Internal Outreach)
  - Introduce Draft Product
    - Suggested Process
    - Inventory of Tools or Measures
  
  - Does Product Hit Target?  
If Not, Why Not? What is Missing?  
Where does it go Wrong or Fall Short?
  
  - Are there other Products Needed?  
I.E. Agreements, Committees, Etc.
- Product: Record Reactions and Suggestions  
Modify Draft Product Accordingly or Revise Process for another Try.

### III. INTERNAL OUTREACH (Late July and Early August)

- Objective: Close the information loop with O&M Managers to make them aware of the reactions and suggestions by the customer
- Target Audience: O&M Managers within each Region
- Revised draft PowerPoint presentation
- Product: Record reactions and suggestions and incorporate into new draft

### IV. WORKSHOP AT STAKEHOLDER MEETING (September or October)

- Objective: Obtain Reaction from National Stakeholders to Draft Process, Tools and Measures  
  
Determine if Goal of Transparency and Customer/Stakeholder Involvement is Accomplished Adequately
- Target Audience: National Stakeholders
- Present Draft PowerPoint
  - Suggested Process
  - Available Tools or Measures

### Determine Shortcoming of Product

- Product: Record Shortcomings and Revise Product Accordingly

#### V. TRANSMIT DRAFT PRODUCT FOR FINAL COMMENT (October or November)

- Objective: Obtain Final Thoughts and Ideas
- Target Audience: National Stakeholders and Internal Organization
- Product: Final Recommendations (October or November)

#### VI. ANALYSIS OF OUTREACH ALTERNATIVES

Our goal is to obtain support internally before arriving at a proposed solution that could be presented to customers and stakeholders. If we leave out the internal organization, we may derive a product that may not work or may not be accepted internally and would ultimately fail even if it were accepted by stakeholders.

Working with a subset of customers in each Region should provide a broad base to get meaningful comments and suggestions that are likely to be accepted by the full customer and stakeholder community. Small groups are more forgiving if we miss the target initially and it will be easier to correct any false starts. They also can be great allies with the larger groups later. If we successfully work with customers in each Region, only one national stakeholder presentation is probably necessary.

An alternative approach would be to outreach once to all stakeholders which could work and save the time and money of the first targeted audience. It may also miss the mark and cause a longer and more expensive route if we inadvertently missed something.

Another alternative is to plan on two National Outreach efforts which will be more costly but could meet our objectives.

## Internal Outreach Contacts

### Great Plains Region:

Gary Campbell, Regional Office  
Jeff Ticknor, Regional Office  
Martin Bauer, Eastern Colorado Area Office  
Craig Peterson, Regional Office  
Scott Boelman, Regional Office  
Larry Schoessler, Regional Office  
Mike Ryan, Regional Office  
Arden Freitag, Dakotas Area Office

### Lower Colorado Region:

Randy Chandler, Phoenix Area Office  
Jennifer McCloskey, Yuma Area Office  
Ron Smith, Boulder Canyon Operations Office  
Bill Bruninga, Lower Colorado Dams Office  
Deborah Linke, Office of Programs and Policy Services

### Upper Colorado Region:

Kerry MCalman, Regional Office  
Arlo Allen, Regional Office  
Ed Vidmar, Provo Area Office  
Ed Warner, Grand Junction Area Office  
Ken Rice, Glen Canyon Dam  
Wayne Xia, Regional Office

### Mid Pacific Region:

Richard Kristof, Regional Office  
Bob MacDougal, Lahontan Basin Area Office  
Richard Sandoval, Regional Office  
Mel Wallace, Regional Office  
Joe Pennino, South Central California Area Office  
John Williamson, South Central California Area Office  
Ed Roza, Central California Area Office  
Cecil Lesley, Klamath Area Office  
Tony Buelna, South Central California Area Office

### Pacific Northwest Region:

Steve Jarsky, Snake River Area Office  
Terry Kent, Regional Office  
Kathy Marshall, Regional Office  
Jerrold Gregg, Snake River Area Office  
Jerry Cheek, Upper Columbia Area Office

### **Draft Questions for Internal Outreach**

- a) What constitutes a major repair challenge?
- b) How well does the draft process identify and justify a major repair?
  - a. What does your process look like?
  - b. Are the process and tools presented sufficiently quantitative to allow you to prioritize funding? If not, what do you need?
- c) Will the draft process work for “Transferred Works” and “Reserved Works”?
  - a. If not, what needs to be added or revised to account for both classes of assets?
- d) We have built transparency and stakeholder involvement into the draft process. Will the draft process fit into your operation? If not, why?
  - a. How and when do you involve stakeholders into your existing decision-making process?
  - b. Can you give us examples of successes and failures when involving customers and stakeholders in your decision-making process for major repairs?
  - c. How do you weigh suggestions or concerns of stakeholders with those of customers? (look for examples)
  - d. How do you schedule items identified by reviews?
- e) Are there other tools or measures that we should consider?
  - a. How do you factor social and environmental considerations into your decision-making process for justifying major repairs?
  - b. Are there weaknesses or voids in the existing tools and measures?
  - c. How do you factor in safety and security?
- f) Are we missing anything or are there things we should be considering when trying to justify a major repair? (i.e., cash flow, cost levelization)
- g) Who would be good external customers or stakeholders to contact to get their reaction to this information? We would like a mix of water/power customers, good and less than good experiences, stakeholders, etc. What would be the best way to meet with them? i.e., in a group or individually?
- h) Do you have any questions for us or suggestions that are fit to print?

## Targeted External Outreach

**Introduction:** Team 18, **Justifying Major Repairs**, has developed a process chart and inventoried a set of tools to determine if a major repair is justified. The internal organization has been briefed and questioned on the adequacy of the process and tools. The process has been slightly modified as a result.

Our next step is to present the process and tools to a targeted set of external customers to get their reaction and ideas prior to going back to the internal customers and ultimately to the national stakeholders. Our objective at this stage is to discover if the team has adequately addressed the concerns of a sample of customers in the process of identifying and determining the need for a major repair.

**Criteria for Selecting Sample:** We want to get a broad cross section of customers to review the process and tools defined to this point. The following criteria was used to identify the sample:

1. Each Region sampled for geographic diversity.
2. One water and one power customer per Region ensures that both customer classes are represented across geographic boundaries
3. At least one customer of reserved works and one customer of transferred works to ensure the process and tools are adequate for both major divisions.
4. At least one large and one small customer to ensure that the spectrum of size has been covered.
5. At least one multipurpose and one single purpose facility to ensure that purpose does not pose a problem in the process.
6. At least one single purpose irrigation facility to ensure that ability to pay is tested within the process.
7. At least one multipurpose facility where the irrigation component is quite small to ensure that budget processes can be considered.

### Proposed Sample:

| Region | Power                     | Water  |
|--------|---------------------------|--|
| GP     | Western States Power Corp | Greenfield Irrigation District   |
| PN     | BPA                       | Twin Falls Canal Company<br>A&B Irrigation District                          |
| UC     | CREDA                     | Weber Basin Water Conservancy District<br>Dolores Water Conservancy District |
| LC     | MWD                       | SRP  |
| MP     | SMUD                      | San Luis Delta Mendota Water Authority                                       |



### Silicon Valley Power

**Procedure for Sampling:** Each Team member will sample his own Region and involve the Regional Director in confirming the sample selection and provide the opportunity for the Region or area office to make the initial contact and accompany the team member on the visit.

## External Outreach Contacts

### Great Plains Region:

John Allum, Western States Power Corporation  
Bob Hardin, Greenfields Irrigation District

### Lower Colorado Region:

John Sullivan, Salt River Project  
Guy Hammond, Salt River Project  
Mark Mitchell, Salt River Project  
Ann Finley, Metropolitan Water District of Southern California  
Kirsten Moore, KR Saline  
Paul Cherrington, Salt River Project  
Rich Lehman, Salt River Project  
Larry Bottolfson, Salt River Project

### Upper Colorado Region:

Leslie James, Colorado River Energy Distributors Association  
Tage Flint, Weber Basin Water Conservancy District  
Mark Anderson, Weber Basin Water Conservancy District  
Kenneth Smith, Delores Water Conservancy District  
Bruce Harrison, Delores Water Conservancy District

### Mid Pacific Region:

Edward Roman, Sacramento Municipal Utility District  
William Reichmann, Silicon Valley Power  
Bob Martin, San Luis Delta Mendota Water Authority  
Frances Mizuno, San Luis Delta Mendota Water Authority

### Pacific Northwest Region:

Vince Alberti, Twin Falls Canal Company  
Dan Temple, A&B Irrigation District  
Lew Tauber, Bonneville Power Administration

### **Draft Questions for Targeted External Outreach**

1. Does our definition of a major repair fit the process defined?
2. How well does the draft process identify and provide a framework for justifying a major repair?
  - a. What does your process look like?
  - b. Is the process and tools presented sufficiently quantitative to allow you to prioritize funding? If not, what do you need?
3. How and when have you, as a customer, been involved in the decision-making process for a major repair?
  - a. Successes?
  - b. Failures?
4. We have built transparency and stakeholder involvement into the draft process. Will this process address any of the concerns you may have regarding identifying and justifying major repairs? What could be done to improve the process?
5. How do you handle recommendations resulting from RO&M's? How do you prioritize or decide which recommendations to implement?
6. Are there other tools or measures that we should consider?
  - a. How do you factor social and environmental considerations into your decision-making process for justifying major repairs?
  - b. Are there weaknesses or voids in the existing tools and measures?
  - c. How do you factor in safety and security?
7. Are we missing anything or are there things we should be considering when trying to justify a major repair? (i.e., cash flow, cost levelization)
8. Do you have any questions for us or suggestions that are fit to print?

# **MANAGING FOR EXCELLENCE**

**Major Repair Challenges**

**Team 18**

Appendix D – PowerPoint Presented at Stakeholder  
Meeting

# RECLAMATION

*Managing Water in the West*

**Reclamation Meeting on  
*Managing For Excellence*  
Breakout Session:  
Process and Tools to Determine “Go” or  
“No Go” for Major Repairs**

Salt Lake City, UT  
September 19-20, 2006



U.S. Department of the Interior  
Bureau of Reclamation

## **Functional Area: Major Repair Challenges**

**Overall Objectives:**

- Sustainable Infrastructure
- Financial Viability For Water Users
- Customer Involvement
- Transparent Process

RECLAMATION

## **Action Item 18: Develop Process or Measuring Tools to Determine Whether a Major Repair Project is Warranted**

### **Objectives:**

- **Incorporate Transparency and Customer Involvement into the Process**
- **Determine if Tools are Adequate**

**RECLAMATION**

### **Tasks**

- **Research Existing Process and Measuring Tools**
- **Seek Feedback (internal and external) on Effectiveness**
- **Evaluate Need for Additional Processes and Measuring Tools**
- **If Needed, Develop Additional Processes and Measuring Tools**
- **Submit Alternatives and Recommendations for Review**

**RECLAMATION**

## Progress to Date

- **Inventoried Existing Process and Tools**
- **Developed Process Emphasizing Customer Involvement and Transparency**
- **Completed Internal Outreach**
- **Completed Targeted External Outreach**

RECLAMATION

## Next Steps

- **Obtain Broader Stakeholder Feedback**
- **Modify Process and/or Tools Based on Feedback**
- **Recommend Adoption of Process or Alternative**

RECLAMATION





## Purpose of Breakout

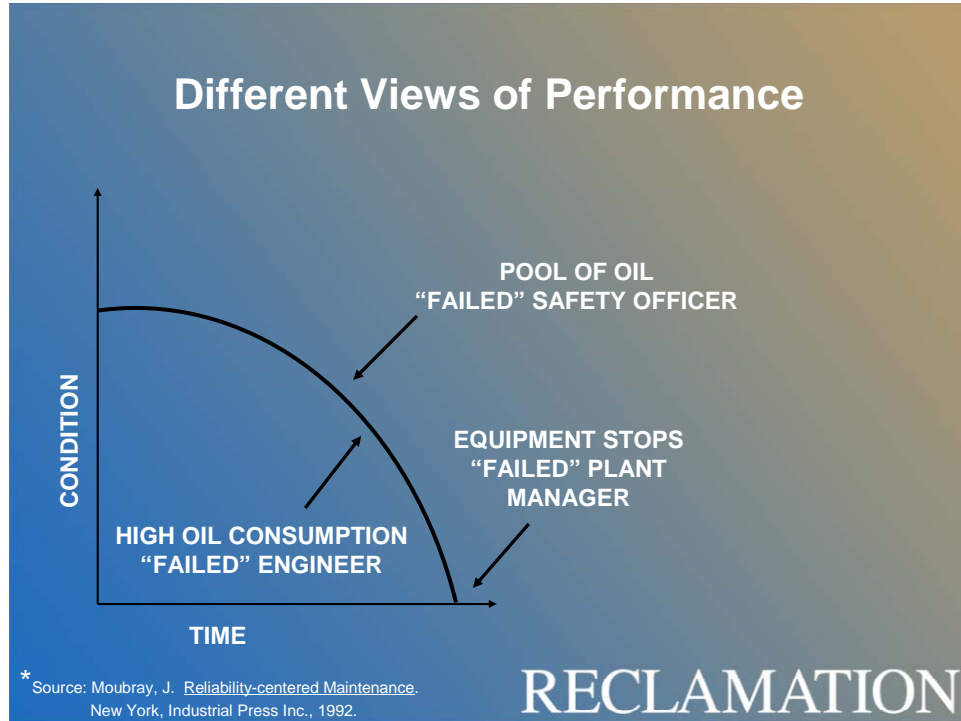
- Present Proposed Process and Tools to Wide Range of Customers and Stakeholders
- Solicit Comments and/or Suggestions for Improvement

RECLAMATION

## Definition

Major Repair =  
> 10% of O&M  
or  
> \$100,000

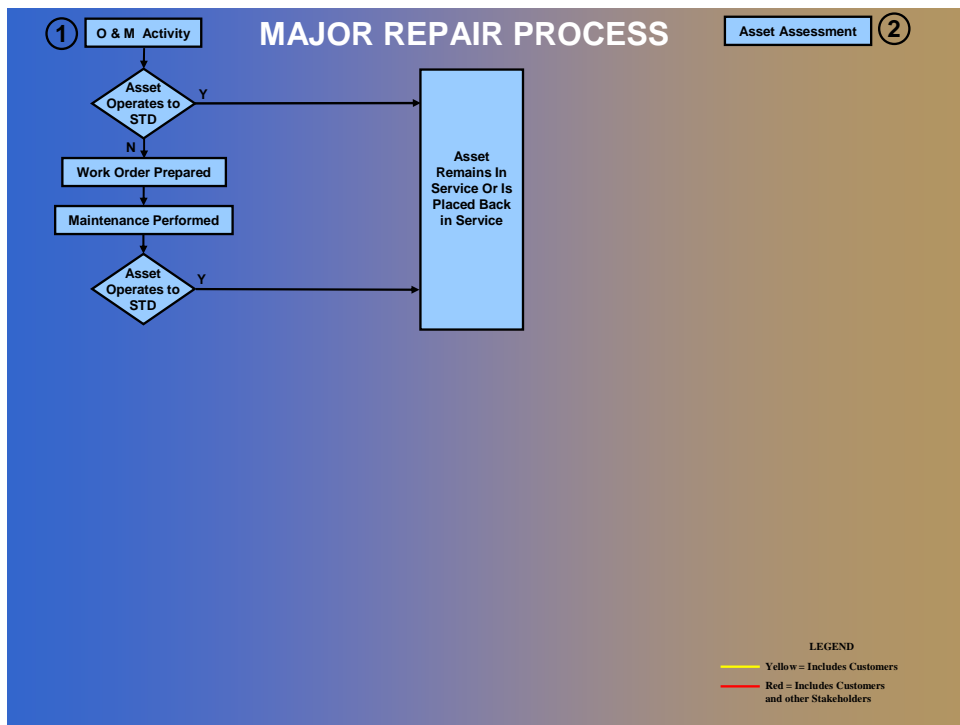
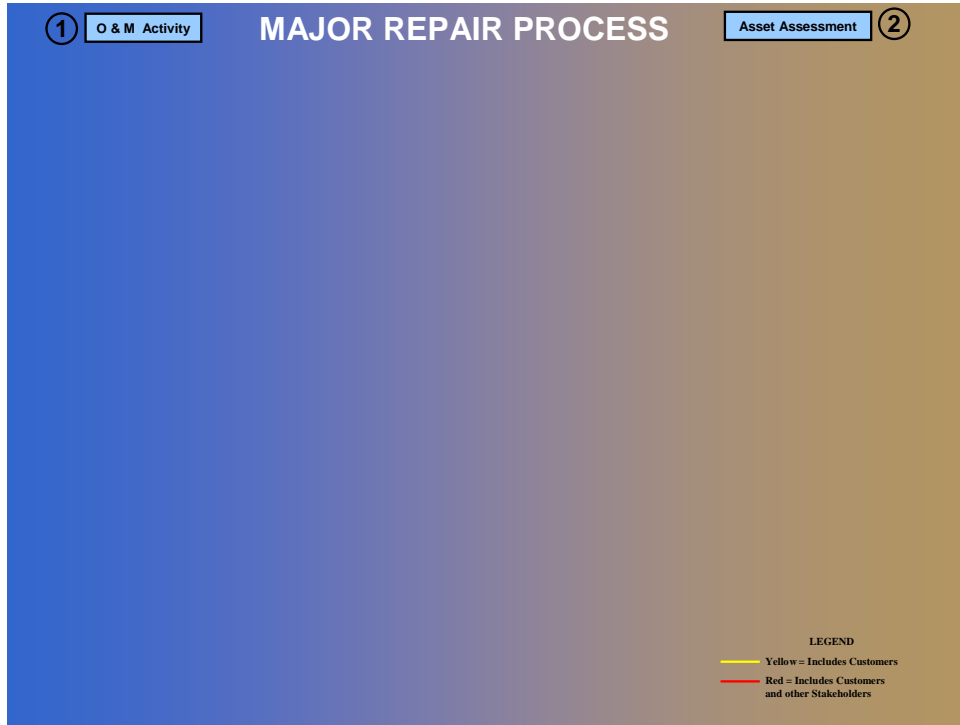
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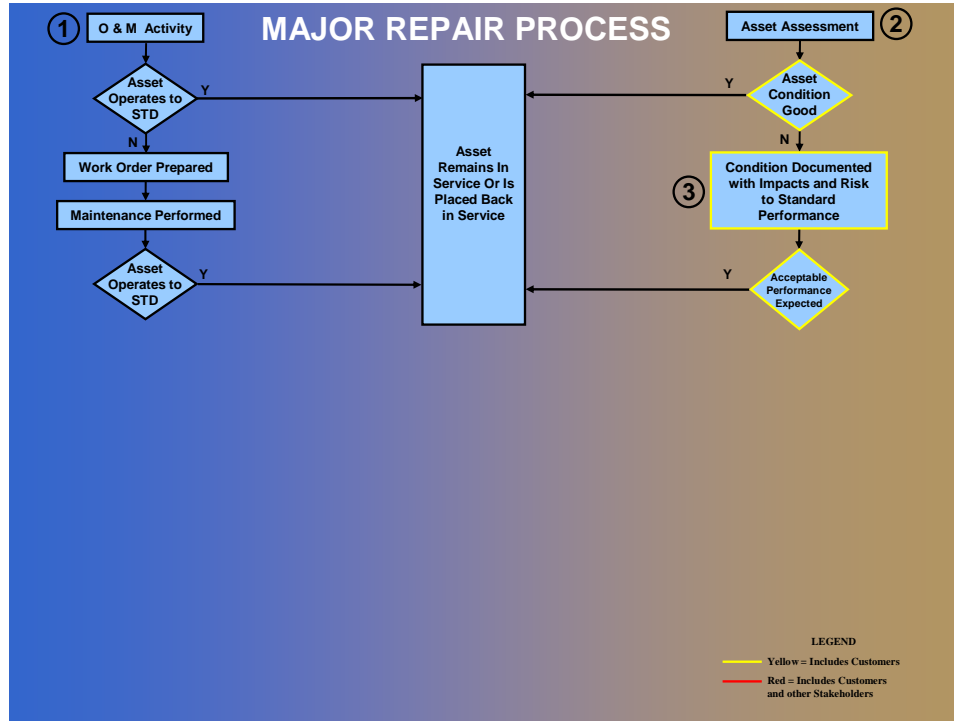


### Postulate

- Performance is the Primary Driver of Major Repairs
  - Actual
  - Predicted

RECLAMATION

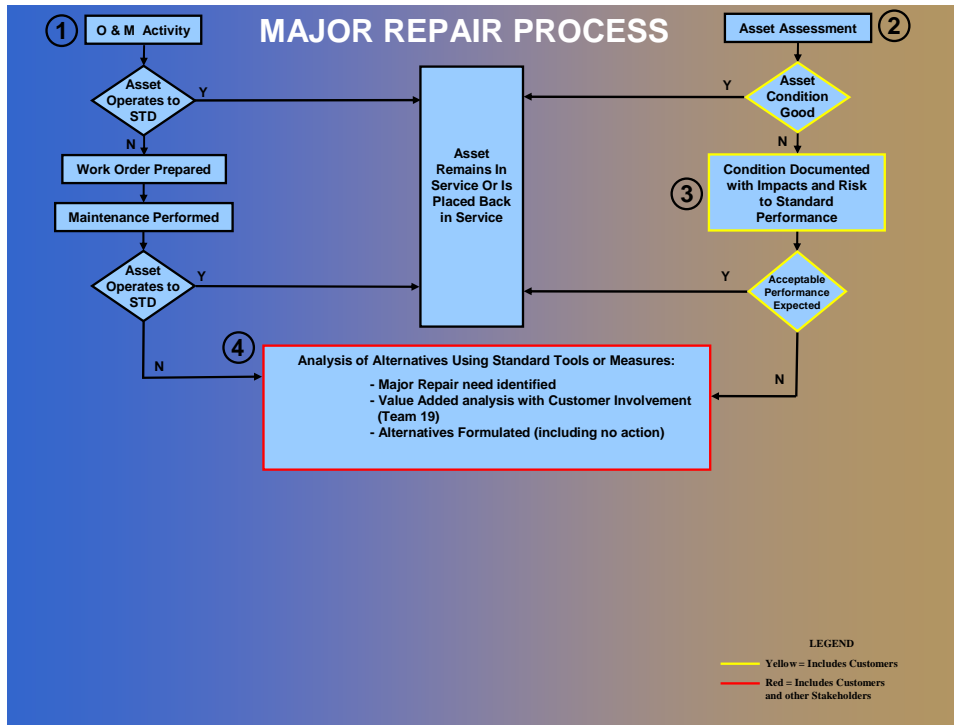




## Reviews for Predicted Performance

- Annual Facility O&M Reviews
- Periodic Facility Reviews
- Comprehensive Facility Reviews
- Associated Facility Reviews
- SEED & SOD Activities
- Monitoring & Instrumentation
- Customer Reviews
- Other Informal Reviews

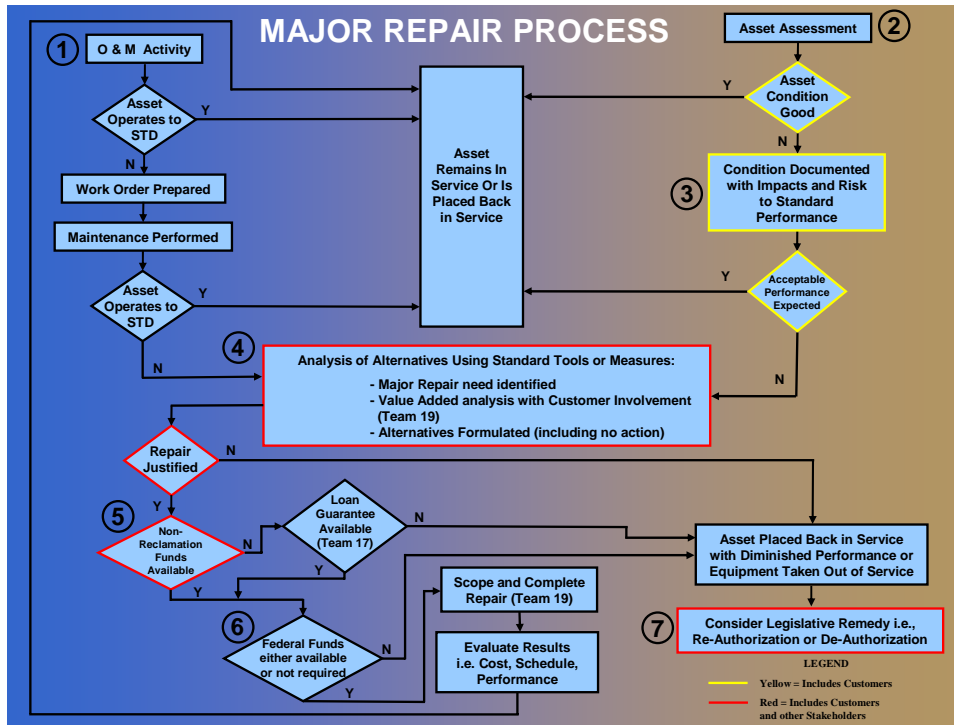
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## Analysis Tools

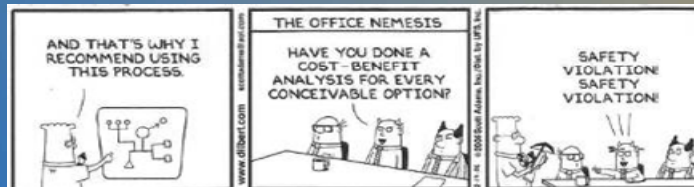
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|---|-------|-------|-----|------|-----|------|----------|--|--|
| <p><u>Economic/Financial Analysis</u></p> <ul style="list-style-type: none"> <li>NPV</li> <li>B/C</li> <li>IRR</li> <li>Payback Period</li> <li>Lifecycle Cost Analysis</li> <li>Cost Effectiveness</li> <li>Cash Flow</li> </ul> <p><u>Risk Analysis</u></p> <ul style="list-style-type: none"> <li>P (Loss of Life)</li> <li>EV = P(f) • C</li> </ul> <p><u>Environmental/Regulatory Analysis</u></p> <table border="0" style="width: 100%;"> <tr> <td>NEPA</td> <td>NPDES</td> </tr> <tr> <td>ESA</td> <td>FERC</td> </tr> <tr> <td>CWA</td> <td>NERC</td> </tr> <tr> <td>Security</td> <td></td> </tr> </table> | NEPA  | NPDES | ESA | FERC | CWA | NERC | Security |  | <p><u>Technical Tools</u></p> <ul style="list-style-type: none"> <li>Engineering Studies</li> <li>Modeling &amp; Monitoring</li> <li>Asset Prioritization</li> <li>Design Standards</li> </ul> <p><u>Social/Political Considerations</u></p> |
| NEPA  | NPDES |       |     |      |     |      |          |  |  |
| ESA   | FERC  |       |     |      |     |      |          |  |  |
| CWA   | NERC  |       |     |      |     |      |          |  |  |
| Security  |       |       |     |      |     |      |          |  |  |

RECLAMATION



## Managing for Excellence

Questions?



# RECLAMATION