NWHF hydroAMP Update

Overview, Guide Updates and New Application
5/16/17

Overview

- Originally developed by the US Army Corps of Engineers, Bureau of Reclamation, Hydro Quebec and Bonneville Power Administration.

- Goal: An objective, consistent and efficient condition assessment framework to inform asset management decision making.

- Released in 2006

Condition Assessment Principles

- Objective results
- Developed from routine tests and inspections
- Simplified process
- Easy interpretation
- Technically sufficient (valid though not necessarily perfect)
- Consistent and repeatable results
- Start small, expand with time
- Open to improvement

Two-Tier Approach

Tier 1

- The rating is based on condition indicators derived from tests, measurements, and inspections that are normally performed during routine O&M activities.
- The assessment results in a “Condition Index” with a rating scale of zero to 10; higher CI means better condition.
- Mid- to low-range values may trigger a Tier 2 evaluation.
- Assessment results are easily entered into CMMS or other databases for tracking and reporting.

Tier 2

- Includes in-depth, non-routine tests or inspections that may be invasive and/or require specialized equipment and expertise not normally found at the hydro plant.
- Results are used to adjust the Condition Index score (either up or down).
- Adds confidence to the assessment results and conclusions.

Current Equipment Guides

The hydroAMP Guide contains guides for the following equipment:

- Turbines
- Generator Stators
- Generator Rotors
- Governors
- Exciters
- Transformers
- Circuit Breakers
- Penstocks
- Surge Arrestors
- Cranes
- Batteries
- Compressed Air System
- Emergency Closure Gate and Valve
- Balance of Plant

Use results of the insulation resistance and polarization index tests to determine Condition Indicator score:	
Results are normal and similar to previous tests.	3
Results indicate minor decrease in insulation resistance or polarization index (e.g., factor of 2 decrease).	2
Results indicate significant decrease in insulation resistance or polarization index (e.g., factor of 10 decrease).	1
Insulation resistance or polarization index is below minimum acceptable values.	0

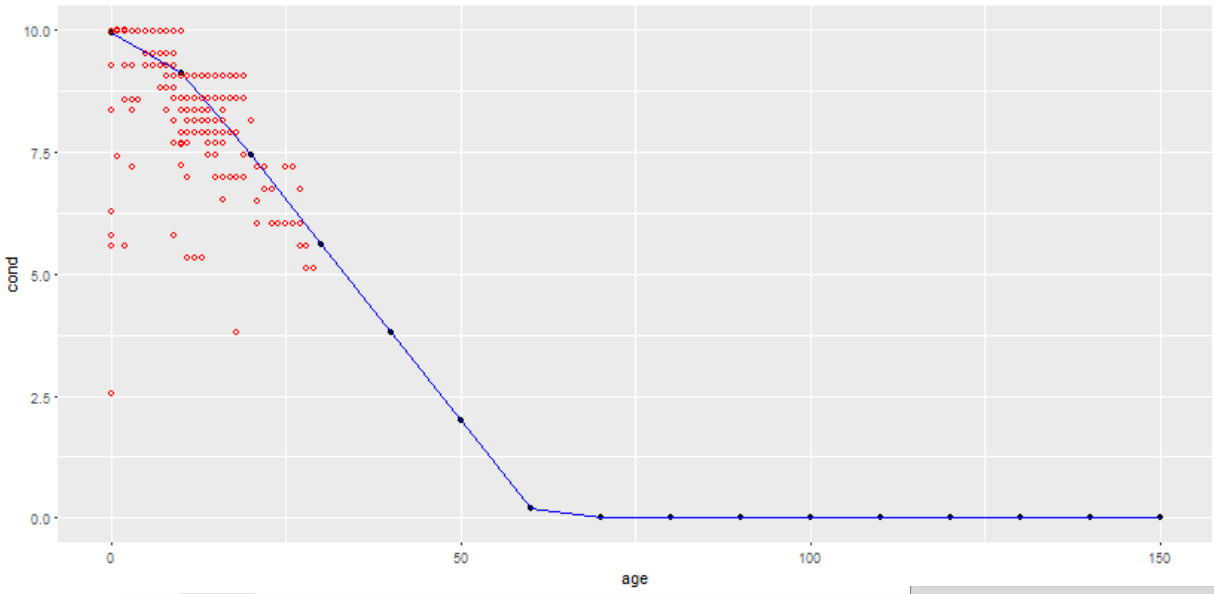
Revisions and New Guides

- Turbines
  - Will be split into Turbine Runner (Kaplan, Francis, Impulse) and Turbine Components
- Governors
  - Will be split into Controls and Hydraulic Components
- Electrical Components Guide
  - A more specific guide based on the Balance of Plant framework for Station Service and various electrical equipment
- Other Guides
  - Minor changes to align framework
- Changes will launch in October/November 2017

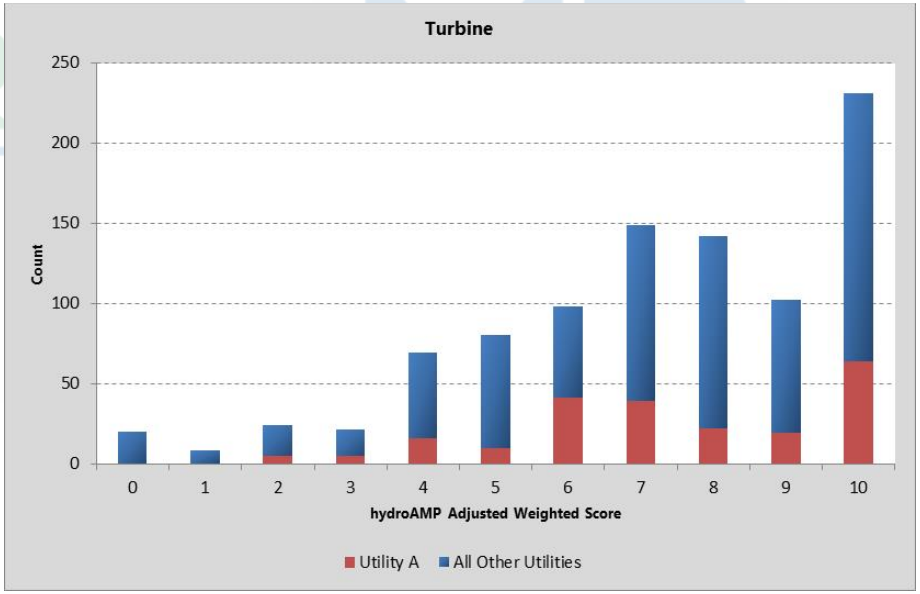
New hydroAMP Application

- CEATI is in the process of replacing the hydroAMP application, currently built and hosted by BPA, with a new application designed by Copperleaf.
- The new hydroAMP application is highly flexible and scalable, making changes to guides much simpler and easier to implement.
- Can view, edit and delete past assessments as well as view the guide version used for the assessment.
- Benchmarking Capabilities
  - Condition and Age at Assessment by Equipment Type
  - Compare your assets to the population
  - Others?
- Launches July 2017
  - Current data will be transferred over to the new application.

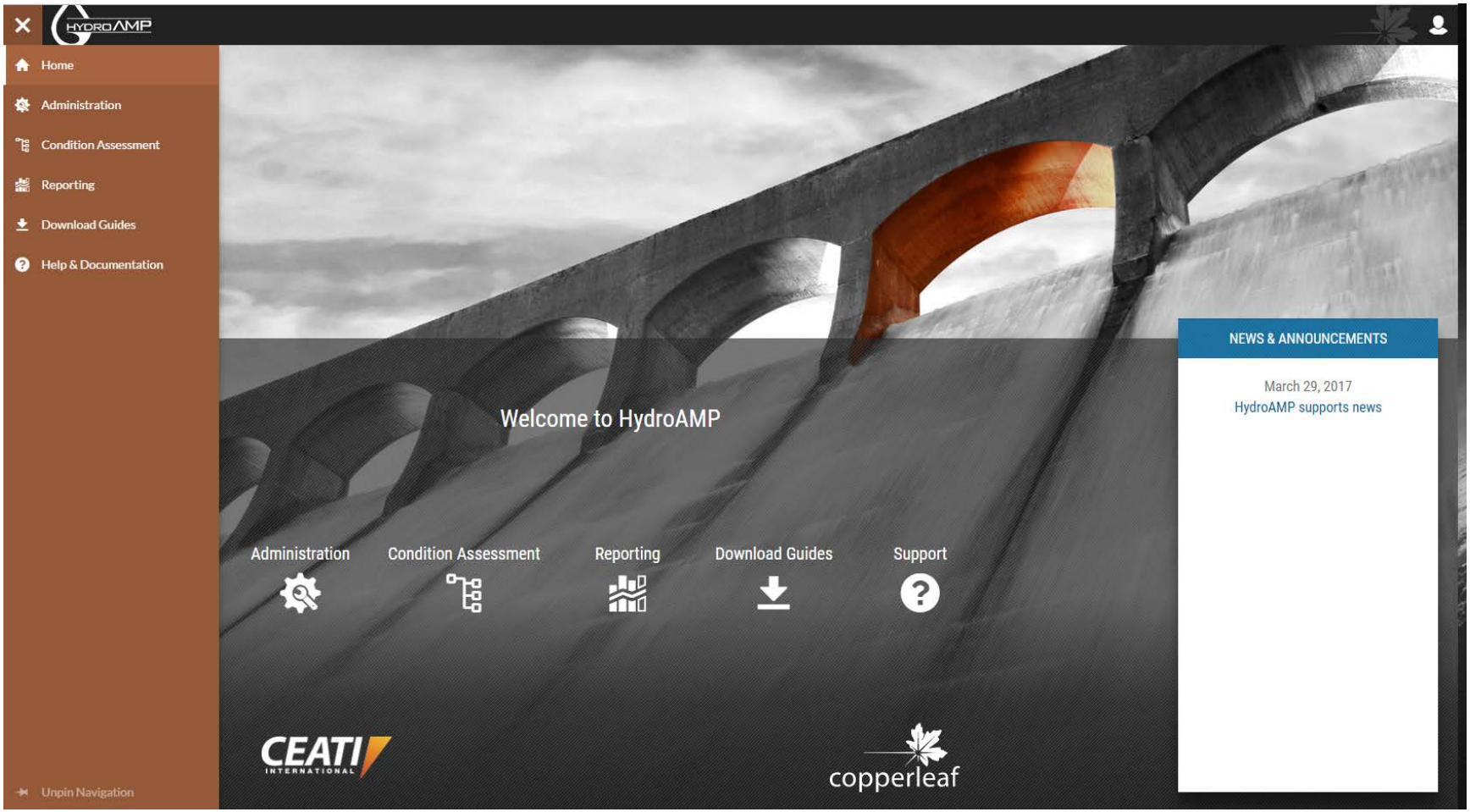
Benchmarking and Data Analysis



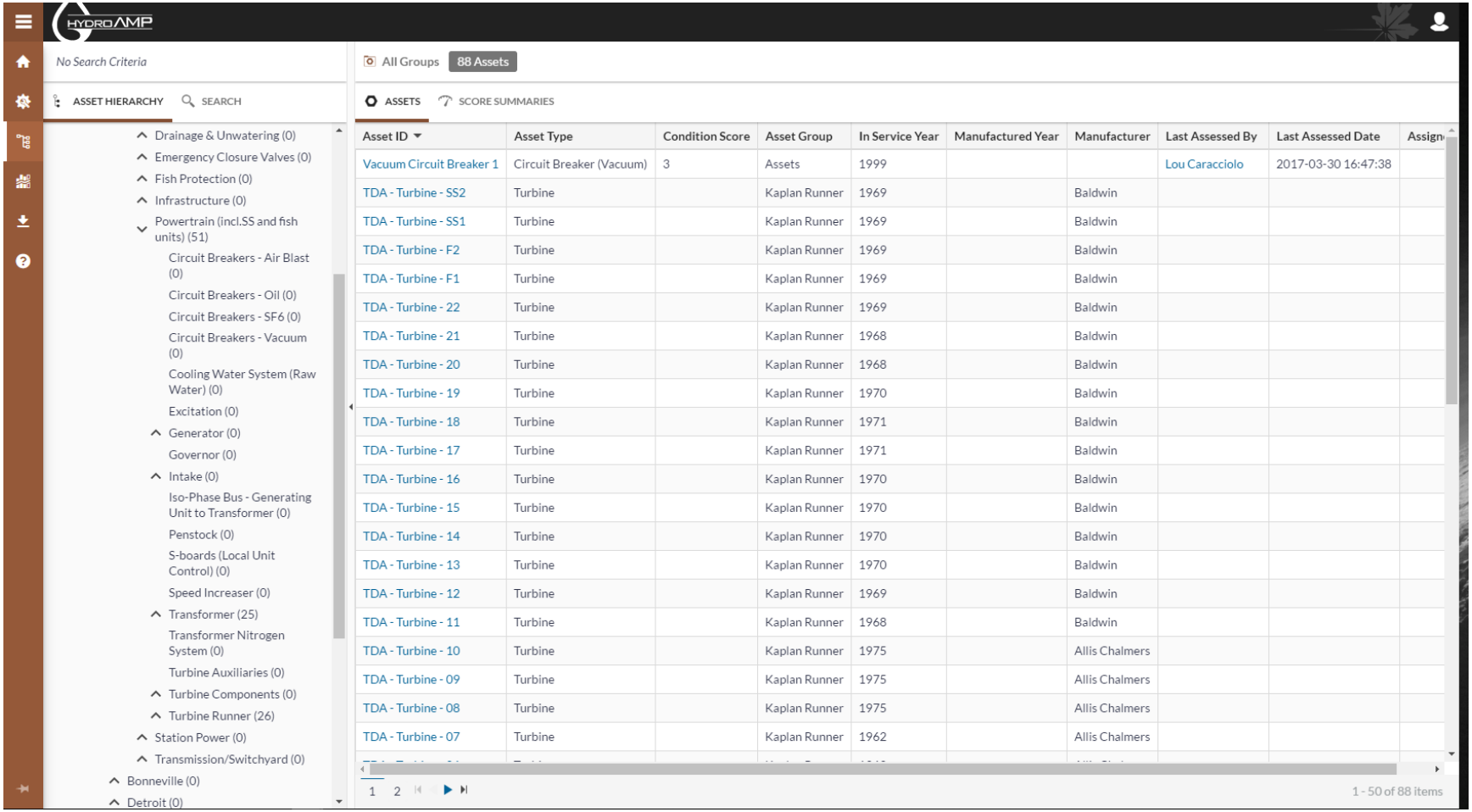
The hydroAMP Steering Committee is interested in what types of data utilities would like to see captured in hydroAMP that could be used for analysis and benchmarking.



New Homepage



Asset Hierarchy



Asset ID	Asset Type	Condition Score	Asset Group	In Service Year	Manufactured Year	Manufacturer	Last Assessed By	Last Assessed Date	Assign
Vacuum Circuit Breaker 1	Circuit Breaker (Vacuum)	3	Assets	1999			Lou Caracciolo	2017-03-30 16:47:38	
TDA - Turbine - SS2	Turbine		Kaplan Runner	1969		Baldwin			
TDA - Turbine - SS1	Turbine		Kaplan Runner	1969		Baldwin			
TDA - Turbine - F2	Turbine		Kaplan Runner	1969		Baldwin			
TDA - Turbine - F1	Turbine		Kaplan Runner	1969		Baldwin			
TDA - Turbine - 22	Turbine		Kaplan Runner	1969		Baldwin			
TDA - Turbine - 21	Turbine		Kaplan Runner	1968		Baldwin			
TDA - Turbine - 20	Turbine		Kaplan Runner	1968		Baldwin			
TDA - Turbine - 19	Turbine		Kaplan Runner	1970		Baldwin			
TDA - Turbine - 18	Turbine		Kaplan Runner	1971		Baldwin			
TDA - Turbine - 17	Turbine		Kaplan Runner	1971		Baldwin			
TDA - Turbine - 16	Turbine		Kaplan Runner	1970		Baldwin			
TDA - Turbine - 15	Turbine		Kaplan Runner	1970		Baldwin			
TDA - Turbine - 14	Turbine		Kaplan Runner	1970		Baldwin			
TDA - Turbine - 13	Turbine		Kaplan Runner	1970		Baldwin			
TDA - Turbine - 12	Turbine		Kaplan Runner	1969		Baldwin			
TDA - Turbine - 11	Turbine		Kaplan Runner	1968		Baldwin			
TDA - Turbine - 10	Turbine		Kaplan Runner	1975		Allis Chalmers			
TDA - Turbine - 09	Turbine		Kaplan Runner	1975		Allis Chalmers			
TDA - Turbine - 08	Turbine		Kaplan Runner	1975		Allis Chalmers			
TDA - Turbine - 07	Turbine		Kaplan Runner	1962		Allis Chalmers			

Condition Assessment Screen

HYDROAMP

Assets › Powerhouse › Powertrain (incl.SS and fish units) › Turbine Runner › Francis Runner › HGH - Unit 1

Assessments: March 28, 2017, 8:24 a.m. | Francis Runner

ASSESSMENT | COMMENTS | ATTACHMENTS | ASSET DETAILS

Turbine Assessment

Assessed By
Ian Muirhead (imuirhead@copperleaf.com)

Assessment Date
March 28, 2017, 8:24 a.m.

Tier 1 Turbine Condition Assessment

In-Service Year *: 1899

Rehabilitation Level *: Partial Rehabilitation

Rehabilitation Year (If applicable): 2015

3.0 SCORE

Physical Condition Cracks *: Inactive Cracks

Cavitation and Surface Damage *: Good Surface/Minimal Cavitatio

3.0 SCORE

Operation Limitations *: No Operating Restraints

3.0 SCORE

Corrective Maintenance *: Small Amounts of Corrective Maintenance

2.0 SCORE

Tier 1 Data Quality Indicator

Tier 1 Data Quality Indicator *: All completed within the normal testing

10.0 SCORE

Tier 2 Turbine Condition Assessment

HYDROAMP

Thank You

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