



# hydroAMP

## Equipment Condition Assessment for Hydro Plants

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### Why?

Aging and deteriorating equipment poses significant risk to hydro plant equipment reliability and may result in low generating unit availability and reduced plant performance. Significant investment to replace, repair or refurbish existing generation and support equipment within hydropower plants is required to assure the continued productive capability of these assets.

### Who?

The four organizations involved in hydroAMP - the Bureau of Reclamation (BOR), Hydro-Québec (HQ), the US Army Corps of Engineers (COE) and the Bonneville Power Administration (BPA)- developed a common framework to streamline, simplify and improve the evaluation and documentation of the condition of hydropower equipment and facilities in order to support business decision-making.

### What?

HydroAMP is a two-tiered methodology for assessing equipment condition and risk of failure of hydro plant equipment.

- **Tier 1** – relies on test results and/or inspections that are normally obtained during routine maintenance activities. These **Condition Indicators** are weighed together to compute an equipment **Condition Index**. The index ranges from 10 to 0 and equates to a good, fair, or poor rating.
- **Tier 2** – is used to further investigate abnormal Tier 1 results and relies on more in-depth, non-routine tests and inspections requiring specialized knowledge, diagnostic equipment or outages. These results refine or adjust the Tier 1 **Condition Index**.

The criteria for scoring the Condition Indicators under Tier 1 and for adjusting the Condition Index as part of Tier 2 are detailed in equipment **Assessment Guides**. Currently, there are 11 assessment guides on the following equipment:

<b>Generator Stator/Rotor</b>	<b>Transformer</b>	<b>Turbine</b>	<b>Governor</b>
<b>Excitation System</b>	<b>Circuit Breaker</b>	<b>Batteries</b>	<b>Compressed Air System</b>
<b>Emergency Closure Gate/Valve</b>	<b>Crane</b>	<b>Surge Arrester</b>	

Two more assessment guides are under development – “Balance of Unit” and “Balance of Plant.”

### When?

Tier 1 assessments are designed to be conducted when hydro plant personnel are completing work orders, job plans or other preventative maintenance activities on the equipment. Condition indicators are assessed as the work activity is completed and are recorded as part of closing out the work order.

## Where?

HydroAMP ratings can be stored as hard copy reports, or entered into a computerized maintenance management system or other equipment condition database. With the help from Corps staff, BPA developed a **hydroAMP Database** to record, store and provide access to Tier 1 Condition Indicators, resulting Condition Index, all equipment Assessment Guides and other relevant equipment data. The database has several important features; namely, accessibility through the internet, real-time updating of results, and reporting of indicators and indices. This website was developed in order to allow hydro plant personnel to store equipment condition data in a single repository using a common format. The database also allows for a variety of individual plant/utility reports. The hydroAMP database is currently hosted and maintained on BPA's website, but is available for use by to any organization that is using hydroAMP. The site is password protected with access granted to registered users. Unique permissions are given to users to ensure confidentiality of data.

### User Registration for Database Access:

Access to the database and website is restricted and requires a user account. Accounts may be requested by e-mail to [hydroAMP@bpa.gov](mailto:hydroAMP@bpa.gov), and must include: the user's first and last name, company name, user's job title, user's telephone number, and user's e-mail address. The request should also identify the hydro plants the user wishes to access. The hydroAMP administrator will assign a log-in and password, and will send this information via e-mail to the user. Contact Steve Bellcoff (503) 230-3319 for more information or assistance.

### Adding Plants:

To have a hydro plant established in the database for which data can recorded, a user must send a request to [hydroAMP@bpa.gov](mailto:hydroAMP@bpa.gov) that includes the following information about the plant: the plant name, a 3-letter plant abbreviation, utility/owner (include division or district, if appropriate), the number of generating units, and the number of transformers and how they are configured to the generating units. A unit can include main power generation units, station service units, fish passage units, or any other type of unit that consists of some or all of the drive-train equipment. Spares, such as transformers or turbine runners, can also be included. Contact Steve Bellcoff (503) 230-3319 for more information or assistance.

## What's Next?

The agencies that developed hydroAMP are considering several enhancements including:

- Increasing participation in hydroAMP by providing the assessment tools, database access and process to interested utilities, thereby broadening the use of the database to support analyses
- Validating and analyzing trends in Condition Indices, relating ratings to operational history
- Developing user-driven forums to advance hydroAMP implementation and review
- Expanding the number of condition indicators and equipment assessment guides
- Engaging a third party facilitator for process management of hydroAMP implementation, including assessment guide revisions, technical analyses, database maintenance and user forum coordination

## Whom?

For more information on hydroAMP development or implementation, feel free to contact:

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