

Utilizing Maximo for Data Capture / Condition Assessments to Support Asset Management at Chelan County PUD



CHELAN COUNTY
www.chelanpud.org

October 13, 2022

Presenters

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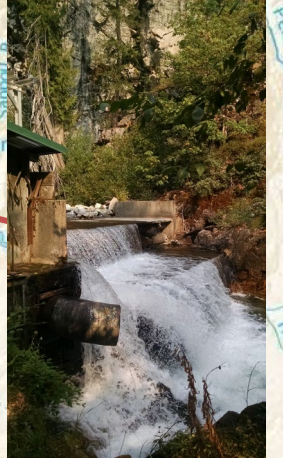
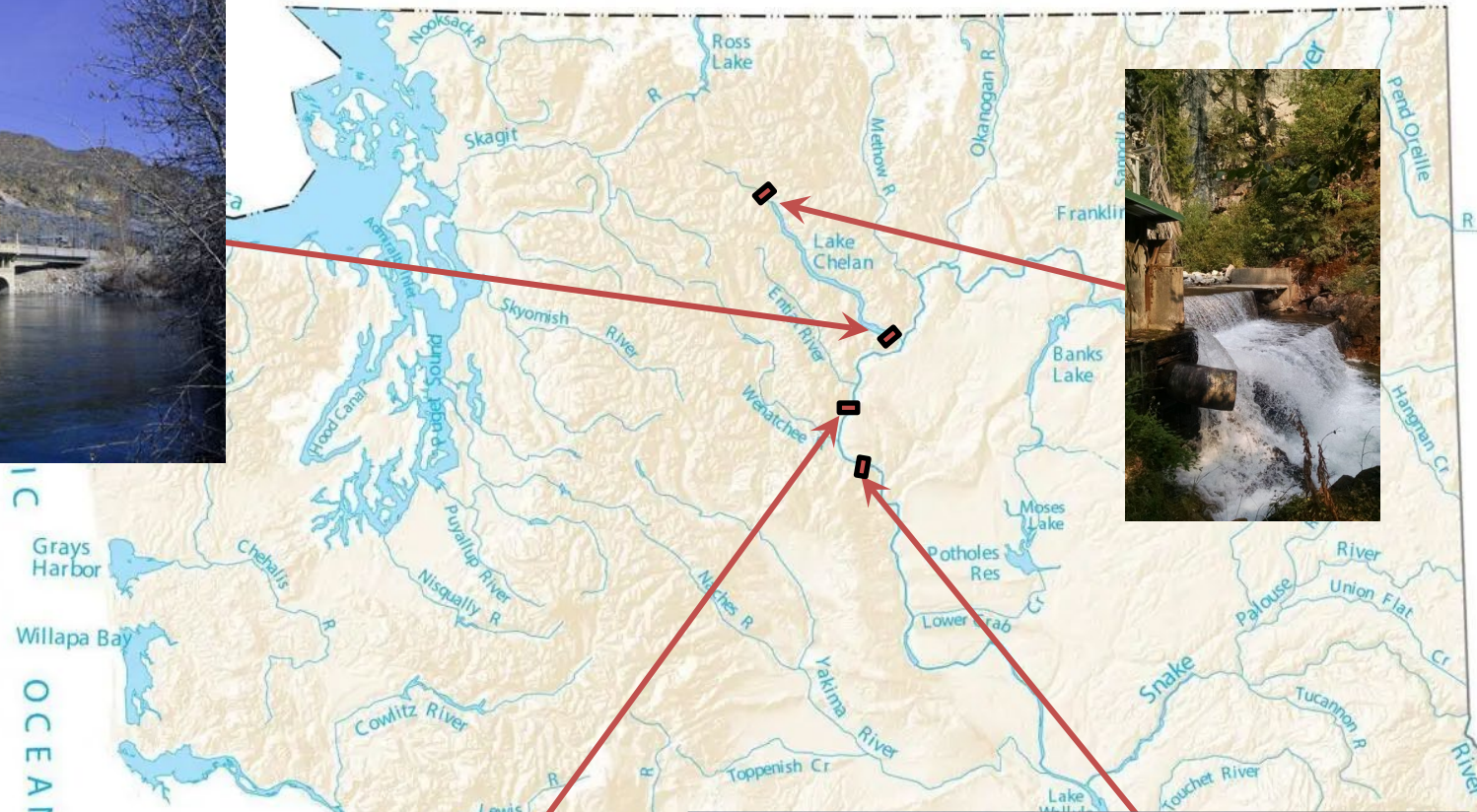
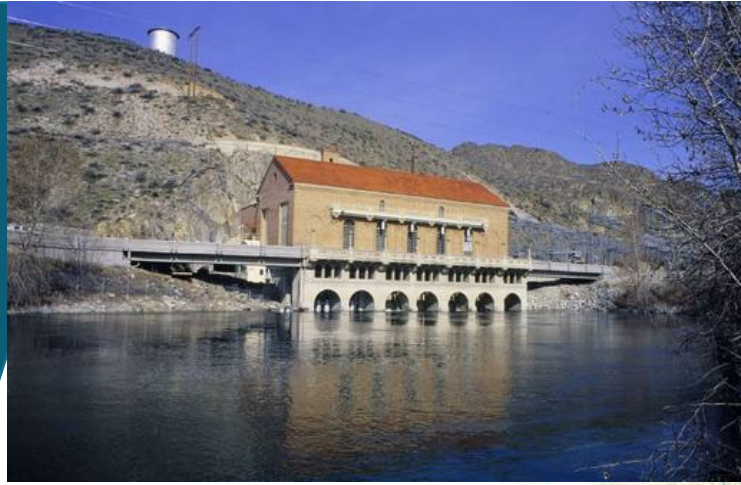
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- Chelan County Public Utility District
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Presentation Topics

- Chelan PUDs Asset Management Program
- What are condition assessments
- Using Maximo for condition assessments
- Condition assessment reporting

About Chelan PUD



Powerhouses:

Rocky Reach: ~1300MW, 11 Units,
1967

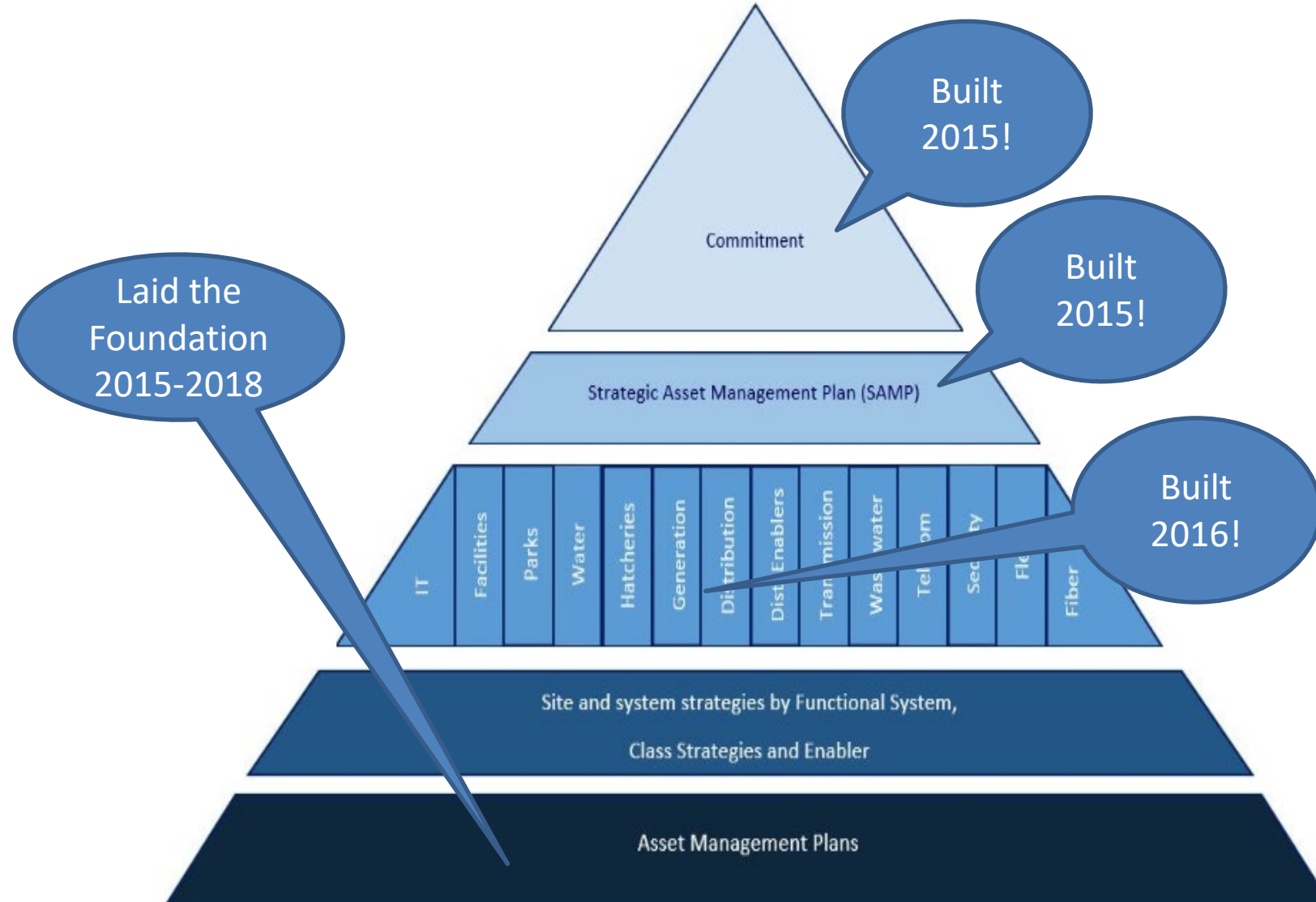
Rock Island: ~640MW, 19 units,
1933/1979

Chelan: ~65MW, 2 units,
1927

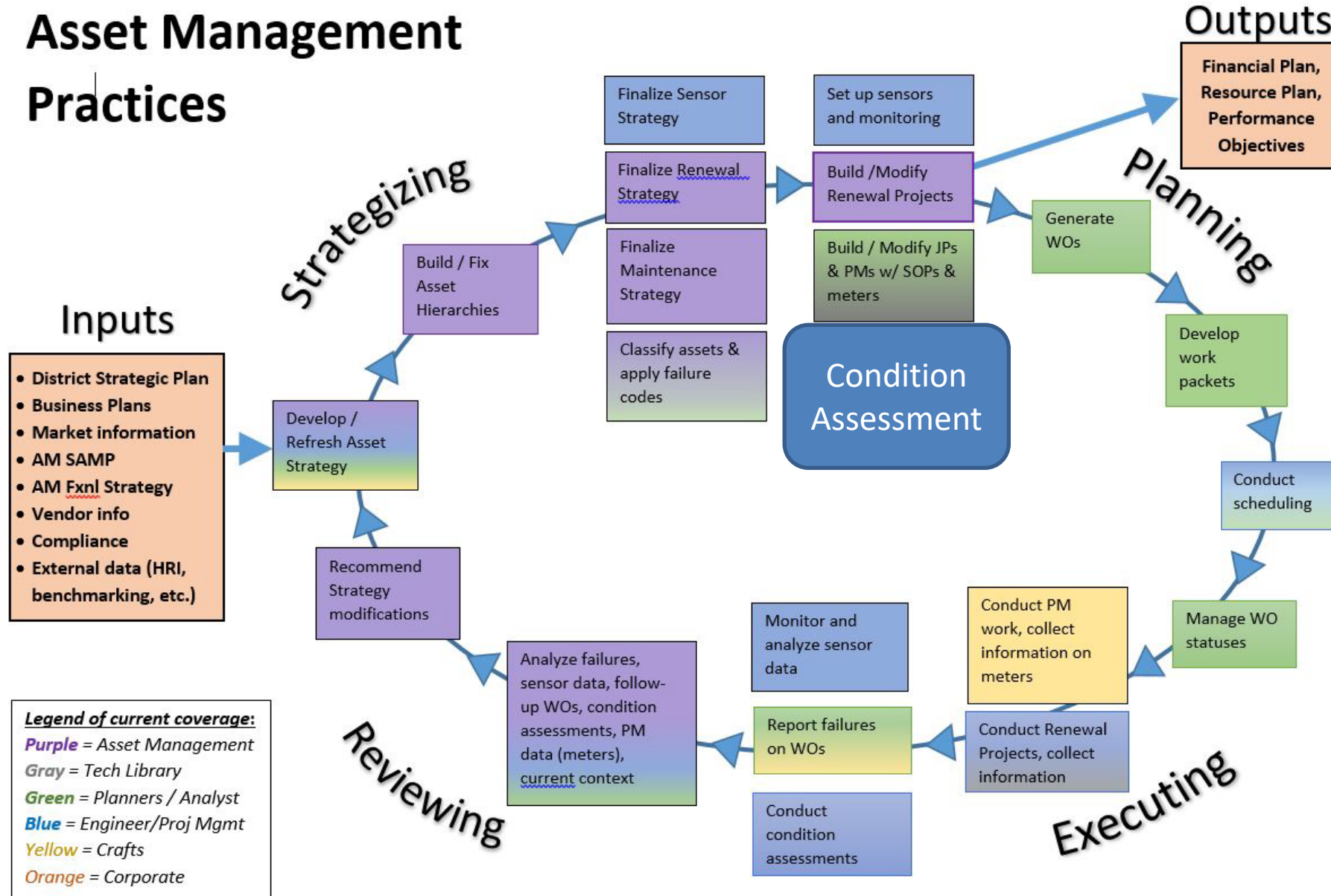
Stehekin: ~850kW, 1 hydro, 3 diesel,
1963



Asset Management Model



Asset Management Practices



HydroAMP Asset Management Standards

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Steering Committee
Portal

Hydropower Asset Condition Assessments



Successful strategic planning for capital investments in existing hydropower facilities requires consideration and the balancing of many factors, including the risks and consequences of equipment failure. The hydropower community has long recognized the importance of accurate assessments of equipment condition in order to make informed and sound capital investment planning and management decisions. Seeking to improve the evaluation and documentation of hydroelectric equipment condition, industry leaders have partnered to create the Hydropower Asset Management Partnership (hydroAMP). As part of CEATI's Hydraulic Plant Life Interest Group, which is

comprised of over 60 hydroelectric utilities, the hydroAMP Steering Committee is managing hydroAMP for its current users by assisting in its continued development and guiding its future enhancements.



CHELAN COUNTY

First Attempt - using Asset Main Screen

Assets - Windows Internet Explorer

http://amazonite-dev:7713/MaxDev/ui/?event=loadapp&value=asset&sessionid=5

Assets

Find: [] Select Action: []

List Asset Spare Parts Safety Meters Specifications PMs / Work Orders

Asset: 2033 Heat Exchanger - 2B - U-2 Asset System: HYDRO Type: PRODUCTION Status: OPERATING

Details

Parent: [] Location: 25580 Rotating Item: [] Serial #: [] License #: [] Usage: [] Item Type: [] Meter Group: [] Failure Class: HXCHR Bin: [] Tool Rate: []

Purchasing Information

Manufacturer: [] Vendor: [] PO: [] Prints: [] Hydro Category: C08 02 4 340

Owner

Responsible Department: 4220 RI Maintenance Assigned To: []

Account Details

GL Account: []

Costs

Total Cost: 38.33 YTD Cost: 0.00 Budgeted: 0.00 Inventory: 0.00

Service Life

Purchase Price: 0.00 Loaded Installation Cost: [] Replacement Cost: 0.00 Term of Capital Funding: Invalid Binding

Installation Date: [] Warranty Expiration Date: [] Estimated Service Life: Invalid Binding Remaining Service Life: Invalid Binding

Priority

Criticality: 1 Index: R08 Reportable?: []

Modified

Changed By: 54125 Changed Date: 01/07/2011 10:33 AM Moved?: []

Done

Local intranet

Problem: Did not record the history of Asset Health

Condition (Asset Health) Assessments

- Monitoring is a specific reading
- Assessment is using the other operating information to assign scores that represent the current condition of different attributes
 - Age
 - Maintenance History
 - Physical Inspection
- We start with a Tier 1 Assessment and conduct a Tier 2 assessment if more information is needed to prioritize any necessary maintenance
 - Tier 1: Relies on operational history and information gathered during routine maintenance
 - Tier 2: Additional tests and inspections if needed to determine urgency

Condition Index Scoring

Condition Index	
8 to 10	Asset expected to continue operating under normal conditions. Continue current O&M and repeat condition assessment on normal frequency.
5 to 8	Medium level of confidence the asset will continue operating under normal conditions. Continue current O&M. Consider Tier 2 test to further evaluate risks. Minor maintenance may be necessary.
2 to 5	Asset may not perform normally. Expect restricted operation and/or non-routine maintenance. Perform Tier 2 tests.
0 to 2	Expect significant operation restrictions and/or extensive non-routine maintenance. Perform Tier 2 test. Evaluate replacement.

Use Meters Instead - New Meter Type and Groups

List

Meter Group

Meter Group:
H.22.1

Balance of Plant Condition Meters

Condition Meter Group?

☐

☒

Meters in Group

Filter

>

Q

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←

1 - 8 of 10

→

Sequence	Meter	Description	Meter Type
> 1	AMCI-0.0	> Condition Indicator - Condition	AMCI
> 2	AMCI-1.0	> Condition Indicator - Tier 1 Condition	AMCI
> 3	AMCI-1.1	> Condition Indicator - Age	AMCI
> 4	AMCI-1.2	> Condition Indicator - Maintenance Hist	AMCI
> 5	AMCI-1.3	> Condition Indicator - Operational Perfo	AMCI
> 6	AMCI-1.4	> Condition Indicator - Physical Inspectic	AMCI
> 7	AMCI-2.0	> Condition Indicator - Tier 2 Adjustment	AMCI
> 8	AMCI-RWA	> Condition Indicator - Real World Adjust	AMCI

New Row

Custom Condition Assessment Screens

ListAssetSpare PartsSafetyMetersCondition MetersCondition AssessmentsSpecificationsRelated RecordsAttachmentsMapLog

Asset:
13181

Pump: 1, Water Suppr Sys, RRPHT

Status:
OPERATING

Manufacture Date:

Manufacture Age:
0

Condition Meter Group:
H.22.1

Balance of Plant Condition Meters

Installation Date:

Service Age:
0

Condition AssessmentsFilter1 - 1 of 1

Meter	Description	Reading	Pending?	Assessment Date	Assessor	Read Notes
AMCI-0.0	Condition Indicator - Condition	9.300	<input checked="" type="checkbox"/>	10/10/2022 12:00 AM	060912	

New Row

Condition Indices & Indicators for Assessment Dated 10/10/2022 12:00 AM1 - 9 of 9

Sequence	Meter	Description	Reading	Reading Date	Assessor	Read Notes	Previous Reading	Previous Date	Previous Assessor
2	AMCI-1.0	Condition Indicator - Tier 1 Condition	9.300	10/10/2022 12:00 AM	060912				
3	AMCI-1.1	Condition Indicator - Age	3.000	10/10/2022 12:00 AM	060912				
4	AMCI-1.2	Condition Indicator - Maintenance History	3.000	10/10/2022 12:00 AM	060912				
5	AMCI-1.3	Condition Indicator - Operational Performance	3.000	10/10/2022 12:00 AM	060912				
6	AMCI-1.4	Condition Indicator - Physical Inspection	2.000	10/10/2022 12:00 AM	060912				
7	AMCI-2.0	Condition Indicator - Tier 2 Adjustment		10/10/2022 12:00 AM	060912				
9	AMCI-Q1	Condition Indicator - Scope of Assessment		10/10/2022 12:00 AM	060912				
10	AMCI-Q2	Condition Indicator - Confidence of Evaluator		10/10/2022 12:00 AM	060912				
8	AMCI-RWA	Condition Indicator - Real World Adjustment		10/10/2022 12:00 AM	060912				

Input Sheets with Scoring Definitions

Physical Inspection:																			
3	<input type="checkbox"/>	No physical deterioration is observed																	
2	<input type="checkbox"/>	Physical deterioration is more than cosmetic, but has not yet compromised physical/structural integrity																	
1	<input type="checkbox"/>	Physical deterioration is significant though equipment is still functional																	
0	<input type="checkbox"/>	Physical deterioration has yielded low confidence in physical or structural integrity																	

Operational Performance:																			
3	<input type="checkbox"/>	Performance is normal and meets original design criteria																	
2	<input type="checkbox"/>	Performance is adequate, and meets original design criteria but is less efficient or effective than when originally installed																	
1	<input type="checkbox"/>	Performance is significantly affected or design is inadequate for current function																	
0	<input type="checkbox"/>	Performance is inadequate or the device is not operational																	

Start a New Assessment

ListAssetSpare PartsSafetyMetersCondition MetersCondition AssessmentsSpecificationsRelated RecordsAttachmentsMapLog

Asset:
13181

Pump: 1, Water Suppr Sys, RRPH

Status:
OPERATING

Manufacture Date:

Manufacture Age:
0

Condition Meter Group:
H.22.1

Balance of Plant Condition Meters

Installation Date:

Service Age:
0

Condition Assessments

Filter

1 - 2 of 2

Meter	Description	Reading	Pending?	Assessment Date	Assessor	Read Notes
AMCI-0.0	Condition Indicator - Condition	8.300	<input checked="" type="checkbox"/>	10/10/2022 12:00 AM	060912	
AMCI-0.0	Condition Indicator - Condition	9.300	<input type="checkbox"/>	10/10/2022 12:00 AM	060912	

New Row

Condition Indices & Indicators for Assessment Dated 10/10/2022 12:00 AM

1 - 9 of 9

Sequence	Meter	Description	Reading	Reading Date	Assessor	Read Notes	Previous Reading	Previous Date	Previous A
2	AMCI-1.0	Condition Indicator - Tier 1 Condition	8.300	10/10/2022 12:00 AM	060912				
3	AMCI-1.1	Condition Indicator - Age	2.000	10/10/2022 12:00 AM	060912				
4	AMCI-1.2	Condition Indicator - Maintenance History	2.000	10/10/2022 12:00 AM	060912				
5	AMCI-1.3	Condition Indicator - Operational Performance	3.000	10/10/2022 12:00 AM	060912				
6	AMCI-1.4	Condition Indicator - Physical Inspection	3.000	10/10/2022 12:00 AM	060912				
7	AMCI-2.0	Condition Indicator - Tier 2 Adjustment		10/10/2022 12:00 AM	060912				
9	AMCI-Q1	Condition Indicator - Scope of Assessment		10/10/2022 12:00 AM	060912				

Condition Assessment Quality

ListAssetSpare PartsSafetyMetersCondition MetersCondition AssessmentsSpecificationsRelated RecordsAttachmentsMap

Asset:
13181

+ Pump: 1, Water Suppr Sys, RRP

Status:
OPERATING

Manufacture Date:

Condition Meter Group:
H.22.1 > Balance of Plant Condition Meters

Installation Date:

Condition AssessmentsFilter>1 - 1 of 1

Meter	Description	Reading	Pending?	Assessment Date	Assessor	Read Notes
AMCI-0.0	Condition Indicator - Condition	9.300	<input type="checkbox"/>	10/10/2022 12:00 AM	060912	>

New Row

Condition Indices & Indicators for Assessment Dated 10/10/2022 12:00 AM1 - 9 of 9

Sequence	Meter	Description	Reading	Reading Date	Assessor	Read Notes
2	AMCI-1.0	Condition Indicator - Tier 1 Condition	9.300	10/10/2022 12:00 AM	060912	>
3	AMCI-1.1	Condition Indicator - Age	3.000	10/10/2022 12:00 AM	060912	>
4	AMCI-1.2	Condition Indicator - Maintenance History	3.000	10/10/2022 12:00 AM	060912	>
5	AMCI-1.3	Condition Indicator - Operational Performance	3.000	10/10/2022 12:00 AM	060912	>
6	AMCI-1.4	Condition Indicator - Physical Inspection	2.000	10/10/2022 12:00 AM	060912	>
7	AMCI-2.0	Condition Indicator - Tier 2 Adjustment				>
8	AMCI-RWA	Condition Indicator - Real World Adjustment				>
9	AMCI-Q1	Condition Indicator - Scope of Assessment	3.000	10/10/2022 12:00 AM	060912	>
10	AMCI-Q2	Condition Indicator - Confidence of Evaluator	5.000	10/10/2022 12:00 AM	060912	>

Decay Rate Reporting

1	Asset Condition Forecast, Project Replacement Plan - (Multiple Items), HYDRO																																							
2																																								
3	Asset System		HYDRO																																					
4	Asset Class Path		(Multiple Items)																																					
5	Average Condition: 6.7 6.7 6.6 6.7 6.8 6.9 6.8 6.6 6.9 6.8 6.8 6.8 6.6 6.4 6.2																																							
6	Min of Forecast Condition		Yes																																					
7	Work Zone		Asset Description		Asset Code		Year		Assessment		Quality																													
8	Lake Chelan Hydro		Circuit Breaker, Vacuum, 4-540 CHS		13741		2016				2018		2019		2020		2021		2022		2023		2024		2025		2026		2027		2028		2029		2030		2031		2032	
9	Lake Chelan Hydro		Circuit Breaker, Vacuum, 4-550 CHS		13726		2016		75		10		9.5		9		8.5		8		7.5		7		6.5		6		5.5		5		10		9.5		9		8.5	
10	Lake Chelan Hydro		Main XFMR Bank 1 Chelan Swyd		13598		2013		0		8.5		8.3		8		7.8		7.5		7.3		7		6.8		6.5		6.3		6		5.8		5.5		5.3		5	
11	Lake Chelan Hydro		Main XFMR Bank 2 Chelan Swyd		13599		2016		75		8.4		8.2		7.9		7.7		7.4		7.2		6.9		6.7		6.4		6.2		5.9		5.7		5.4		5.2		4.9	
12	Lake Chelan Hydro		Breaker: Generator, WECC, 4-520 Vacuum Circuit Breaker, A		13816		2016		75		10		9.5		9		8.5		8		7.5		7		6.5		6		5.5		5		4.5		4		3.5		3	
13	Lake Chelan Hydro		Breaker: Generator, WECC, 4-500 Vacuum Circuit Breaker, A		13817		2016		75		10		9.5		9		8.5		8		7.5		7		6.5		6		5.5		5		4.5		4		3.5		3	
14	Lake Chelan Hydro		Stator: A-2		13495		2016		75		9.7		9.5		9.3		9.1		9		8.8		8.6		8.4		8.3		8.1		7.9		7.7		7.6		7.4		7.2	
15	Lake Chelan Hydro		Rotor: A-1		13496		2015		50		9.5		9.3		9.2		9		8.8		8.7		8.5		8.3		8.2		8		7.8		7.7		7.5		7.3		7.2	
16	Lake Chelan Hydro		Rotor: A-2		13498		2017		100		9.8		9.7		9.5		9.3		9.2		9		8.8		8.7		8.5		8.3		8.2		8		7.8		7.7		7.5	
17	Lake Chelan Hydro		Runner Assembly: A-2		15219		2016		75		6.9		6.7		6.5		6.3		6.1		5.9		5.7		5.5		5.3		5.1		4.9		4.7		4.5		4.3		4.1	
18	Lake Chelan Hydro		Stator: A-1		13494		2015		40		9.5		9.3		9.1		9		8.8		8.6		8.4		8.3		8.1		7.9		7.7		7.6		7.4		7.2		7	
19	Lake Chelan Hydro		Runner Assembly: A-1		15218		2014		25		7.8		7.6		7.4		7.2		7		6.8		6.6		6.4		6.2		6		5.8		5.6		5.4		5.2		5	
20	Lake Chelan Hydro		Turbine: A-1		13346		2014		25		7.3		7.1		6.9		6.7		6.5		6.3		6.1		5.9		5.7		5.5		5.3		5.1		4.9		4.7		4.5	
21	Lake Chelan Hydro		Turbine: A-2		13347		2016		75		6.9		6.7		6.5		6.3		6.1		5.9		5.7		5.5		5.3		5.1		4.9		4.7		4.5		4.3		4.1	
22	Lake Chelan Hydro		Breaker: Generator, WECC, 4-530 Vacuum Circuit Breaker, A		13802		2016		75		10		9.5		9		8.5		8		7.5		7		6.5		6		5.5		5		10		9.5		9		8.5	
23	Lake Chelan Hydro		Breaker: Generator, WECC, 4-510 Vacuum Circuit Breaker, A		13807		2014		25		10		9.5		9		8.5		8		7.5		7		6.5		6		5.5		5		10		9.5		9		8.5	
24	Lake Chelan Hydro		Governor HYD: A-1		91069		2015		50		9.5		9.3		9.2		9		8.8		8.7		8.5		8.3		8.2		8		7.8		7.7		7.5		7.3		7.2	
		Hydro	OVH Pivot	Class Summary	Master Pivot	ama_data	windings																																	

Static Reporting

Asset Condition Report

<u>Asset Number</u>	<u>Description</u>	<u>Priority</u>	<u>Maint Cost</u>	<u>Install Date</u>	<u>Est. ServiceLife</u>	<u>Remaining Service Life</u>	<u>Con. Index</u>	<u>Location</u>
		1	166,685.60	8/28/09	50.00	44.09	8.80	25773
		1	96,309.69	5/16/03	20.00	7.81	7.10	25777
		1	25,632.69	9/25/09	25.00	19.16	10.00	25779
		1	22,396.43	9/25/09	50.00	44.16	10.00	25779
		1	54,992.83	6/13/03	50.00	40.00	7.60	31474
		2	54.45	1/1/09	50.00	43.44	10.00	25775