MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO:	Commissioners Carlson, Mital, Helgeson, Schlossberg, Brown
FROM:	Sue Fahey, Assistant General Manager/CFO; Deborah Hart, Financial Services Manager; Leslie Kidd, Interim General Accounting Supervisor
DATE:	August 23, 2019
SUBJECT:	2018 Audit Management Letter Update
OBJECTIVE:	Information Only

Attached is the 2018 Audit Management Letter, which includes an update by Management to outline the progress made since the letter was presented to the Board in April.

COMMUNICATIONS WITH THOSE
CHARGED WITH GOVERNANCE

EUGENE WATER & ELECTRIC BOARD

December 31, 2018

2019 Management Update

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Communications with Those Charged with Governance and Internal Control Related Matters

To the Board of Commissioners
Eugene Water & Electric Board

Dear Commissioners:

We have audited the financial statements of Eugene Water & Electric Board (EWEB or the Board) as of and for the year ended December 31, 2018, and have issued our report thereon dated March 18, 2019. Professional standards require that we provide you with the following information related to our audit.

Our Responsibility under Auditing Standards Generally Accepted in the United States of America

As stated in our engagement letter dated January 10, 2019, our responsibility, as described by professional standards, is to form and express an opinion about whether the financial statements prepared by management with your oversight are fairly presented, in all material respects, in conformity with accounting principles generally accepted in the United States of America. Our audit of the financial statements does not relieve you or management of your responsibilities.

Our responsibility is to plan and perform the audit in accordance with auditing standards generally accepted in the United States of America and to design the audit to obtain reasonable, rather than absolute, assurance about whether the financial statements are free from material misstatement. An audit of financial statements includes consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Board's internal control over financial reporting. Accordingly, we considered the Board's internal control solely for the purposes of determining our audit procedures and not to provide assurance concerning such internal control.

We are also responsible for communicating significant matters related to the financial statement audit that, in our professional judgment, are relevant to your responsibilities in overseeing the financial reporting process. However, we are not required to design procedures for the purpose of identifying other matters to communicate to you.

Planned Scope and Timing of the Audit

We performed the audit according to the planned scope and timing previously communicated to you in our planning meeting held on December 4, 2018.

Significant Audit Findings and Issues

Qualitative Aspects of Accounting Practices

Management is responsible for the selection and use of appropriate accounting policies. The significant accounting policies used by the Board are described in Note 1 to the financial statements. The Board adopted GASB 75, *Accounting and Financial Reporting for Postemployment Benefits other than Pensions*, which established new standards for recognizing and measuring OPEB related liabilities, deferred outflows of resources, deferred inflows of resources, and expenses. No other new accounting policies were adopted and there were no changes in the application of existing policies during 2018. We noted no transactions entered into by the Board during the year for which there is a lack of authoritative guidance or consensus. There are no significant transactions that have been recognized in the financial statements in a different period than when the transaction occurred.

Significant Accounting Estimates

Accounting estimates are an integral part of the financial statements prepared by management and are based on management's knowledge and experience about past and current events and assumptions about future events. Certain accounting estimates are particularly sensitive because of their significance to the financial statements and because of the possibility that future events affecting them may differ significantly from those expected. The most significant estimates affecting the financial statements were:

Unbilled Revenue – Unbilled revenue is a measure of revenue earned through the end of the reporting period that has yet to be billed. This generally represents accounts with billing cycles that start in the reporting year and end in the subsequent year. We have evaluated the key factors and assumptions used to develop unbilled revenue in determining that it is reasonable in relation to the financial statements taken as a whole.

Allowance for Doubtful Accounts – This represents an estimate of the amount of accounts receivable that will not be collected. We have evaluated the key factors and assumptions used to develop the allowance in determining that it is reasonable in relation to the financial statements taken as a whole.

Recovery Periods for the Cost of Plant – This represents the depreciation of plant assets. Management's estimate of the recovery periods for the cost of plant is based on regulatory-prescribed depreciation recovery periods. We have evaluated the key factors and assumptions used to develop the recovery periods in determining that they are reasonable in relation to the financial statements taken as a whole.

Other Post-Employment Benefit Obligations – This represents the amount of annual expense recognized for post-employment benefits. The amount is actuarially determined, with management input. We have evaluated the key factors and assumptions used to develop the annual expense in determining that it is reasonable in relation to the financial statements taken as a whole.

Mark-to-Market Adjustment – Certain derivative instruments are marked to market at year end. However, the impact to the statements of revenues, expenses, and changes in net position is deferred in accordance with GAAP. We have evaluated the key factors and assumptions used to develop year-end amounts and have determined that they are reasonable in relation to the financial statements taken as a whole.

Net Pension Liability – This represents the amount of pension liability. The amount is actuarially determined, with OPERS management input. We have evaluated the key factors and assumptions used to develop the annual expense in determining that it is reasonable in relation to the financial statements taken as a whole.

Valuation of Investments – Management's estimate of investments is based on current market rates and conditions. We evaluated the key factors and assumptions used to develop the valuation of investments and determined that they are reasonable in relation to the financial statements taken as a whole.

Financial Statement Disclosures

The disclosures in the financial statements are consistent, clear, and understandable. Certain financial statement disclosures are particularly sensitive because of their significance to financial statement users. Significant disclosures include: Note 2 – Power Risk Management, Note 19 – Commitments and Contingencies and Note 16 – Retirement Benefits.

Significant Difficulties Encountered in Performing the Audit

We encountered no significant difficulties in dealing with management in performing and completing our audit.

Corrected and Uncorrected Misstatements

Professional standards require us to accumulate all factual and judgmental misstatements identified during the audit, other than those that are trivial, and communicate them to the appropriate level of management.

Passed adjustments – Passed adjustments are those entries found during the course of the audit that management has decided to not post to the financial statements of the Board. It has been concluded by management, and agreed upon by Moss Adams, that the adjustments are immaterial to the financial statements as a whole. Passed adjustments are as follows:

1) To close work orders in commercial operation at year end – $223,000 (water)

Disagreements with Management

For purposes of this letter, professional standards define a disagreement with management as a financial accounting, reporting, or auditing matter, whether or not resolved to our satisfaction, that could be significant to the financial statements or the auditor's report. We are pleased to report that no such disagreements arose during the course of our audit.

Management Representations

We have requested certain representations from management that are included in the management representation letter dated March 18, 2019.

Management Consultation with Other Independent Accountants

In some cases, management may decide to consult with other accountants about auditing and accounting matters, similar to obtaining a "second opinion" on certain situations. If a consultation involves application of an accounting principle to the Board's financial statements or a determination of the type of auditor's opinion that may be expressed on those statements, our professional standards require the consulting accountant to check with us to determine that the consultant has all the relevant facts. To our knowledge, there were no such consultations with other accountants.

Other Significant Audit Findings or Issues

We generally discuss a variety of matters, including the application of accounting principles and auditing standards, with management each year prior to retention as the Board's auditors. However, these discussions occurred in the normal course of our professional relationship and our responses were not a condition to our retention.

Communication of Internal Control Related Matters

In planning and performing our audit of the financial statements of EWEB as of and for the year ended December 31, 2018, in accordance with auditing standards generally accepted in the United States of America, we considered the Board's internal control over financial reporting (internal control) as a basis for designing audit procedures that are appropriate in the circumstances for the purpose of expressing our opinion on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the Board's internal control. Accordingly, we do not express an opinion on the effectiveness of the Board's internal control.

A deficiency in internal control exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A material weakness is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected, on a timely basis.

In addition to the required communications, we have identified the following matters for your consideration. Our recommendations are based on observations and testing during the course of our audit. These recommendations should be evaluated by management and the Commissioners for implementation and EWEB should conduct a cost benefit analysis including consideration of the risks for the recommended action. Management responses were provided by the Board and have not be subjected to audit procedures.

Other Matters

Billing Controls

Customer account adjustments

We noted management review of billing adjustments was not performed during the first eight months of 2018. Management review helps to ensure that controls are in place and operating as intended.

Recommendation: New controls were implemented in September 2018 (see management response below). As such, we consider this matter to be resolved.

Management Response: Susan Eicher, Assistant Treasurer

In September of 2018, EWEB staff began using random sampling techniques to test adjustments made to customer accounts in CIS each month. The staff performing the testing do not have the ability to make adjustments in CIS. The adjustments selected are reviewed to ensure that the adjustments, and the persons making them, were authorized, and that the adjustments were supported and reasonable. Testing is documented and reviewed by a supervisor. In addition to testing, analytical review is performed by EWEB staff in order to identify trends or training opportunities.

Review of off-cycle billings

During our review of the billing cycle controls, we noted that personnel in the customer service department are able to manually input usage information into the billing system before generating and sending an off-cycle bill to a customer for specific circumstances such as a move-out. However, we noted that the usage information in these situations does not go through the exception reporting process and therefore the Board is not able to identify errors in the billing information before the bill is generated and sent to the customer.

***Recommendation*:** We recommend that management design and implement controls that require a review of the usage information for any customers receiving off-cycle bills to ensure the usage is accurately reflected in the customer's bill before the bill is generated and sent to the customer.

Management Response: Julie McGaughey, Customer Operations Manager & Danielle Wright, Accounts Receivable Supervisor

Management agrees with the comment and has identified steps to implement and enhance controls related to off-cycle billings. System and business constraints prevent implementing the recommendation to review an exception report before the bill is generated.

Management will take the following steps, which they believe will mitigate future risk.

1) Management will provide additional process training to all staff who manually enter usage information into CIS. Training will be completed by September of 2019.
2) Management, with the help of information services, will create a report showing historically high or low usage by August of 2019. The report will be reviewed weekly by accounting staff to ensure the usage was reasonable. Staff reviewing the report will not have access to make adjustments in CIS.

Management will be monitoring the outcome of these actions and refine the process as necessary.

2019 Update:

Management Response: Julie McGaughey, Customer Operations Manager & Danielle Wright, Accounts Receivable Supervisor

1) The documented data entry process was reviewed with all Customer Service personnel who manually enter usage information. Special attention was given to the step in the process that outlines what to do when a high or low usage warning occurs including resources that are able to assist when more analysis is needed.

2) In August 2019, Information Services completed development of a report that identifies historically high and low usage. The report is reviewed by staff no less than once a week to ensure that usage is reasonable. Outliers are investigated and, where appropriate, adjustments are forwarded to Accounts Receivable for review and entry.

3) The bill print vendor selected as part of the Customer Experience Improvement Project provides enhanced functionality which includes online bill audit review with 50 different audit thresholds to increase bill accuracy. The new system is anticipated to be implemented in 2020.

Work order controls

Timely closing of work orders

During our testing of open work orders, we noted that one of the work orders selected was in commercial operation in 2018 and should have been closed to plant in service prior to year-end.

***Recommendation*:** We recommend that management generate a report at year end to show the date of the last charge for each of the open work orders to help identify work orders that should be closed to plant in service at year end.

Management Response: Wally McCullough, Water Engineering Supervisor

The recommended report was created and used throughout 2018 to assist in identifying open work orders for closure. The issue with the work order noted during testing was a miscommunication between work groups as to responsibility for closure and an associated business process. Going forward a formal team, comprised of members of both engineering and operations, will be created. The team will meet quarterly to review all work orders and their tasks for closure. This effort will enhance the control effectiveness of the recommended report.

2019 Update:

Management Response: Wally McCullough, Water Engineering Supervisor

A team with a representative from both engineering and operations has been formed with the task of reviewing open work orders for closure. A kickoff meeting was held in July and the team is currently reviewing approximately 150 open work orders. This will be an effort for the third quarter of this year. The effort will be repeated monthly during the last quarter.

IT controls

User access review

In the prior year's Communication to Those Charged with Governance, we recommended that the user access review process continue to be formalized with application owners of SmartStream, WAM and CIS applications to help ensure user permissions are appropriate for each user's job responsibilities. In the current year we noted that such review is being routinely performed, however, we noted a few items below that should be considered in future reviews of user access:

- In examining the user access review process, it was noted that access to the network, and review of domain and enterprise administrators was not included as part of the annual review process.

- We noted a shared administrator account in the SmartStream application.

- We noted a service account not in use in the CIS Database, which had not been identified and disabled previously.

- We observed that there are activity monitoring solutions in place, however, not all admin activity is or can be tracked by the current systems in place. We believe this is particularly important to help detect unauthorized activity, especially with the use of shared admin accounts, or privileged account activity.

***Recommendation*:** We recommend that the user access review process continue to be formalized with application owners for SmartStream, WAM, and CIS applications to help ensure user permissions are appropriate for each user's job responsibilities. As part of this process, we recommend the following:

- Incorporate a review of domain and enterprise administrators' access into the user access review.

- Remove shared administrator accounts and ensure that each account is assigned to only one user.

- Incorporate a review of unused accounts and disable any accounts identified as no longer in use.

- Lastly, we recommend configuring or upgrading the systems in place to monitor application activity, specifically for any privileged account activity or changes that require elevated access to systems.

Management Response: Matt Barton, Chief Information Officer
Management agrees with the recommendations, and the following responses address the recommendations in the order presented above:

- Management will incorporate a review of domain and enterprise administrators' access into the 2019 user access review.

- Management will remove the shared administrator access.

- Management will review and disable unused service accounts, where technically feasible. Technical feasibility will be determined by several factors:

    - Disabling the service account does not cause the system to go out of support with the vendor
    - Disabling the service account does not have negative impacts on the system, other systems, or integrations

- Management will seek to add system configuration functionality as systems are upgraded and replaced. The systems in scope of this audit lack the functionality described.

2019 Update:

Management Response: Matt Barton, Chief Information Officer

Management has made the following progress toward addressing the user access review recommendations:

- Information Services (IS) has begun the process for gathering data for the 2019 user access review. The new process will include user access review of WAM, SmartStream, CIS, NERC CIP Cyber Systems, and Domain Administrators. Once the data is compiled, a report will be sent to managers and supervisors for their review and system owners for their approval.
- In the SmartStream application, it was noted that there is one administrator account used by multiple employees who support the application. IS has created separate administrator accounts for those individuals who support the SmartStream application. We have found that the shared account is required to create scheduled jobs but is not used for other operational activities.
- In the CIS database, it was noted that there was an account that was not in use and had not been identified or disabled previously. That account has been disabled. IS will continue to review and disable unused services accounts as long as disabling the account does not cause the system to malfunction.
- IS has installed a demo of a new centralized log server and is testing its capabilities. IS plans to use it to monitor and alert on privileged account access. IS will continue our efforts to upgrade and/or replace systems that lack the ability to audit activity and changes to our financial applications.

This communication is intended solely for the information and use of the Board and members of management and is not intended to be and should not be used by anyone other than these specified parties.

Portland, Oregon
March 18, 2019


MOSSADAMS

MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO:	Commissioners Carlson, Mital, Helgeson, Schlossberg and Brown
FROM:	Sue Fahey, Assistant Manager and Chief Financial Officer, Rene Gonzalez, Customer Solutions Manager, Juan Serpa Munoz, Electrification and Conservation Business Line Manager
DATE:	August 19, 2019
SUBJECT:	Carbon Reduction Accounting Methodology
OBJECTIVE:	Information Only

Issue

One of EWEB's organizational goals is to equitably and cost-effectively reduce community/regional carbon emissions by 7,500 MTCO2e. Commissioners requested additional information on how savings are calculated.

Discussion

Staff calculates carbon emission reductions from energy efficiency efforts, electric vehicles, fleet and conversions from gas heating to heat pump technology based on certain assumptions. EWEB has direct control over some of the carbon reduction efforts, such as fleet operations. For others, like Electric Vehicles (EV), EWEB's products and services support community-wide efforts. The assumptions used are intended to provide a reasonable representation of carbon savings.

Bonneville Power Administration provides annual savings estimates for energy efficiency measures to ensure savings are calculated consistently throughout the region. These estimates are multiplied by a regional carbon intensity factor assuming the most-carbon intensive source on the grid is reduced. Carbon emission reductions from our various energy efficiency programs are projected to account for around 50% of EWEB's target.

Until EWEB receives final 2019 data from the Oregon Department of Environmental Quality on EVs registered in EWEB service territory, reported carbon reduction totals from EV's only include those that have participated in our transportation electrification programs. The carbon reduction is estimated based on the carbon intensity of gasoline saved and adjusts for increased electricity use. These carbon savings are expected to meet about a third of EWEB's target.

The calculation for fleet carbon reductions is based on reduced fuel consumption and the increased use of biofuels. To calculate the reduction in fuel consumption, current usage is compared to 2009 which is the first year EWEB began tracking greenhouse gas emissions. The carbon reductions from these efforts will contribute 15 to 20% of the target.

Heating conversion carbon reduction is estimated based on the carbon intensity of decreased natural gas use and adjusted for increased electricity use, and its regional carbon intensity. Carbon savings

are achieved primarily through the overall reduction in energy use enabled by heat pump technology. Since these opportunities arise on a case-by-case basis and require extra time to develop and implement, these savings are expected to contribute minimally to the target.

Recommendation/Board Action
None at this time. For information only.

MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO:	Commissioners Carlson, Mital, Helgeson, Schlossberg and Brown
FROM:	Michael McCann, Electric Generation Manager
DATE:	August 22, 2019
SUBJECT:	Consideration of Hydrogen as an Alternative Fuel
OBJECTIVE:	Informational Only

Background

On Thursday, August 1, EWEB hosted a Hydrogen Roundtable event in our north building that was organized by Congressman Peter DeFazio's office. The roundtable, which kicked off with remarks by General Manger Lawson and Congressman DeFazio, included speakers from EWEB, Northwest Natural Gas, Oregon State University, the Columbia-Willamette Clean Cities Coalition, Toyota and the Renewable Hydrogen Association (RHA). The event also showcased a Hydrostar solar-power electrolyzer and a Toyota Mirai, a hydrogen fuel cell passenger vehicle. The event was open to invited public officials and staff from the region and about 50 people were in attendance for the presentations.

Discussion

EWEB has been interested in hydrogen as an alternative energy source for a number of years as news of its deployment and use across Europe and in eastern North America started to gain traction. In 2016, the Electric Generation Department commissioned a study by Good Company, a Eugene-based sustainability consulting firm, to evaluate the viability of EWEB using electrolysis to produce hydrogen using excess water and electricity that could then be stored for use as a resiliency fuel or converted back into electricity when prices dictated. The Good Co. study indicated that EWEB could cheaply and easily produce more hydrogen than we would need for our own purposes, and that project scale was important to improve project economics. We then started having discussions with regional utility partners to learn what others were considering.

This initial work led to partnerships with Northwest Natural, Oregon State University and others who are looking to take advantage of hydrogen's potential to help decarbonize our energy sectors and provide a resiliency hedge in the event of a large-scale natural disaster in the Northwest. In 2018, EWEB joined the RHA as a founding member to further explore and facilitate opportunities for the advancement of hydrogen's development as an alternative fuel. EWEB is now one of eight utility members in RHA, with the others being Douglas County PUD, Fortis BC, Klickitat County PUD, Northwest Natural, Tacoma Power, Puget Sound Energy, and Portland General.

EWEB is interested in renewable hydrogen both because it can help us meet some of the challenges in attaining the clean energy future we need as a society and because we believe that hydrogen is an important component in building resilient utility infrastructure here in the PNW. As a utility that both produces electricity and buys and sells power on the wholesale market, we find ourselves at times with an oversupply of low cost, carbon-free, green energy. When this happens, dispatchable generation is turned off. We spill more water and we curtail our wind resources. While this tends to affect large power producers, like BPA, our own Harvest Wind facility routinely gets curtailed in the spring due to oversupply. Not only are we giving up carbon-free energy during curtailment, the shutdown hurts project economics.

At other times of the year, typically mid-winter for heating loads and late summer for cooling loads, demand exceeds supply and all available resources are generating electricity. Sometimes even that isn't enough and we import electricity into our region, largely from coal and other hydrocarbon-intensive resources located to our east. It is not uncommon in the Northwest, for instance, to have very little solar, wind and hydroelectricity available during a typical winter cold snap, and during this period we are importing carbon-intensive energy. Most of EWEB's electricity-linked carbon footprint comes from purchases made by BPA during these periods.

Imagine if we had a hydrogen electrolyzer taking price and environmental signals from the market. When prices call for it and clean energy is plentiful, we generate hydrogen. At other times, when electricity prices are higher and clean energy is less available, our electrolyzer is in standby mode and our green energy is feeding the grid. From a generation standpoint, our renewable resources are now being utilized to their greatest extent. The hydrogen we've just produced can then be used in the natural gas system, as a transportation fuel and as industrial feedstock for making fertilizer, for instance. It can also be stored for future use, either with natural gas or separately, to help address the winter heating or summer cooling peaks where capacity might be an issue. Finally, using a fuel cell, it can be turned back into electricity if that's what the market dictates. From an energy standpoint, that is where we see the importance and value in renewable, or green, hydrogen. We are converting available renewable energy into another form, hydrogen, that can used to help decarbonize other energy sectors or stored for later use to displace carbon-intensive resources.

We also believe that hydrogen can be part of EWEB's resilient future. Hydrogen fuel cells can operate water pump stations and emergency drinking water wells. They can also help black start a localized electric grid and provide grid stability as we add local critical loads like police, fire and hospitals to our system. Finally, because fuel cells are roughly twice as efficient internal combustion engines, fuel cells can operate for significantly longer periods without refueling than standard emergency generators.

The green hydrogen market is still in its infancy, especially in the Northwest. There are hydrogen vehicle fueling stations in California and in British Columbia, but none in the area between. Northwest Natural has yet to determine how much hydrogen they are comfortable injecting into their system, and auxiliary markets for green hydrogen in agriculture and industrial applications have yet to develop. But EWEB is participating because we see both the need and the potential. We recently joined Northwest Natural and Oregon State University in a grant application made to the US Department of Energy for funding to study the economic dispatch of a hydrogen electrolyzer that would feed the energy and transportation sectors. While we weren't successful in that funding opportunity, the collaboration and partnerships formed in the pursuit will allow EWEB to continue hydrogen development discussions with others in the region as the technology matures.

MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

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TO:	Commissioners Carlson, Mital, Helgeson, Schlossberg and Brown
FROM:	Rod Price, Chief Operating Officer; Julie Nuttall, Vegetation and Electric Meter Shop Supervisor
DATE:	August 26, 2019
SUBJECT:	Current EWEB Vegetation Program Overview and Change Impacts
OBJECTIVE:	Information Only

Issue
Recent focus on the impact of vegetation to electric reliability due to major weather events, as well as wildfire concerns, have raised questions about EWEB's Right of Way (ROW) vegetation program and options to adjust the program.

Background
Trees that grow on or adjacent to power line rights-of-ways are a common cause of outages, damage to facilities, fires, injury, or damage to public and private property. EWEB has an obligation to maintain those electrical facilities to minimize interruptions of service and to provide a safe and continual supply of electricity to our customers. Beyond this obligation, EWEB needs to comply with various state and federal regulatory requirements. Our current program is based on best management practice (BMP) guides and ANSI standards. For complete program details on clearance distances, trimming methods other program guidelines, please refer to EWEB document DR.100.PRG.01-03, Right of Way Vegetation Management Program: Procedures, Clearances, and Technical Specifications.

EWEB maintains vegetation clearances for approximately 1400 miles of transmission and distribution circuits, which accounts for about 400,000 trees pruned. Based on experience, EWEB has adopted a 5-year vegetation management cycle to optimize compliance, cost and electric reliability. This backgrounder will give an overview of how the 5-year cycle works and potential effects of making changes to this programs.

Discussion
The primary purpose of the ROW vegetation management program is to prune trees over a 5-year cycle in a manner that meets regulatory requirements and maintains electric reliability on a normal grow cycle basis. The 5-year cycle has been refined over time to optimize costs to prune vegetation based on historical experience ranging from not having an organized cycle to running a 4-year cycle. It's worth noting, the program is meant to manage clearances by pruning trees, not removing them. Our current process and equipment is not set up to remove trees larger than 4 inches. Wood larger than 4 inches in diameter will be left on site; in no more than 3-4 foot lengths and is the responsibility of the property owner to clean up. This means complete tree removal is the exception,

and is done in collaboration with the property owners.

The vegetation department has the third largest budget in the Electric and Water Operations Division, with an annual budget of $3.8 million while consisting of only six EWEB full time employees (FTE). It is a bit unique in that most of the work is directed by three EWEB foresters but accomplished through contracts for around 31 equivalent FTE, including 11 crews for tree trimming service, a separate landscape contractor for cleanup and a separate contractor for flagging.

A 5–year cycle means that every circuit mile is visited and brought to minimum clearance every five years. Minimum clearances are prescribed to account for voltage levels and expected 5 year growths. For primary distribution voltages, vegetation must be kept at least 3 ft. from conductors and 5 ft. for climbable trees. For 115 kV transmission lines, the regulations state that the utility must maintain at least 7.5 ft. between trees and vegetation and the conductors. Typically, clearances are trimmed to 12-14 feet on the 5-year cycle.

The program divides the total line miles up evenly over each year, with a target of inspection and trimming 280 miles (56,000 trees) per year. Routes are organized by feeder and transmission circuits to meet the yearly targets. Once the routes are organized, the Foresters do a complete visual inspection and make a record of tree type, location and amount of clearance needed and if it's climbable. When the Foresters return to the office, they organize the field observations into work packets for the contract tree crews to go out and prune. The tree contractor typically organizes the flagging and removal contractors to help them complete the prescribed work packets.

As trees grow at different rates and not always predictably, each route is inspected half way between its 5-year cycle. This inspection is referred to as the mid-cycle and is aimed at pruning only the fast growing trees that will likely violate the minimum clearance before the five year return. Mid-cycle pruning also results when customers call in concerns or other EWEB employees report clearance issues. Typically one contract tree crew is always focused on the mid-cycle and troubleshooting type work.

Customers and land owners along the way are contacted by the Foresters to let them know that EWEB will be along in the near future to trim trees. If there are trees identified as hazardous and need to be removed, the Foresters will work with the property owner to educate the owner about removal options. EWEB and its contractors are currently not equipped to routinely remove large wood, therefore the large wood removal is the responsibility of the property owner.

Potential Program Changes

Our program is set up to manage clearances on trees we can control in our ROW's, not to remove any chance of trees from causing outages. As we have reported in the recent past, the program has made dramatic reductions in the number of outages due to controlled tress including a reduction to the number of outages in minor wind events.

Recent statistics around major wild fires in California indicates about 40% are started by electric utilities with vegetation contacting conductors being a major ignition source. Our vegetation program is well suited to preventing tree contacts. For relatively little cost we can target mid-cycle inspections and pruning to areas where wild fire threats are high. Recognizing this, the Foresters scheduled mid-cycle inspections in high risk areas this spring and early summer to help insure minimal chance of contact by trees to electrical equipment. This activity of 132 additional line miles

was noted in the recent quarterly report, almost doubling our planned line miles for Q2.

A more complicated problem is major storm events that bring trees and big limbs down, from both within the EWEB ROW and from outside the ROW. There are typically two options to address these trees, prune to a greater minimum clearance and remove trees completely.

Increasing the pruning clearances will have several limitations. Our current practices have proven to be just within the tolerance of most customer's threshold of acceptance for visual impact. In the last decade we have pruned tress more aggressively and had strong customer pushback. One other major limitation to increased pruning is the health of the tree itself. There are limits to how much a tree can be trimmed and stay in good health, typically no more than 1/3.

Another option is to shorten the cycles to maintain greater clearances. Reducing the cycle time will require more tree crews, as well as associated clean up and flagging crews we would need. It would also mean more work for our staff Foresters, meaning reduced time with customers for them. This will increase yearly costs by estimated 25-30% ($650k-$780k). We do not have enough data at this point to determine how a reduced cycle would impact our major event resiliency, but we do know the current 5-year cycle has nearly eliminated controlled tree outages for non-major events.

There are a number of limitations to complete tree removals, including our current program limitations and landowner resistance. Our current practice is to recommend tree removal where the tree (Hazard Tree) is not healthy or otherwise would be a problem to our facilities in the judgment of the Forester. Trees are removed in partnership with the property owners. Meaning we cut the tree down and remove the limbs but the main trunk is responsibility of the property owner. Property owners are typically resistant to having their trees removed, especially at some expense to them. To remove more trees, EWEB will need more legal support, increased public support and likely need to increase funding to support complete removal. Study work has not been done on financial impacts of a more aggressive removal program, but it's likely to be a significant increase from present budgets. However, overall storm event resiliency would improve.

Overall, the current ROW vegetation management program is optimized for minimum cost to obtain regulatory compliance, keep EWEB facilities and public safe and maintain overall reliability. Implementing a more aggressive program will impact costs significantly with unknown reliability impacts. It may be we target certain areas more aggressively to maximize resiliency improvements while keeping costs to a minimum overall. In the coming year, Staff will be evaluating options for the ROW management program around the financial and reliability impacts. Findings will be communicated to the Board for input.

TBL Assessment
NA at this time

Requested Board Action
None at this time.

If you have any questions or wish to discuss please contact Rod Price, Chief Operations Officer at 541-685-7122 or email rod.price@eweb.org.