KPU

Your Community, Your Utility

General Manager
334 Front Street
Ketchikan, AK 99901

Phone (907) 228-5603
Fax (907) 225-5075

TRANSMITTAL MEMORANDUM

TO: The Honorable Mayor and City Council

FROM: Karl R. Amylon, General Manager

DATE: January 25, 2021

RE: **Authorizing Budget Transfer – 2020 Whitman Lake Hydroelectric Project 2020 True-Up Payment to Southeast Alaska Power Agency (SEAPA)**

The motion detailed below was prepared at the request of Finance Director Michelle Johansen, who asked that it be placed before the City Council for consideration at its meeting of February 4, 2021. If adopted, the motion provides for transferring $18,405 from the Electric Division's 2020 Purchased Power Account (Account No. 525.05) to the Whitman Lake - SEAPA True-up Account (Account No. 525.10), in order to provide sufficient funds to make the 2020 Whitman true-up payment to the agency. The true-up payment for 2020 is projected at $636,404.66. The Finance Director's transmittal memorandum is attached and requires no elaboration on the part of my office. I concur with Ms. Johansen's recommendation.

The Finance Director and Electric Division Manager will attend the City Council meeting of February 4, 2021, in order to address any questions and/or concerns that Councilmembers may have.

A motion has been prepared for City Council consideration.

RECOMMENDATION

It is recommended the City Council adopt the motion authorizing the General Manager to transfer from within the Electric Division's 2020 Operating and Capital Budget, $18,405 from the Electric Division's Purchased Power Account (Account No. 525.05) to the Whitman Lake - SEAPA True-up Account (Account No. 525.10), in order to provide sufficient funds to make the 2020 Whitman true-up payment to the agency.

Recommended Motion: I move the City Council authorize the General Manager to transfer from within the Electric Division's 2020 Operating and Capital Budget, $18,405 from the Electric Division's Purchased Power Account (Account No. 525.05) to the Whitman Lake - SEAPA True-up Account (Account No. 525.10), in order to provide sufficient funds to make the 2020 Whitman true-up payment to the agency.

MEMORANDUM
CITY OF KETCHIKAN, ALASKA
Finance Department
Office of the Finance Director

Michelle Johansen, Finance Director
Camille Nelson, Senior Administrative Assistant
Phone: (907) 228-5621
Facsimile: (907) 228-5617

TO: Karl R. Amylon, City Manager/KPU General Manager

FROM: Michelle Johansen, Finance Director

DATE: January 19, 2021

SUBJECT: **2020 Budget Transfer from Purchased Power to Whitman True-up Account**

At its meeting of December 3, 2020 the Council approved a budget transfer in the amount $406,000 to bring the total budget for the Whitman True-up Account (525.10) to $618,000 in 2020. The Electric Division received the Annual Whitman True-up Report on January 13, 2021. The total true-up amount is expected to be $636,404.66 which is $18,405 over the budgeted amount of $618,000.

As a result, a motion has been prepared for Council consideration in the amount of $18,405 from the Electric Division's 2020 Purchased Power Account 525.05 to the Electric Division's Whitman True-up Account 525.10. The transfer is needed because there were insufficient funds in the Whitman True-up Account to cover the cost of the final true-up amount. This transfer is necessary in order to provide an appropriation for the payment of $636,404.66 required under the Whitman Lake True-up Agreement between the City and SEAPA.

In the past, the KMC 3.08.030(b) has allowed the public utilities manager to approve similar transfers and to notify the Council at its next regular meeting any budget transfers needed between the purchase power account (525.05) and the generation diesel fuel account (525.01). This section of the KMC has not been modified since the City has been subject to the Whitman True-up Agreement, an agreement that requires the City to remit funds for SEAPA's lost revenue due to Whitman Lake hydroelectric generation and Swan Lake spillage events. As you may recall we experienced a significant amount of precipitation in November and December, which forced the Electric Division to generate more than expected kWh from Whitman Lake hydroelectric facility for safety reasons. Should the Council desire to amend the KMC to update chapter 3.08.030 to allow transfers between purchased power, generation diesel fuel and Whitman true-up accounts an ordinance can be brought forward for consideration.

Please let me know if you have any questions.

Recommended Motion: I move the City Council authorize the KPU General Manager to transfer from within the Electric Division's 2020 Operating and Capital Budget, $18,405 from the Purchase Power Account (525.05) to the Whitman True-up Account (525.10).

KETCHIKAN - PETERSBURG - WRANGELL

SEAPA

Southeast Alaska Power Agency

1900 First Avenue
Suite 318
Ketchikan, Alaska 99901

Phone: 907.228.2281
Fax: 907.225.2287
www.seapahydro.org

October 1, 2018

Via Hand Delivery

Karl R. Amylon, General Manager
Ketchikan Public Utilities
334 Front Street
Ketchikan, Alaska 99901

  Re: Whitman True-up Agreement

Dear Karl:

At its meeting of September 27, 2018, the Southeast Alaska Power Agency's Board of Directors adopted a motion approving the enclosed amended Whitman True-up Agreement, which I have signed on behalf of SEAPA. In accordance with paragraph 13 of the agreement, the effective date is October 1, 2018. We will also retain a duplicate, fully executed agreement in our files.

If you have any questions, please do not hesitate to contact our office.

Sincerely,

Trey Acteson, CEO
Southeast Alaska Power Agency
P 907.228.2281 | C 907.617.0323 | tacteson@seapahydro.org

Attachment:
  Original, fully executed amended Whitman True-up Agreement effective October 1, 2018

Z/Operations & Maintenance/Whitman True-up/2018_1001_Ltr_to_Amylon_Re_Amended_Whitman_True-up_Agreement
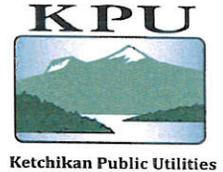
*Between
Ketchikan Public Utilities (KPU) and
Southeast Alaska Power Agency (SEAPA) Regarding
True-up Process For Certain Displaced Sales*

RECITALS

WHEREAS, The City of Ketchikan, Alaska, d/b/a Ketchikan Public Utilities (KPU) is completing construction of the Whitman Lake Hydroelectric Project in Ketchikan, Alaska, and this Whitman True-up Agreement ("Agreement") and Exhibit A (Whitman True-up Process) attached hereto provide a process to determine whether the annual operation of Whitman Lake results in certain displaced sales that would otherwise be made by SEAPA; and

WHEREAS, The Southeast Alaska Power Agency (SEAPA) is a Joint Action Agency organized pursuant to Title 42, Chapter 45, Article 5 of the Alaska Statutes, and is an agency of the State of Alaska, comprised of KPU, Petersburg, Alaska (Petersburg Municipal Power & Light) and Wrangell, Alaska (Wrangell Municipal Light & Power), collectively known as the "Member Utilities"; SEAPA and KPU may also be referred to as a "Party", or collectively as "Parties", in this Agreement; and

WHEREAS, SEAPA owns two hydroelectric facilities and an intertie connecting the Swan Lake and Tyee Lake Projects, with Swan Lake's energy and capacity being dedicated to Ketchikan, and Tyee Lake being dedicated jointly to the Petersburg Borough and the City and Borough of Wrangell, Alaska; and

WHEREAS, SEAPA and the Member Utilities are parties to a Long-Term Power Sales Agreement ("PSA"), where SEAPA has agreed to sell, and KPU has agreed to purchase, all available Dedicated and Additional Dedicated output from Swan Lake and Tyee Lake required to satisfy its Firm Power Requirements, as the case may be, consistent with the PSA; and

WHEREAS, the PSA also recognizes that KPU has two "Qualifying Existing Hydroelectric Resources" commonly referred to as Beaver Falls/Silvas and Ketchikan Lakes (FERC Project No. 1922 and FERC Project No. 420, respectively), as defined in the PSA; and

WHEREAS the PSA obligates SEAPA to sell, and KPU to purchase all available energy and capacity that exceeds its "Qualifying Existing Hydroelectric Resources", as defined in the PSA; and

WHEREAS, SEAPA and its Member Utilities are parties to an Indenture of Trust, dated February 1, 2009, providing long-term financing to SEAPA, allowing the Member Utilities to satisfy

debt obligations, maintenance and operating costs solely through purchases from SEAPA, among other things; and

WHEREAS, the PSA and the Indenture of Trust together mandate that the Full Requirements obligations of the PSA must not be altered unless bondholder approval is obtained, and require the obligation to satisfy all purchases of available energy and capacity from SEAPA facilities before purchases may be made from Whitman Lake generation; and

WHEREAS, the Parties agree that adopting the procedures set forth in this Agreement and Exhibit A hereto will allow SEAPA and its Member Utilities to cover the cost of any possible displaced sales resulting from Whitman Lake's operations, and will fulfill each Party's Full Requirements obligations in the PSA; and

WHEREAS, the Parties agree that the fundamental principles guiding this Agreement are that KPU should not be penalized for displacing diesel generation, and SEAPA should not incur displaced sales as a result of Whitman generation. This Agreement addresses these principles consistent with the obligations of the PSA and Indenture of Trust.

NOW, THEREFORE, the Parties agree as follows:

1.   **Whitman True-up Process.** Attached to this Agreement, and incorporated herein by this reference, is **Exhibit A – the Whitman True-up Process**. Exhibit A provides the procedures the Parties will use to determine whether any True-up Payment is to be paid by KPU, after each annual Measurement Period. Exhibit A is supported by Appendices A1-A8 detailing the calculations used to determine whether a True-up Payment will be due. The attached Exhibit A and its supporting Appendices A1-A8, and Case 1 to Exhibit A, provide the supporting data for the description of the Whitman True-up Process.

2.   **Operations Plan.** SEAPA and the Member Utilities prepare an annual Operations plan pursuant to the PSA. The Operations Plan estimates the Firm Power Requirements of the Purchasing Utilities and identifies the Dedicated Output to be delivered to meet the Firm Power Requirements. It also identifies any Additional Dedicated Output to be delivered to meet a Purchasing Utility's Firm Power Requirements. The Operations Plan, including but not limited to draft reservoir elevations, is mandated by the PSA and is developed by SEAPA in consultation with the Member Utilities using the best available information at the time. The Operations Plan, and any revisions thereto, shall be reasonable, timely, and determined in good faith between the Parties. The Operations Plan may be revised consistent with the PSA.

3. Annual Measurement. SEAPA agrees to measure spill throughout the calendar year, as provided in Exhibit A. SEAPA will provide quarterly reports containing all measurements detailed in Exhibit A to KPU. The Parties agree to work together should KPU or SEAPA need additional reports. Subject to both SEAPA and KPU measured values being verified, SEAPA will provide a final full annual accounting for the True-up no later than twenty-one (21) days after the end of the Measurement Period, and will submit an invoice for payment ("SEAPA Invoice").

4. True-up Payment and Protest. KPU shall pay the SEAPA Invoice no later than March 1 following the end of the Measurement Period. In the event KPU protests the final accounting of the True-up Payment, it shall provide, in writing, an explanation of the basis of its claim that the SEAPA Invoice is in error, no later than the March 1 due date for payment of the SEAPA Invoice. All payments are due, except for those subject to protest. The Parties, including their senior officials, shall meet to discuss any disputes within fifteen (15) business days of March 1. In the event such a meeting does not result in a final agreement to the protest regarding the SEAPA Invoice, the Parties agree to mediate the dispute. Any mediator used to resolve this dispute shall be a national expert experienced in electric generation matters and power agreements as well as the issues in dispute. Should the Parties be unable to mutually agree upon a mediator, then the dispute shall go to binding arbitration. Such mediation shall occur no later than sixty (60) days after March 1, as the Parties understand that a timely resolution of any such disputes is important for the continued operations of each Party's facilities. Should the Parties fail to resolve any dispute through a meeting of senior officials and mediation, a Party may bring a binding final arbitration action, consistent with the rules of the American Arbitration Association governing commercial disputes. The Parties shall agree to a single arbitrator, unless unable, and then each Party shall select an arbitrator, and the two arbitrators shall select a third arbitrator. Costs of the arbitration shall initially be paid for by each Party. The losing Party at the arbitration shall be responsible for all costs, and attorney fees for both Parties.

Unless otherwise stated, any other dispute between the Parties shall use the same process to resolve it as is described in this section of the Agreement.

5. Definitions. As may be utilized in this Agreement and Exhibit A hereto, the following terms shall have the definitions indicated:

> **Combined Spill.** Combined Spill is the water volume and energy as defined in Appendices A1 and A2 to Exhibit A where formulas for Daily Swan Lake and Daily Tyee Lake Spilled Water, and Daily Spilled Energy for each Facility are documented.

> **Delivery Limit.** A limit placed on SEAPA deliveries to KPU by a request from SEAPA. This in turn limits KPU imports from SEAPA.

A delivery limit is any SEAPA requested restriction on exports to KPU that results in a power transfer level that is below the existing capacity of the delivery system.

Delivery Loss. Delivery loss is the amount of energy lost between the point of generation and Bailey substation. It accounts for line, transformer and other stray losses that occur due to transmission and equipment.

Eligible KPU Diesel Generation. Eligible KPU Diesel Generation is diesel generation that is <u>required</u> by KPU to supplement SEAPA deliveries. Diesel generation that occurs when SEAPA transmission from Swan Lake to Bailey powerhouse is out of service or a Delivery Limit is in effect <u>is</u> Eligible KPU Diesel Generation. All other diesel generation is <u>not</u> eligible.

Displaced Sales. Displaced Sales are calculated as Whitman generation minus Eligible KPU Diesel Generation. Displaced Sales are not recorded if the SEAPA transmission from Swan Lake to Bailey powerhouse is out of service or a Delivery Limit is in effect. See Appendix A4 in Exhibit A.

Measurement Period. Measurement cycle which starts January 1 and ends December 31.

SEAPA Capacity. SEAPA capacity is defined as the total available capacity of Swan Lake plus the total available capacity of Tyee Lake minus the firm power requirements of Petersburg & Wrangell.

SEAPA Lost Revenue. SEAPA Lost Revenue is measured as the lesser of displaced sales and spilled energy after deductions. SEAPA will not record any lost revenue if there is no spill recorded from Swan Lake and Tyee Lake in the Measurement Period.

True Up Payment. The True-up Payment is a payment from KPU to SEAPA resulting from Displaced Sales that account for SEAPA lost revenue due to the operation of Whitman.

This Agreement also relies upon definitions from the existing Long-Term Power Sales Agreement between SEAPA and KPU, as well as certain terms defined in Exhibit A. In the event of any conflict between these Definitions, Exhibit A, and the PSA, the PSA shall govern.

6.   <u>**Term and Renegotiation.**</u> The Term of this Agreement shall commence on the Effective Date and end upon expiration or termination of the PSA.

Whitman True-Up Agreement

SEAPA
Ketchikan - Petersburg - Wrangell
Southeast Alaska Power Agency

KPU
Ketchikan Public Utilities

Either Party may exercise options to renegotiate this Agreement, and propose different terms and conditions as amendments to this Agreement as set forth herein. The initial option to renegotiate shall commence three (3) years after the Effective Date. Either Party may provide written notice to the other of its request to renegotiate the terms of this Agreement ("Notice of Renegotiation"). The first Notice of Renegotiation must be sent by the Party exercising this option prior to the end of the initial three (3) years of this Agreement. In addition, either party may exercise such an option prior to the end of each subsequent three year period of this agreement or defeasance of SEAPA's 2009 Electric Revenue Refunding Bonds. If a Notice of Renegotiation is not timely sent, the terms and conditions of the Agreement shall continue until a subsequent Notice of Renegotiation is timely sent, only after three years from when the Notice of Renegotiation is due. The Notice of Renegotiation shall be sent ten (10) days prior to the end of the three (3) year period.

A Notice of Renegotiation shall be accompanied by a written proposal for any changes to this Agreement, and all necessary back up to allow the non-requesting Party to understand the proposal. Good faith negotiations shall occur regarding the Notice of the Renegotiation, and if necessary, the Parties shall meet and confer to discuss the Notice of Renegotiation. Should the Parties fail to reach agreement regarding renegotiation of this Agreement, the Party seeking the renegotiations may seek a final, non-binding mediation. The mediation period shall be for thirty (30) days following the selection of a mediator. The mediator shall be mutually agreed upon by the Parties, and be an expert in electric generation matters and power agreements. If the Parties fail to agree on a mediator, they shall each select an independent mediator, and the selected mediators shall select a mediator who is an expert in electric generation matters and power agreements to serve as the sole mediator.

Any changes agreed upon by the Parties shall be memorialized in a written amendment signed by the Parties. Until any agreed upon amendment is signed, the Parties shall follow the terms and conditions of the then existing Agreement.

7.   **Severability**. If any section, paragraph, clause, or provision of this Agreement or any agreement referred to in this Agreement shall be found to be invalid or unenforceable by a court of law with jurisdiction over the Parties, the remainder of this Agreement shall be unaffected by such adjudication and all the remaining portions of this Agreement shall remain in full force and effect. If any section, paragraph, clause, or provision of this Agreement or any agreement referred to in this Agreement shall be found invalid or unenforceable by a court of law with jurisdiction over the Parties, then and in such event the Parties agree that they shall exercise their best efforts to correct such invalidation and substitute appropriate agreements and contractual arrangements to achieve the intent of this Agreement.

8. **Assignment.** This Agreement shall inure to the benefit of, and shall be binding upon the respective successors and assigns of the Parties to this Agreement; provided, however that neither this Agreement nor any interest herein shall be transferred or assigned by either Party to any other person without prior written consent of the non-assigning Party, and that the assignee or successor in interest complies with any statutory requirements and regulations governing the Parties.

9. **Indemnity.** Each Party agrees to indemnify, defend, and hold the other harmless, and its directors, officers, employees, agents and other representatives from all losses or damages arising from their breach of this Agreement, or any negligent or wrongful acts or omissions in connection with this Agreement. Any damages resulting from the negligent or wrongful acts by either party shall be levied in proportion to the percentage of fault attributable to each Party, and each Party shall have the right to seek contribution from the other Party in proportion to the percentage of negligence or wrong doing attributable to the other Party.

10. **Waiver and Entire Agreement.** Any waiver at any time by any Party to this Agreement or its rights with respect to any default of any other Party hereto, or with respect to any other matter arising in connection with this Agreement, shall not be considered a waiver with respect to any subsequent default, right or matter. This Agreement and the attached Exhibit A with accompanying Appendices and all attachments, and other agreements and documents incorporated herein, constitute the entire agreement between the Parties, and supersede all other prior representations, understandings, negotiations and discussions, whether written or oral, of the Parties.

11. **Applicable Law.** This Agreement shall be governed by and construed in accordance with the laws of the State of Alaska without giving effect to the conflicts of law principles thereof. Any controversy, claim, or dispute arising under or relating to this Agreement may be brought in an Alaska State court, in the venue of Ketchikan, Alaska.

12. **Incorporation.** This Agreement specifically incorporates Exhibit A – Whitman True-up Process, Case 1 and Appendices A1-A8 to Exhibit A, and the existing Long-Term Power Sales Agreement.

13. **Effective Date.** This Agreement shall be effective as of the date last written below.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed, each on the date written below.

CITY OF KETCHIKAN, d/b/a
KETCHIKAN PUBLIC UTILITIES

BY: _____
    Karl R. Amylon, Manager

ATTEST:
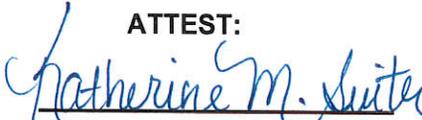
_____ [SEAL]
Katherine M. Suiter, City Clerk

CITY ACKNOWLEDGMENT

STATE OF ALASKA   )
) ss:
First Judicial District   )

THIS IS TO CERTIFY that on this 22nd day of June, 2018, before me, the undersigned, a notary public in and for the State of Alaska, duly commissioned and sworn, personally appeared **Karl R. Amylon** and **Katherine M. Suiter**, to me known to be the **City Manager** and **City Clerk**, respectively, of the **City of Ketchikan**, a municipal corporation, the corporation which executed the above and foregoing instrument; who on oath stated that they were duly authorized to execute said instrument and affix the corporate seal thereto on behalf of said corporation; who acknowledged to me that they signed and sealed the same freely and voluntarily on behalf of said corporation for the uses and purposes therein mentioned.

WITNESS my hand and official seal the day and year in the certificate first above written.

_____
Notary Public for Alaska
My Commission Expires: 5/9/19

Official Seal
Diane L. Walker
Notary Public - State of Alaska
My Comm. Expires
May 9, 20 19
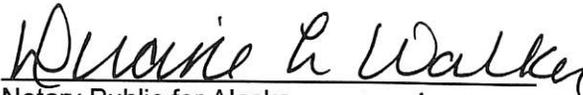
SOUTHEAST ALASKA POWER AGENCY

BY: _____
   Trey Acteson, CEO

SEAPA ACKNOWLEDGMENT

STATE OF ALASKA   )
) ss:
First Judicial District   )

THIS IS TO CERTIFY that on this 1st day of October, 2018, before me, the undersigned, a notary public in and for the State of Alaska, duly commissioned and sworn, personally appeared **Trey Acteson**, to me known to be the **Chief Executive Officer**, of the **Southeast Alaska Power Agency**, a joint action agency, the agency which executed the above and foregoing instrument; who on oath stated that he was duly authorized to execute said instrument; and who acknowledged to me that he signed the same freely and voluntarily on behalf of said agency for the uses and purposes therein mentioned.

WITNESS my hand and official seal the day and year in the certificate first above written.

_____
Notary Public for Alaska
My Commission Expires: 08.08.2021

KETCHIKAN - PETERSBURG - WRANGELL

SEAPA

Southeast Alaska Power Agency

Whitman True-Up Process

Exhibit A

KPU

Ketchikan Public Utilities

A True-up Payment is due when generation at Whitman causes SEAPA Lost Revenue. Lost Revenue is based upon measurement of Whitman Generation and spill volumes at Swan Lake and Tyee Lake. Any sales SEAPA could potentially make, that are instead displaced by Whitman generation, initially accrue as water in the Swan Lake and Tyee Lake reservoirs. This displacement increases reservoir levels in the short term, but as long as this water is not wasted as spill, there is no long-term Lost Revenue since the water could be used to generate sales in the future. This Exhibit details the process for measuring and calculating Whitman generation, spill volumes and Lost Revenue. (Note: If another non-SEAPA source comes on line after Whitman, that source will precede Whitman in the True-up process.)

Steps for Determining SEAPA Lost Revenue

1. Sum all Displaced Sales (Appendix A4)
2. Sum all Spilled Energy for Swan and Tyee (Appendix A1 & A2)
3. Apply Delivery Loss Deduction (Appendix A3)
4. Calculate Lost Revenue

SEAPA Lost Revenue is the lesser of Displaced Sales and Spilled Energy (after deductions)

Measurements & Measurement Intervals

1. Daily: Measure lake level at Tyee Lake using the USGS outlet streamflow gauge or a future replacement gauge
2. Continuously: Measure spill at Swan Lake using the Vertical Gate Programmable Logic Controller (PLC)
3. Hourly: Record generation (kWh) from Whitman Unit 1 and Whitman Unit 2 at the delivery point defined in Appendix A8
4. Hourly: Record KPU diesel generation (kWh)
5. Hourly: Record the 115 kV Bailey breaker position (Open/Closed)
6. At each Occurrence: Record SEAPA Delivery Limit (if any)

Calculation Intervals

Displaced Sales:
Whitman generation minus KPU Eligible Diesel Generation: Daily (with hourly consideration for breaker position and Whitman Generation)

Spilled Energy:
Swan Lake: Continuously (PLC)
Tyee Lake: Daily (USGS Lake Level)

Line Loss Deduction:
For All Displaced Sales: Reports are Quarterly and Final is Annually

Lost Revenue:
Final Calculation: Reports are Quarterly and Final is Annually

Attachments:

Please see the attached pages, which provide the following:

1. A representational "Case" that provides details for annual measurements with tables, calculations and methodology for determining Lost Revenue. The representational case is for demonstration purposes to represent scenarios only and should not be considered contractual.

2. Appendices A1- A8, which provide detailed calculations for each step in the True-Up process:

    Appendix A1—Swan Lake Spilled Water and Spilled Energy
    Appendix A2—Tyee Lake Spilled Water and Spilled Energy
    Appendix A3—Delivery Loss Deduction
    Appendix A4—Method to Record Displaced Sales
    Appendix A5 – True-Up Measurement Period
    Appendix A6—Tyee Lake kW Calculation (used in Appendix A2—Tyee Lake)
    Appendix A7—Swan Lake kW Calculation (used in Appendix A1—Swan Lake)
    Appendix A8—Whitman Generation Delivery Point

[Remainder of page intentionally left blank.]

Whitman True-Up Process
Exhibit A

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SEAPA
KETCHIKAN - PETERSBURG - WRANGELL
Southeast Alaska Power Agency

CASE 1: Displaced Sales Method

Case 1 is a representation of displaced sales used to calculate lost revenue. Eight scenario days are used to characterize the year (Table 1) with each of the eight days having slight variances. The steps for calculating lost revenue are detailed with calculations for each step below.

Table 1: Displaced Sales Method Representation

Measurements

1. Daily: Measure lake level at Tyee Lake using the USGS outlet streamflow gauge or a future replacement gauge
2. Continuously: Measure spill at Swan Lake using the Vertical Gate Programmable Logic Controller
3. Hourly: Record generation (kWh) from Whitman Unit 1 and Whitman Unit 2 at the delivery point defined on page 25
4. Hourly: Record KPU diesel generation (kWh)
5. Hourly: Record the 115 kV Bailey breaker position (Open/Closed)
6. At each Occurrence: Record SEAPA Delivery Limit (if any)

Calculations

Ops Plan Values

	Swan Lake	Tyee Lake
Draft Elevation	275.00	1265.00
Draft Tolerance(+)	5.00	15.00
Spill Elevation	342.00	NA

Date	Tyee Lake Level	Swan Lake Level	Tyee Spill (avg cfs)	Swan Spill (avg cfs)	Whitman Generation (MWh)	KPU Diesel Generation (MWh)	Bailey 115kV Bkr Position	Bkr Position Duration (hrs)	SEAPA Delivery Limit (MW)	Displaced Sales (MWh)	Total Spilled Energy (MWh)	Line Losses (MWh)
Day 1	1340.00	320.40	0.00	0.00	106.50	101.25	Closed	NA	12	0.00	0.00	0.00
Day2	1290.30	285.00	0.00	0.00	61.77	153.21	Open	8	NA	41.18	0.00	0.00
Day 3	1400.00	329.30	484.85	0.00	54.81	0.00	Closed	NA	NA	54.81	1224.88	61.61
Day 4	1397.00	342.00	60.61	0.00	41.48	0.00	Closed	NA	NA	41.48	152.78	7.68
Day 5	1395.00	330.20	0.00	0.00	42.35	112.10	Open	24	NA	0.00	0.00	0.00
Day 6	1398.00	340.00	171.42	772.95	107.25	101.50	Closed	NA	NA	107.25	903.48	45.45
Day 7	1389.00	341.00	0.00	1190.57	58.25	5.25	Closed	NA	NA	58.25	0.00	0.00
Day 8	1396.00	341.50	0.00	0.00	108.25	152.40	Closed	NA	NA	108.25	0.00	0.00
Totals:			716.87	1963.52	580.66	625.71				411.22	2281.14	114.74

Procedure:

Step 1: Sum all Displaced Sales

Following the procedure as delineated in Appendix A4, the first step is to determine whether any of the following conditions exist:

Condition	Description	True?
Condition A:	SEAPA transmission from Swan Lake to Bailey Powerhouse is out of service.	☐
Condition B:	A delivery limit is in effect.	☐

Day 1:

Condition A: False—Condition B: True
Displaced Sales: 0.00MWh *(Condition B is True for entire day therefore displaced sales are zero)*

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Southeast Alaska Power Agency

Whitman True-Up
Process
Exhibit A

KPU
Ketchikan Public Utilities

Day 2:

Condition A: True—Condition B: False
Displaced Sales: 41.18MWh *(Condition A is True for 8hrs, therefore 16hrs of Whitman Generation are Displaced Sales)*

Day 3:

Condition A: False—Condition B: False
Displaced Sales: 54.81MWh *(Conditions A&B are False, therefore Displaced Sales are Whitman Generation)*

Day 4:

Condition A: False—Condition B: False
Displaced Sales: 41.48MWh *(Conditions A&B are False, therefore Displaced Sales are Whitman Generation)*

Day 5:

Condition A: True—Condition B: False
Displaced Sales: 0.0MWh *(Condition A is True for 24hrs therefore Displaced Sales are zero)*

Day 6:

Condition A: False—Condition B: False
Displaced Sales: 107.25MWh *(Conditions A&B are False, therefore Displaced Sales are Whitman Generation)*

Day 7:

Condition A: False—Condition B: False
Displaced Sales: 58.25MWh *(Conditions A&B are False, therefore Displaced Sales are Whitman Generation)*

Day 8:

Condition A: False—Condition B: False
Displaced Sales: 108.25MWh *(Conditions A&B are False, therefore Displaced Sales are Whitman Generation)*

Displaced Sales are therefore 0.0+41.18+54.81+41.48+0.0+107.25+58.25+108.25 = **411.22MWh**

Total Displaced Sales

Displaced Sales = 411.22 MWh

Step 2: Sum all Spilled Energy for Swan Lake and Tyee Lake

Following the procedure as delineated in Appendix A1 & A2, Spilled Energy is determined by performing calculations for each lake separately.

Swan Lake Spilled Energy Example:

Day 6:

On Day 6, the Swan Lake Level was at 340.0 ft. Elevation 340.0ft is below the Ops Plan Spill elevation of 342ft. If Swan Lake and Tyee Lake do not spill at any time in the future, the spill on Day 6 would not be counted as Spilled Energy. Spill does however occur on Day 7 (in the future) and so all spill on Day 6 is considered Spilled Energy.

Swan Lake levels and the position of the vertical gate are monitored continuously by the vertical gate programmable logic controller (PLC). With lake level and vertical gate position data, the PLC continuously calculates and sums the amount of water spilled in cubic feet per second (cfs). The equation used by the PLC is: $Q = 85.928 * \left[(P_E - 330)^{3/2} - (P_E - 330 - G_O)^{3/2} \right]$

Where:

$$P_E = Lake\ Elevation$$
$$G_O = Gate\ Position$$

On Day 6, the PLC would calculate the spill using the equation as stated above:

Measured Lake Level and Gate Position by the PLC:

$$P_E = 340.0\ ft$$
$$G_O = 2.0$$

PLC Calculation:

$$Q = 85.928 * \left[(P_E - 330)^{3/2} - (P_E - 330 - G_O)^{3/2} \right]$$
$$Q = 85.928 * \left[(340.0 - 330)^{3/2} - (340.0 - 330 - 2.0)^{3/2} \right]$$

Q = 772.95 (cfs)

With the spilled cfs averaged continuously over the 24hr period, the spilled energy is calculated using the following equation:

$$MWh = \frac{H*Q}{557.92}\ \text{(See Appendix A1)}$$

H = 340.0 ft *(H is equal to Net Head which equals the lake elevation at Swan Lake)*
Q = 772.95 cfs

MWh (Day 6) = $\frac{340.0*772.95}{557.92}$

MWh (Day 8) = 471.04 MWh

Day 7:

On Day 7, the Swan Lake Level was at 341.0 ft. Elevation 341.0ft is below the Ops Plan Spill elevation of 342ft. Since Swan Lake and Tyee Lake did not spill any days in the future, all spill at Swan Lake on Day 7 would not be counted as Spilled Energy.

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Whitman True-Up
Process
Exhibit A

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Sum of Swan Lake Spilled Energy:

Using the same methodology as above, the total MWh for Swan Lake Spilled energy is calculated below:

Date	(P_E) Swan Lake Level	(G_O) Swan Lake Gt. Position (ft)	PLC Equation for Calculation of cfs $85.928 * \left[(P_E-330)^{3/2} - (P_E-330-G_O)^{3/2}\right]$	Swan Spill (avg cfs)	Swan Lake MWh Equation $\dfrac{H*Q}{557.92}$	Swan Lake Spilled MWh
Day 1	320.40	0.00	$85.928 * \left[320.4 - 330)^{3/2} - (320.4 - 330 - 0)^{3/2}\right]$	0.00	$\dfrac{320.4 * 0.0}{557.92}$	0.00
Day 2	285.00	0.00	$85.928 * \left[(285 - 330)^{3/2} - (285 - 330 - 0)^{3/2}\right]$	0.00	$\dfrac{285.0 * 0.0}{557.92}$	0.00
Day 3	329.30	0.00	$85.928 * \left[(329.3 - 330)^{3/2} - (329.3 - 330 - 0)^{3/2}\right]$	0.00	$\dfrac{329.3 * 0.0}{557.92}$	0.00
Day 4	342.00	0.00	$85.928 * \left[(342.0 - 330)^{3/2} - (342.0 - 330 - 1.0)^{3/2}\right]$	0.00	$\dfrac{342.0 * 85.93}{557.92}$	0.00
Day 5	330.20	0.00	$85.928 * \left[(330.2 - 330)^{3/2} - (330.2 - 330 - 1.0)^{3/2}\right]$	0.00	$\dfrac{330.2 * 7.69}{557.92}$	0.00
Day 6	340.00	2.00	$85.928 * \left[(340.0 - 330)^{3/2} - (340.0 - 330 - 1.35)^{3/2}\right]$	772.95	$\dfrac{340.0 * 772.95}{557.92}$	471.04
Day 7	341.00	3.00	$85.928 * \left[(341.0 - 330)^{3/2} - (341.0 - 330 - 3.0)^{3/2}\right]$	1190.57	$\dfrac{341 * 1190.57}{557.92}$	0.00
Day 8	341.50	0.00	$85.928 * \left[341.5 - 330)^{3/2} - (341.5 - 330 - 4.0)^{3/2}\right]$	0.00	$\dfrac{341.5 * 0.00}{557.92}$	0.00

Ops Plan Spill Elevation: 342ft

Sum of Swan Lake Spilled Energy (MWh): **471.04**

Tyee Lake Spilled Energy Example:

Day 6:

The Tyee Lake Levels are monitored using the USGS outlet streamflow gauge. Calculating spilled energy at Tyee is done by recording the lake level and inputting the value into the following equation:

$$Q = 60.606 * (P_E - 1396)^{3/2} \text{ (Appendix A6)}$$

Where:

P_E = Lake Elevation

On Day 6, the spill would be calculated as follows using the equation as stated above:

Measured Lake Level from the USGS outlet streamflow gauge:

$P_E = 1398.0 \ ft$

Calculation:

$$Q = 60.606 * (P_E - 1396)^{3/2}$$
$$Q = 60.606 * (1398.0 - 1396)^{3/2}$$

Q = 171.42 (cfs)

For cfs over a 24hr period, the Spilled Energy is calculated using the following equation:

$$MWh = \frac{H*Q}{554.167} \text{ (See Appendix A2)}$$

H = 1398 ft *(H is equal to Net Head which equals the lake elevation at Tyee Lake)*
Q = 171.42 cfs

$$MWh \text{ (Day 6)} = \frac{1398*171.42}{554.167}$$

MWh (Day 6) = $432.44 MWh$

Sum of Tyee Lake Spilled Energy:
Using the same methodology as above, the total MWh for Tyee Lake Spilled energy is calculated below:

Date	(P_E) Tyee Lake Level	PLC Equation for Calculation of cfs $60.606 * \left[(P_E - 1396)^{3/2}\right]$	Tyee Spill (avg cfs)	Tyee Lake MWh Equation $\frac{H*Q}{554.167}$	Tyee Lake Spilled MWh
Day 1	1340.00	$60.606 * \left[134.00 - 1396\right]^{3/2}$	0.00	$\frac{1340.0 * 0.0}{554.167}$	0.00
Day 2	1290.30	$60.606 * \left[1290.3 - 1396\right]^{3/2}$	0.00	$\frac{1290.3 * 0.0}{554.167}$	0.00
Day 3	1400.00	$60.606 * \left[1400.0 - 1396\right]^{3/2}$	484.85	$\frac{1400.0 * 484.85}{554.167}$	1224.88
Day 4	1397.00	$60.606 * \left[1397.0 - 1396\right]^{3/2}$	60.61	$\frac{1397.0 * 60.61}{554.167}$	152.78
Day 5	1395.00	$60.606 * \left[1395.0 - 1396\right]^{3/2}$	0.00	$\frac{1395.0 * 0.0}{554.167}$	0.00
Day 6	1398.00	$60.606 * \left[1398.0 - 1396\right]^{4/2}$	171.42	$\frac{1398.0 * 171.42}{554.167}$	432.44
Day 7	1389.00	$60.606 * \left[1389.0 - 1396\right]^{3/2}$	0.00	$\frac{1389.0 * 0.0}{554.167}$	0.00
Day 8	1396.00	$60.606 * \left[1396.0 - 1396\right]^{3/2}$	0.00	$\frac{1396.0 * 890.72}{554.167}$	0.00
				Sum of Tyee Lake Spilled Energy (MWh):	**1810.10**

Total Spilled Energy:
The total spilled energy is the sum of Tyee Lakes and Swan Lakes spilled energy as calculated below:

Total Spilled Energy = Swan Spilled Energy (MWh) +Tyee Spilled Energy (MWh)

Total Spilled Energy = 471.04 MWh + 1810.10MWh

Total Spilled Energy = 2,281.14 MWh

Step 3: Apply Delivery Loss Deductions

Appendix A3 demonstrates that over multiple years, the delivery losses are consistent at an average of 5.03%. This percentage is multiplied by the total Spilled Energy and deducted to account for what could have been delivered at the Bailey Substation. The losses include step up transformers, line losses, step down transformers and all ancillary equipment between Swan Lake generators and the Bailey Substation.

Delivery Loss Calculation:

Delivery Loss Calculation = (1 − Delivery Loss Percentage) * Total Spilled Energy
Delivery Loss Calculation = (1 − 0.0503) * Total Spilled Energy
Delivery Loss Calculation = 0.9497 * Total Spilled Energy

Total Spilled Energy w/ Delivery Loss = 0.9497 * 2281.14 MWh

Total Spilled Energy w/Delivery Loss = 2166.40 MWh

Step 4: Calculate Lost Revenue

Lost Revenue is the lesser of Spilled Energy and Displaced Sales. For Case 1, Displaced Sales are the lesser.

Spilled Energy: 2166.40 MWh
Displaced Sales: 411.22MWh

Lost Revenue ($) = 411.22MWh * $68/MWh = $27,962.96

[Remainder of page intentionally left blank.]

The water that is spilled at Swan Lake through the vertical gate is continuously calculated by the PLC. Direct inputs allow the PLC to collect lake elevation and gate position. The amount of spilled water is then calculated continuously using the following equation:

Daily Swan Lake Spilled Water:

$$Q = 85.928 * \left[(P_E - 330)^{3/2} - (P_E - 330 - G_O)^{3/2} \right] \text{ (See Table A1)}$$

Where:

P_E = Lake Elevation
G_O = Gate Position

For Hydro-generators, Kilo-Watts (kW) are a function of net head (in ft), flow (in cfs) and efficiency. See Appendix A7 for the method of deriving the kW equation. To determine the amount of spilled energy in Mega-Watthours (MWh), the kW equation is divided by 1,000 (to convert kW to MW) and then multiplied by 24hrs as shown below:

Daily Swan Lake Spilled Energy:

kW Equation: see Appendix A7

$$kW = \frac{H * Q}{13.39}$$

Where:

H = Head (ft)
Q = flow (cfs)

MWh Equation:

$$kWh = \frac{H*Q}{13.39} * 24hr$$

$$MWh = \frac{1MW}{1000kW} * \frac{H * Q}{13.39} * 24hr$$

$$MWh = \frac{H * Q}{557.92}$$

Table A1: Swan Lake Vertical Gate Discharge Table

Swan Lake Vertical Gate Discharge Table (cfs)																
Gate Opening Ft / Percent																
	1 Ft	2 Ft	3 Ft	4 Ft	5 Ft	6 Ft	7 Ft	8 Ft	9 Ft	10 Ft	11 Ft	12.3 Ft	13 Ft	14 Ft	15 Ft	16.4 Ft
	6%	12%	18%	25%	30%	37%	43%	50%	55%	61%	67%	75%	79%	85%	91%	100%
331 Ft	86	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
332 Ft	158	244	*	*	*	*	*	*	*	*	*	*	*	*	*	*
333 Ft	204	361	447	*	*	*	*	*	*	*	*	*	*	*	*	*
334 Ft	241	445	602	*	*	*	*	*	*	*	*	*	*	*	*	*
335 Ft	274	515	718	888	961	*	*	*	*	*	*	*	*	*	*	*
336 Ft	303	576	817	1038	1177	1263	*	*	*	*	*	*	*	*	*	*
337 Ft	329	631	904	1168	1349	1506	1592	*	*	*	*	*	*	*	*	*
338 Ft	353	682	984	1283	1498	1702	1859	*	*	*	*	*	*	*	*	*
339 Ft	376	729	1058	1389	1633	1874	2078	2259	2321	*	*	*	*	*	*	*
340 Ft	398	773	1126	1486	1757	2030	2271	2510	2632	2718	*	*	*	*	*	*
341 Ft	418	815	1191	1578	1873	2175	2448	2733	2892	3049	3135	*	*	*	*	*
342 Ft	438	855	1252	1664	1981	2310	2612	2936	3126	3329	3487	*	*	*	*	*
343 Ft	456	893	1311	1747	2084	2437	2765	3124	3341	3582	3785	3978	4028	*	*	*
344 Ft	474	930	1367	1825	2182	2557	2910	3301	3541	3814	4055	4311	4416	4502	*	*
345 Ft	491	965	1421	1900	2275	2672	3048	3469	3730	4032	4305	4611	4749	4907	4992	*
346 Ft	508	999	1472	1972	2365	2783	3180	3628	3908	4237	4539	4888	5053	5257	5414	*
347 Ft	524	1031	1522	2042	2451	2889	3306	3780	4079	4432	4761	5148	5336	5577	5780	5983

(Left axis label: Pool Elevation)
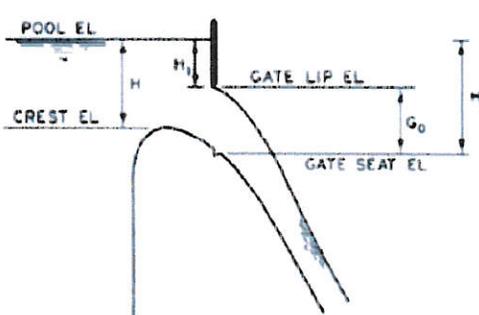
DEFINITION SKETCH

Q_G = Gate Discharge (cfs) C_{d1} = Gate Discharge Coefficient
Q = Free Discharge (cfs) C_d = Free Discharge Coefficent
H_2 = Head on Gate Seat (ft) H_1 = Head on Gate Lip (ft)
H = Head on Spillway Crest (ft) P_E = Pool Elevation (ft)
G_0 = Gate Opening (ft)

$$\frac{Q_G}{Q} = \frac{C_{d1}}{C_d}\left(\frac{H_2^{3/2} - H_1^{3/2}}{H^{3/2}}\right) \qquad \frac{C_{d1}}{C_d} = 1 \qquad C_d = 3.736$$

Substitution: $Q = 3.736 \cdot 23_{ft} \cdot H^{3/2}$ $Q = 85.928 \cdot H^{3/2}$

$$Q_G = 85.928 H^{3/2}\left(\frac{H_2^{3/2} - H_1^{3/2}}{H^{3/2}}\right) \qquad Q_G = 85.928\left(H_2^{3/2} - H_1^{3/2}\right)$$

$H_2 = P_E - 330_{ft}$ $H_1 = H_2 - G_0$ $H_1 = P_E - 330_{ft} - G_0$

$$\boxed{Q = 85.928\left[(P_E - 330)^{3/2} - (P_E - 330 - G_0)^{3/2}\right]}$$

Notes: Reference to HDC 312, McMillen Jacobs 2016 DDR and R.W. Beck 1989 Spillway Discharge Coefficients.

Gate seal is on top of crest. Discharge coefficient linearized to 3.736 above Pool Elevation 336. Substitute for metric: $G_0 = G_M/304.8$

Whitman True-Up Process

APPENDIX A2 – Tyee Lake Spilled Water and Spilled Energy

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The water that is spilled at Tyee Lake over the spillway weir is calculated by the equation below. Data is collected for Tyee Lake pool elevation from the USGS outlet streamflow gauge. The amount of spilled water is then calculated daily using the following equation:

Daily Tyee Lake Spilled Water:

$$Q = 60.606 * (P_E - 1396)^{3/2}$$

Where:

$$P_E = \text{Lake Elevation}$$

For Hydro-generators, Kilo-Watts (kW) are a function of net head (in ft), flow (in cfs) and efficiency. See Appendix A6 for the method of deriving the kW equation. To determine the amount of spilled energy in Mega-Watthours (MWh), the kW equation is divided by 1000 (to convert kW to MW) and then multiplied by 24hrs as shown below:

Daily Tyee Lake Spilled Energy:

kW Equation: see Appendix A6

$$kW = \frac{H * Q}{13.3}$$

Where:

H = Head (ft)
Q = flow (cfs)

MWh Equation:

$$kWh = \frac{H*Q}{13.3} * 24hr$$

$$MWh = \frac{1MW}{1000kW} * \frac{H * Q}{13.3} * 24hr$$

$$\boldsymbol{MWh = \frac{H * Q}{554.167}}$$

Whitman True-Up Process
APPENDIX A3 – Delivery Loss Deduction

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The Delivery Loss Deduction is based upon actual measured delivery losses that occurred from 2010 through 2013. Delivery losses are subtracted from the spill total so the lost revenue calculation is consistent with the delivery point. The delivery point is the KPU 34.5 kV bus in the Bailey Substation. Annual generation and deliveries were tabulated for calendar years 2010 through 2013 and the results are shown in the table below. An average of 5.03% loss was calculated for the period and that is the value used in the Whitman True-up Agreement.

Table A3: Delivery Loss Table

Calendar YR	Tyee	Swan	Total Generation	WRG	PSG	KTN	Total Deliveries	Delivery Loss Calculation $1-\left[\dfrac{Total\ Deliveries}{Total\ Generation}\right]$	Total Losses
2010	92,117	74,345	166,462	29,429	39,702	89,101	158,232	$1-\left[\dfrac{158,132}{166,462}\right]$	4.94%
2011	109,493	67,874	177,366	35,685	44,540	88,081	168,306	$1-\left[\dfrac{168,306}{177,366}\right]$	5.11%
2012	100,228	81,667	181,895	37,694	41,126	94,372	173,192	$1-\left[\dfrac{173,192}{181,895}\right]$	4.78%
2013	113,353	70,583	183,936	38,725	44,165	91,331	174,221	$1-\left[\dfrac{174,221}{183,936}\right]$	5.28%
							Avg. Losses		**5.03%**

Delivery Loss Calculation:
Using the average delivery loss percentage from Table A2, the application of the delivery loss is as demonstrated below:

Delivery Loss Calculation = (1 – Delivery Loss Percentage) * Total Spilled Energy

Delivery Loss Calculation = (1 – 0.0503) * Total Spilled Energy

Total Spilled Energy w/ Delivery Loss:

Spilled Energy w/ Delivery loss = 0.9497*Total Spilled Energy

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Displaced Sales are defined as the difference between Whitman generation and Eligible KPU Diesel Generation in MWh for the day.

$$Whitman\ Generation - Eligible\ KPU\ Diesel\ Generation = Displaced\ Sales$$

Eligible KPU Diesel Generation is diesel generation <u>required</u> by KPU to supplement SEAPA deliveries to meet load. Diesel Generation for maintenance is not eligible. Diesel Generation that occurs when SEAPA has capacity for delivery will not be eligible. For example, if SEAPA has a transmission line outage from Swan Lake to Bailey Powerhouse for 8hrs and KPU generates with diesel for 24hrs, only 8hrs of Diesel Generation is eligible.

Displaced Sales are zero under the following circumstances: (only for the duration of the condition, and calculated hourly)

Condition A:	SEAPA transmission from Swan Lake to Bailey Powerhouse is out of service.
Condition B:	A Delivery Limit is in effect (see Delivery Limit definition)

Table A4: Examples of Conditions

Date	Tyee Lake Level (ft)	Swan Lake Level (ft)	Tyee Spill (avg cfs)	Swan Spill (avg cfs)	Whitman Generation (MWh)	KPU Diesel Generation (MWh)	Bailey 115kV Bkr Position	Bkr Position Duration (hrs)	SEAPA Delivery Limit (MWh)	Displaced Sales (MWh)	Condition
Day 1	1340.00	320.40	0.00	0.00	106.50	101.25	Closed	NA	12	0.00	Condition B
Day 2	1290.30	285.00	0.00	0.00	61.77	153.21	Open	8	NA	41.18	Condition A
Day 3	1400.00	329.30	484.85	0.00	54.81	0.00	Closed	NA	NA	54.81	NA
Day 4	1397.00	342.00	60.61	0.00	41.48	0.00	Closed	NA	NA	41.48	NA
Day 5	1395.00	330.20	0.00	0.00	42.35	112.10	Open	24	NA	0.00	Condition A
Day 6	1398.00	340.00	171.42	772.95	107.25	101.50	Closed	NA	NA	107.25	NA
Day 7	1389.00	341.00	0.00	1190.57	58.25	5.25	Closed	NA	NA	58.25	NA
Day 8	1396.00	341.50	0.00	0.00	108.25	152.40	Closed	NA	NA	108.25	NA
									Total:	411.22	

Example Condition A: Entire Day

Condition A occurs for the entire day on Day 5. The Bailey 115kV breaker is open for 24hrs. Since the breaker is open for 24hrs, Displaced Sales are zero for the entire day.

Example Condition A: Partial Day

Condition A occurs for 8hrs on Day 2. The Displaced Sales are therefore calculated as per the following:

Displaced Sales = (24hr-8hr) * Whitman Generation

Displaced Sales = (16hr) * Whitman Generation

16hr = 16hr/24hr = 2/3

Displaced Sales = 2/3 * Whitman Generation

Whitman True-Up Process

APPENDIX A4 – Method to Record Displaced Sales

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Displaced Sales = 2/3 * 61.77MWh

Displaced Sales = 41.18MWh

Example Condition B:

Condition B occurs on Day 1. A SEAPA delivery limit is in effect with a 12MW limit therefore the Displaced Sales are calculated below. Two scenarios are given for clarity

Scenario 1: Full Day Delivery Limit

For a full day delivery limit, SEAPA would notify KPU that a 12MW limit is in effect for the duration of 24hrs. For this scenario, the Displaced Sales would be zero.

Scenario 2: Partial Day Delivery Limit

For a partial day delivery limit (example is 8hrs), SEAPA would notify KPU that a 12MW limit is in effect for the duration of 8hrs. For this scenario, the displaced sales would be calculated as per the following:

Displaced Sales = (24hr-8hr) * Whitman Generation

Displaced Sales = (16hr) * Whitman Generation

16hr = 16hr/24hr = 2/3

Displaced Sales = 2/3 * Whitman Generation

Displaced Sales = 2/3 * 106.5MWh

Displaced Sales = 71.0MWh

On Day 1, Scenario 1 is used (as an example) for summing Displaced Sales. After summation, the total Displaced Sales for this example year is **411.22MWh**.

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SEAPA's Operations Plan schedules power deliveries such that both Tyee Lake and Swan Lake are full, or nearly full, by December 1st. This is done because system loads are greatest in the winter, and full reservoirs mean maximum energy content and operating capacity are available for winter demands. Also during this time period, inflows are significantly reduced, so the winter loads are easier to accommodate with storage maximized. Generation at Whitman during the January to November time frame may cause spill, but this spill would probably occur during a period from September to November. This means the calculation period for the True-up is best based on the calendar year and not on the fiscal year. If the fiscal year were chosen, then generation from a previous year would cause spill in a future year, making the True-up process more difficult to implement accurately. Since spill volumes are the basis for the True-up, it is better to base the True-up calculation period on the cycle of the reservoirs which is closely aligned to the calendar year.
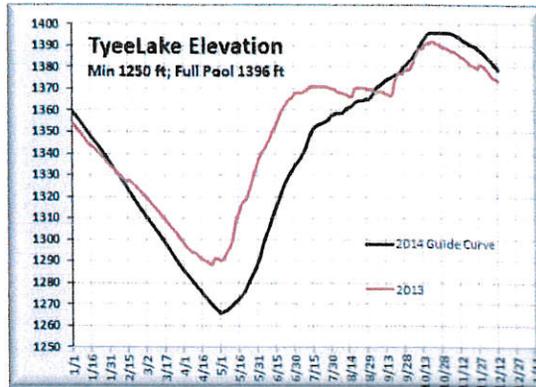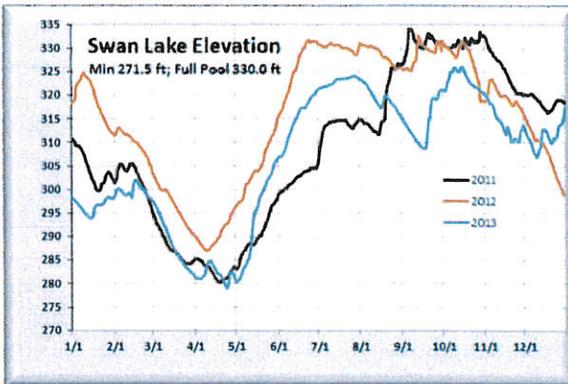
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(used in Appendix A2 – Tyee Lake Spilled Water and Spilled Energy)

The universal hydropower equation to determine kilowatts from a hydropower generator is:

Equation A7.1:

$$kW = E * \frac{H*Q}{11.815}$$

Where:

E = Efficiency
H = Head (ft)
Q = flow (cfs)

The head and flow are easily determined by measurements. Efficiency of the generator is more challenging because it is not constant. Turbine efficiency is determined by the head and flow of the water. The generators efficiency is determined by % load and power factor of the generator. Total efficiency includes both. Efficiency for Tyee Lake is shown for both ends of the water spectrum below (high/low flow & high/low head):

Table A7: Tyee Efficiency Table

Tyee Lake Generator & Turbine Efficiency				
Flow (cfs)	Net Head (ft)	Turbine Efficiency	Generator Efficiency	Total Power Train Efficiency
110	1360	0.908	0.98	0.88984
45	1200	0.914	0.97	0.88658
			Total Averaged Efficiency	0.88821

Considering operation of the Tyee generators will be across the spectrum from low to high flow (cfs) and low to high net head (ft), the total averaged efficiency value in Table A7 is used to calculate spilled energy. The final equation is therefore:

Equation A7.2:

$$kW = E * \frac{H*Q}{11.815}$$

$$kW = 0.88821 * \frac{H*Q}{11.815}$$

$$kW = \frac{H*Q}{13.30}$$

(used in Appendix A1 – Swan Lake Spilled Water and Spilled Energy)

The universal hydropower equation to determine kilowatts from a hydropower generator is:

Equation A8.1:

$$kW = E * \frac{H*Q}{11.815}$$

Where:

E = Efficiency
H = Head (ft)
Q = flow (cfs)

The head and flow are easily determined by measurements. Efficiency of the generator is more challenging because it is not constant. Turbine efficiency is determined by the head and flow of the water. The generators efficiency is determined by % load and power factor of the generator. Total efficiency includes both. Efficiency for Swan Lake is shown for both ends of the water spectrum below (high/low flow & high/low head):

Table A8: Swan Efficiency Table

Swan Lake Generator & Turbine Efficiency				
Flow (cfs)	Net Head (ft)	Turbine Efficiency	Generator Efficiency	Total Power Train Efficiency
500	310	0.93	0.98	0.9114
375	275	0.88	0.97	0.8536
			Total Averaged Efficiency	0.8825

Considering operation of the Swan generators will be across the spectrum from low to high flow (cfs) and low to high net head (ft), the total averaged efficiency value in Table A8 is used to calculate spilled energy. The final equation is therefore:

Equation A8.2:

$$kW = E * \frac{H * Q}{11.815}$$

$$kW = 0.8825 * \frac{H * Q}{11.815}$$

$$kW = \frac{H * Q}{13.39}$$
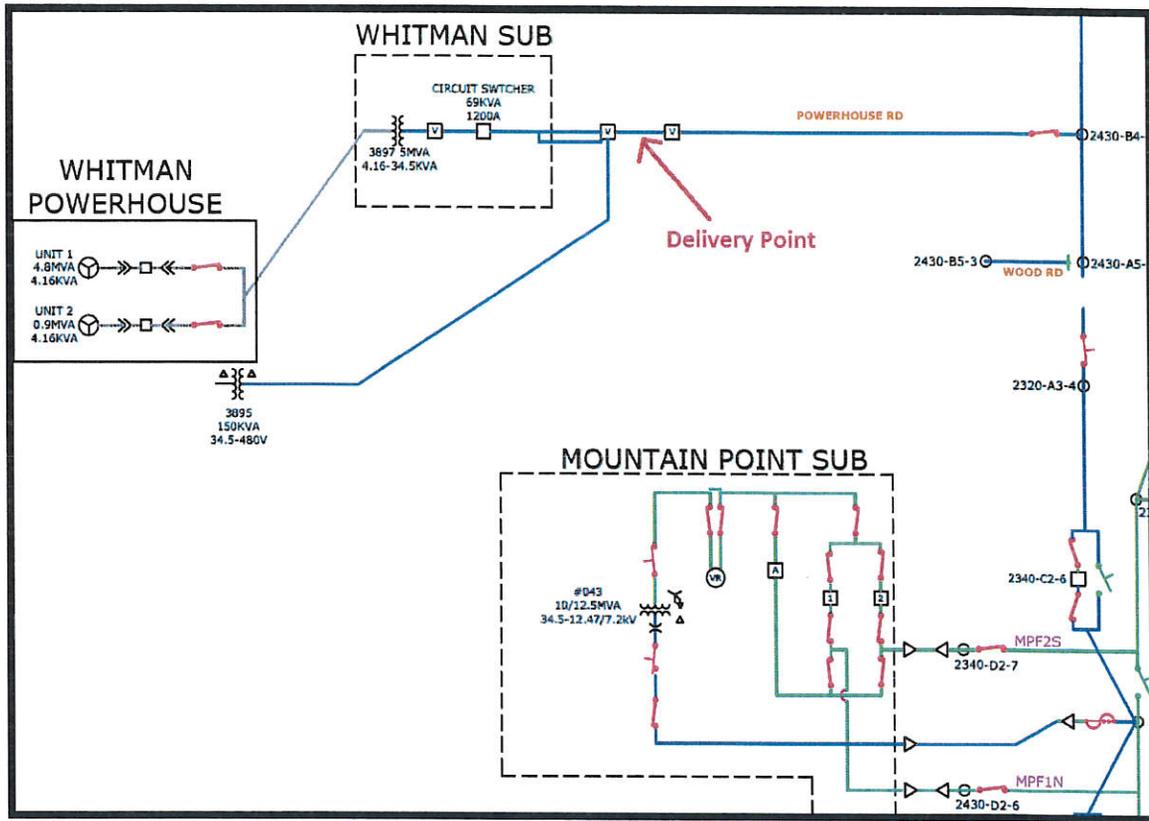
On days that Whitman is not generating, SEAPA sales would be displaced due to cumulative metering of Whitman station service. To prevent this scenario, SEAPA will maintain a Watt-Hour meter at this location.

Marijuana Testing Facility License Application - PEAK ANALYTICAL LLC

Moved by Sivertsen, seconded by Kiffer the City Council approve the application for a marijuana testing facility license for PEAK ANALYTICAL LLC.

Motion passed with Isom, Kiffer, Sivertsen, Gage, Zenge, Flora and Coose voting yea.

Request for Use of the Ted Ferry Civic Center for Burlesque and Variety Show - Cameron Brockett and Taylor Vidic

Moved by Sivertsen, seconded by Kiffer the City Council direct the Civic Center manager to respond to the request of Cameron Brockett and Taylor Vidic for use of the Ted Ferry Civic Center for a burlesque and variety show as determined appropriate by the City Council.

Mayor Williams confirmed there were no objections to allowing Cameron Brockett and Taylor Vidic use of the Ted Ferry Civic Center as requested.

Motion passed with Isom, Kiffer, Sivertsen, Gage, Zenge, Flora and Coose voting yea.

Budget Transfer - Exempting the Procurement of a Virtual Storage Area Network (VSAN), Software and Associated Support Services from the Competitive Bidding/Written Quotation Requirements of the Ketchikan Municipal Code - GCSIT

Moved by Sivertsen, seconded by Kiffer pursuant to subparagraph 6 of Section 3.12.050(a) of the Ketchikan Municipal Code, the City Council exempt the procurement of a Virtual Storage Area Network (VSAN), software and associated support services from the competitive bidding/written quotation requirements of the Ketchikan Municipal Code; authorize the general manager to enter into an agreement for the procurement of such hardware, software and support services from GCSIT at a cost of $112,109; approve a budget transfer in the amount of $38,000 from the Telecommunications Division's 2018 Normal Growth and Repair - Provisioning Capital Account to the Blade Server Capital Account; and authorize funding in the amount of $112,109 from the Telecommunications Division's 2018 Blade Server Capital Account.

Motion passed with Isom, Kiffer, Sivertsen, Gage, Zenge, Flora and Coose voting yea.

Amended Whitman True-Up Agreement Between the City of Ketchikan d/b/a Ketchikan Public Utilities and the Southeast Alaska Power Agency

Moved by Sivertsen, seconded by Kiffer the City Council approve the amended Whitman True-Up Agreement between the City of Ketchikan d/b/a Ketchikan Public Utilities and the Southeast Alaska Power Agency and direct the general manager to execute the agreement on behalf of the City Council.

Motion passed with Isom, Kiffer, Sivertsen, Gage, Zenge, Flora and Coose voting yea.

UNFINISHED BUSINESS - None

NEW BUSINESS

Compensation for Acting Wastewater Division Supervisor

Moved by Sivertsen, seconded by Coose the City Council authorize the city manager to place Acting Wastewater Division Supervisor Andrew Mulder at Step P of Grade 7-62 of the City Compensation Plan, providing an annual salary of $79,043.

Motion passed with Isom, Kiffer, Sivertsen, Gage, Zenge, Flora and Coose voting yea.

Budget Transfer - Consulting Services for the Lease of the Ketchikan Medical Center

Moved by Sivertsen, seconded by Flora the City Council authorize the city manager to transfer $10,000 from Appropriated Reserves of the Hospital Sales Tax Fund to the Public Health Department - Health Care Operation Division's Management and Consulting Services Account No. 640.04 for the purpose of contracting with ECG Management Consultants to review and discuss the renewal of the lease of Ketchikan Medical Center with the City Council.

Motion passed with Isom, Kiffer, Sivertsen, Gage, Zenge, Flora and Coose voting yea.

APPROVAL OF VOUCHERS

Moved by Isom, seconded by Flora for the approval of vouchers to the Ketchikan Daily News in the amount of $2,227.30.

Motion passed with Isom, Kiffer, Sivertsen, Gage, Zenge, Flora and Coose voting yea.

MANAGER'S REPORT

Manager Amylon officially welcomed Assistant City Manager Lacey Simpson to the City, saying she has been working since June 11 and that he is very pleased to have that position filled.

He said there was an issue at the Port for the charter boat loading zones and the associated permits. He said those using the loading zones are required to get a monthly permit. He went on to explain unbeknownst to himself or the Port and Harbors director, a former employee was not enforcing that rule for the past several years nor collecting the monthly permit fees. He said two letters have been sent out to charter boat owners and operators, and staff has had a public hearing about the issue and no one related to the issue showed up. He informed they are telling people they must get the permits. He noted most have complied but there are a couple of holdouts who have made it clear they don't intend to comply with the Code. He noted staff made it clear that after tonight if they don't have the permits, staff has the authority to impound the vessels. Port Operations Manager Dixon said although it varies the number of violators is about six.

Manager Amylon went on to refer to the report about the Alaska Marine Highway System Reform Project. He explained Southeast Conference Executive Director Robert Venables is participating in the June 22, 2018 Cooperative Relations Committee meeting via teleconference.