EXH. DJL-3 (Apdx. J)
DOCKETS UE-240004/UG-240005
2024 PSE GENERAL RATE CASE
WITNESS: DAVID J. LANDERS

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent.**	**Docket UE-240004** **Docket UG-240005**

APPENDIX J (NONCONFIDENTIAL) TO THE SECOND EXHIBIT TO THE PREFILED DIRECT TESTIMONY OF

DAVID J. LANDERS

ON BEHALF OF PUGET SOUND ENERGY

FEBRUARY 15, 2024

PUGET SOUND ENERGY

Pipeline Replacement Plan - Dupont Pipe Replacement

Corporate Spending Authorization (CSA)

Date Created:	Friday, February 10, 2023
Discretionary/ Non-Discretionary:	Discretionary
Multi Year Rate Plan:	Programmatic
Equity Impact:	Yes
Strategic Alignment:	Operate the Business-Safety
Estimated In-Service Date:	Sunday, December 31, 2028
Current State (Business Need):	PSE identified an increased risk of premature, brittle-like cracking of the larger diameter (1-1/4" and larger) Aldyl "HD" plastic pipe manufactured by DuPont. PSE installed this pipe in the 1970s and early 1980s and originally estimated there to be approximately 400 miles in service as of 2013. After further review, PSE estimates the total to be nearly 435 miles in service at the beginning of 2013, prior to any pipe replacement completed under the state filed Pipeline Replacement Plan. This is an industry problem and one peer Washington utilities are actively addressing. The brittle-like cracking is due to slow crack growth (SCG) at locations where there is a stress concentration. Based on PSE's experience, the brittle-like cracking is primarily due to rock impingement but also occurs where the pipe has been squeezed or where other stress concentrations have been introduced due to inconsistent joining practices. The failure is referred to as brittle-like cracking because it occurs without any localized plastic deformation. While the failure occurs without plastic deformation, the pipe is not brittle. Even when a failure occurs due to SCG, the PE pipe is still resistant to crack propagation preventing it from becoming a larger crack. A study by GTI (Gas Technology Institute) performed at PSE's request provides additional insight into how installation and operating practices, environmental conditions, and operating pressures impact the life expectancy of the pipe. PSE developed and implemented a program in 2010 to prioritize larger diameter older vintage PE Pipe, specifically DuPont Aldyl "HD" plastic pipe, for replacement based on the likelihood and consequence of failure. The program was incorporated into DIMP and evaluates the risk of brittle-like cracking based on installation and operating practices and environmental conditions. These segments of larger diameter DuPont Aldyl "HD" plastic pipe have an elevated risk of failure as validated by DIMP system performance data. PSE was on target to have remediated about 213.5 miles (although 2022 fell short by 31% of the 19 miles planned) of Dupont from 2013 to end of 2022. After San Bruno explosion, Regulators came under scrutiny regarding policies that dis-incented investments in pipeline safely. The UTC issued policy associated with RCW 80.28.420, Commission Policy on Accelerated Replacement of Pipeline Facilities with Elevated Risk, Docket UG-120715, requiring utilities to develop a plan to address elevated pipeline safety risks, submit them for approval by the Commission, and then, if necessary, seek cost recovery mechanism (CRM) that ensured utilities would stay focused, resourced, and committed to resolving these risks. PSE has included the replacement of DuPont pipelines in this report as other peer utilities have and sought recovery through the established mechanism. This CRM is now included in the MYRP, but the reporting and review by the Commission will still be an on-going process and scrutiny as plans are approved.

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Desired State (Proposed Solution):	The solution is to replace this Dupont leak prone pipe with like-kind higher integrity pipe. PSE prioritizes the highest risk based on consequence and must stay compliant with the approved plans that are submitted. At the current pace of 19 to 20 miles per year, PSE anticipates the remaining 209 miles of DuPont pipe will be replaced by 2033. PSE will submit the 2024-2025 Pipeline Replacement Plan to the Commission by June 1, 2023.

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Outcome/Results (What are the anticipated benefits):	The primary benefit of this program is public safety, replacing pipe before catastrophic failure and leakage. Completion of 19-20 miles per year results in 6.3% risk reduction annually from a total risk of 27.8 (53 from 2020) as defined by PSE's DIMP risk analysis tools. Additionally, this program avoids 1155 metric tons of CO_2e from methane emissions.

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Dependencies: No

Dependencies comment: None.

Escalation Included: Yes, escalation has been included per corporate guidance.

Total Estimated Costs: $981,900,000

Estimated Five Year Allocation:

Funds Type	ID	Line Item Description	Previous Years Actuals	Fiscal 2024 Requested	Fiscal 2025 Requested	Fiscal 2026 Requested	Fiscal 2027 Requested	Fiscal 2028 Requested
Capital	W_R.10015.03.04.01	G DIMP Dupont Pipe Repl Main With Serv	$ 308,000,000	$ 56,448,358	$ 57,577,325	$ 58,706,500	$ 60,467,695	$ 62,280,000

Incremental O&M: No

Qualitative Benefits:

In additional to the risk reduction and methane reduction, this program reduces reputational risk by staying compliant with the Commission approved PRP plan.

Quantitative Benefits:

Quantitative Benefits	Benefit Type	Previous Years	Fiscal 2024	Fiscal 2025	Fiscal 2026	Fiscal 2027	Fiscal 2028	Fiscal 2029	Remaining Costs	Life Total
Pipeline Safety - Health and Safety	Other	$ -	$ 20,013,400	$ 20,013,400	$ 20,013,400	$ 20,013,400	$ 20,013,400	$ -	$ 100,067,000	$ 200,134,000

Risk Summary:

Project Risk is challenged by Seattle permitting which a large portion of Dupont is in. Permitting is taking a long time and comes with hard surface requirements. The cost is estimated based on current contractual unit pricing and overall average historical costs adjusted by traditional escalators such as inflation, labor, materials, and contract but is increasing in cost due these hard surface requirements.

Benefit Risk is minimized as the benefits are realized when the project is completed.

System Risk exists until all the Dupont is replaced. This pipe is prone to catastrophic failure not just slow small leakage.

Reputational risk exists as this has been identified as a high risk to in the Distribution Integrity Management Plan and as reported to the WUTC. PSE did not complete the 2022 footage per the commitment in the 2022/2023 plan and as a result should be catching up in 2023 to meet the commitment.

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Change Summary:

Planning Cycle	Change Summary	Last Update Date
2022 Baseline Cycle	This CSA has been migrated into the EPPM tool at go-live as part of the Phase 1 EPPM implementation effort. The projects in this CSA were previously approved for the 2023-2027 capital plan. Please refer to the original CSA document for additional information (if available.)	2/10/2023
2023 Cycle 1	Updated from last business plan	4/2/2023

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Approval History:

Approved By	Date Approved
Approved by Cost Center Owner: Weatherby , Niecie	4/5/2023
Approved by Director Sponsor: Landers , David	4/7/2023
Approved by Executive Sponsor: Jacobs , Josh	4/8/2023
CSA Status changed to Approved	4/8/2023
Approved by Cost Center Owner: Shrum , Bailey	12/4/2023
Approved by Director Sponsor: Shrum , Bailey	12/4/2023
Approved by Executive Sponsor: Shrum , Bailey	12/4/2023
CSA Status changed to Approved	12/4/2023
Approved by Cost Center Owner: Weatherby , Niecie	1/29/2024
Approved by Director Sponsor: Landers , David	1/29/2024
Approved by Executive Sponsor: Jacobs , Josh	2/2/2024
CSA Status changed to Approved	2/2/2024

OLDER VINTAGE PE PIPE MITIGATION

ENERGY TYPE: GAS

1. SHORT DESCRIPTION

Based on company and industry experience, PSE has identified a risk of premature brittle-like cracking and fusion failure in 1985 and older, 1-1/4" and larger PE mains and services. To mitigate this risk, PSE conducts field inspections to confirm pipe material and then prioritizes replacement based on risk data. The plan will be continually evaluated as the higher risk populations are replaced and adjustments to the strategy may result if replacement is no longer justified for the remaining population.

2. BACKGROUND

Older vintage PE pipe includes PE mains and services installed prior to 1986 and is specific to larger diameter (1-1/4" and larger) DuPont Aldyl "HD" plastic pipe. Pipe manufactured by DuPont has an increased risk of premature, brittle-like cracking due to slow crack growth at locations where there is a stress concentration. Brittle-like cracking is primarily due to rock impingement but also occurs where the pipe has been squeezed or where other stress concentrations have been introduced due to inconsistent joining practices. DuPont pipe was installed between the 1970s and early 1980s and there was approximately 435 miles of larger diameter DuPont pipe in the system prior to 2013.

The Older Vintage PE Pipe Mitigation plan was initiated in response to an increase in brittle-like cracking and fusion failures on DuPont pipe which typically results in hazardous leaks. A systematic approach was developed that included a risk model to prioritize the replacement of DuPont pipe. In 2013, the plan was incorporated into the Pipeline Replacement Program (PRP). The PRP allows accelerated replacement of gas facilities with elevated risk.

As part of the Pipeline Replacement Program, an identification plan was developed and implemented in 2014 to confirm the location of DuPont pipe in the system through records research and field investigations. Field investigations include both targeted and opportunity-based investigations from normal operations and maintenance activities. The identification effort was completed by the end of 2016.

The plan utilizes the results from Exposed Pipe Condition Reports, Blue Cards, PE Reports, leak repairs, and material failure analysis to prioritize remediation. The primary plan strategy includes pipe identification and pipe replacements.

Table 1 - Older Vintage PE Mitigation Plan (2010 – 2022)

Year	Miles Replaced	Total Leaks (Brittle-like Cracking)	Hazardous Leaks (Brittle-like Cracking)	Total Leaks (Fusion Failure)	Hazardous Leaks (Fusion Failure)
2010 - 2012	8.0	86	43	122	57
2013	6.5	23	22	32	24
2014	10.5	20	26	26	31
2015	28.6	25	25	35	30
2016	27.4	22	18	31	21
2017	27.9	17	10	27	14
2018	38.8	25	9	34	10
2019	27.7	21	17	22	18
2020	14.6	22	13	25	14
2021	15.5	14	13	14	12
2022	13.0	10	9	21	12

3. STATEMENT OF NEED

The Older Vintage PE Pipe Mitigation plan was initiated in response to an increase in brittle-like cracking and fusion failures on DuPont pipe which often results in hazardous leaks. The Older Vintage PE Pipe Mitigation plan is important because it reduces the risk on older vintage PE pipe through proactive main and service replacement.

3.1. NEED DRIVERS

- **Safety:** The main driver for the Older Vintage PE Pipe Mitigation plan is improving safety by eliminating pipe with increased likelihood of hazardous leaks.
- **Environmental:** A secondary driver for the Older Vintage PE Pipe Mitigation plan is to reduce future methane emissions resulting from leaks.

3.2. EQUITY

PSE evaluates equity in the planning process with consideration of the four core tenets of energy justice: Recognition Justice, Procedural Justice, Distributional Justice, and Restorative Justice in various steps of the process.

As specific studies are performed and projects proposed to further a business plan, planners review system, customers, and now equity data to recognize the specific customer burdens, whether there are highly impacted or vulnerable customers that are or will be affected by addressing the specific business need. Planners must prioritize where to focus their study each year, thus the full understanding of the historic and ongoing

inequities for the business plan is extrapolated at this time and will mature over time with greater tools and data.

PSE is building process and tools to enable procedural inclusion in defining the need and solutions through engagement with specific communities and community based organizations, increasing understanding of local needs and consequences to inform specific study development as well as options to address need. Maturity in where and how this occurs will increase over the next several years. Business plans will be updated as informed by this collective engagement to reflect broader equity benefits and burdens as engagement increases over time.

As specific projects are proposed, PSE's investment decision optimization tool captures equity benefits. An optimized portfolio of projects across many business plans ensures the distribution of benefits and burdens are spread across all segments of the community and aim to ensure that marginalized and vulnerable communities do not receive an inordinate share of burdens or are denied access to benefits. As an initial step, PSE leverages Customer Benefit Indicators ("CBI") and information established as part of the 2021 Clean Energy Implementation Plan ("CEIP") to identify an equity framework to evaluate system projects. The CBI approach was developed through an iterative process that was coordinated with the Equity Advisory Group. These CBI span the core tenets of energy justice and provide a framework to evaluate the comparative equity benefit of each solution alternative considered. Refer to Table 1 for a brief description of the CBIs that address equity and the applicable benefits for the Older Vintage PE Pipe Mitigation program. PSE will continue to adjust and refine equity consideration in projects when necessary as the process continues to mature.

Projects will be evaluated on each CBI category and a total equity benefit score will be provided.

Table 2 - Equity Applicable Benefits

Customer Benefit Indicator	Description	Program Applicable Benefit
Customer Energy Savings	Solutions that lead customers to use less energy, which leads to less energy that must be purchased and potentially a reduction in planned system upgrades.	No
Greenhouse Gas Emissions	Solutions that lead to a reduction of greenhouse gas emissions, either directly or indirectly	Yes
Enables Cleaner Energy	Solutions that either directly integrate DER on the system or enable the grid to more readily accommodate future DER.	No
Air Quality	Solutions that either directly eliminate the source of a common pollutant or reduce the risk that could cause a common pollutant to increase, such as enabling Electric Vehicle or DER adoption	No

Resilience	Solutions that address major event outages or harden critical facilities to prevent catastrophic events from creating long duration outages.	No
Cost Reduction	Solutions that identify least cost alternatives and therefore reduce costs for all customers	No
Clean Energy Jobs	Solutions that increase clean energy jobs by furthering clean energy technology application, as described in the CEIP	No
Home Comfort	Solutions that deploy residential energy efficiency in either a targeted solution area or by leveraging load reduction from system wide energy efficiency installations	No

The program attempts to annually address the risk of fusion failure and brittle-like cracking and is programmatically optimized based on total benefit value to cost. Specific program projects are identified based total benefit to cost with named communities receiving additional scored benefit based on vulnerable population designation and highly impacted community characteristics, ensuring investments are distributed appropriately to named communities.

Business plans in isolation do not address restorative justice, but continued planning process improvements which include considerations of data, tools, and documentation as well as operational practices will help to restore equity over time.

4. PLAN DETAIL

4.1. PLAN SIZE/POPULATION

The original population of larger diameter DuPont pipe was 435 miles. This population was split into two categories based on remediation priority. The first 245 miles are the highest risk segments with known leaks, or in high-risk locations. The remaining 190 miles are the lower risk segments.

4.2. PROPOSED COMPLETION DATE

The current target is to eliminate the highest risk population by 2023 and then all remaining DuPont pipe by 2032. Risk data will be continually evaluated to determine if replacement is still the appropriate strategy or if the remaining risk can be mitigated through other means.

4.3. SUMMARY OF PLAN BENEFITS

- **Safety:** The Older Vintage PE Pipe Mitigation plan mitigates the threats of brittle-like cracking and fusion failure. Reducing the inventory of pipe that has an elevated risk of failure is expected to reduce the number of hazardous leaks caused by these threats. Remediation of the entire population of 435 miles of pipe is expected to

reduce risk by 53 risk points[1], out of a total of 482 total distribution system risk points at year-end 2022. Risk is scored based on plan population, historical leak data, field-identified integrity concerns, and subject matter expert feedback.

- **Stakeholder Relationships:** The plan demonstrates our commitment to safety to stakeholder groups such as UTC, cities, and customers through efforts to replace pipe with an elevated risk of failure.
- **Methane Reduction:** Environmental safety benefits relative to methane emission reduction is measured by converting methane to a carbon dioxide equivalent (CO2e). The plan reduces CO2e emissions by replacing pipe that is prone to leakage by brittle-like cracking and fusion failure. Remediation of the entire population of Older Vintage PE pipe is expected to reduce the average annual CO2e emissions rate by 834 metric tons.

Table 2 - CO2e Emission Reduction Potential

	Older Vintage PE Leaks Per Year (5 year average)	Average CO2e Per Leak (metric tons)	Annual CO2e Emissions (metric tons)
Brittle Like Cracking	13	27	351
Fusion Failure	23	21	483

4.4. PRIMARY IDOT CATEGORIES

PSE employs an Investment Decision Optimization Tool (iDOT) to evaluate benefits of projects and optimize the annual portfolios for construction. The top primary iDOT Categories this plan addresses are:

- Health and Safety
- Stakeholders

Table 3 – iDOT Benefit

2025 Forecast Cost ($)	2025 iDOT Benefit ($)	2025 Benefit / Cost Ratio
$57,577,325	$161,237,989	2.80

Proactively replacing leak prone Older Vintage PE Pipe allows for work to be completed by a single field visit which saves unplanned O&M expense, $4,400 O&M a year and capital investment of $4,000 per foot. PSE has also made a commitment with the UTC as part of its Pipeline Replacement Plan to eliminate all DuPont at an accelerated rate, by 2032.

[1] The plan benefit of risk reduction is quantified by using DIMP risk points. Through DIMP, plans are scored based on the probability of a failure or leak occurring and the consequence resulting from a failure or leak

4.5. ESTIMATED COSTS

The programmatic costs to complete the Older Vintage PE Pipe Mitigation plan from 2013 until 2032 is approximately $1,048.0 million. This is based on replacing the entire population of 435 miles of pipe, prioritizing the 235 miles of higher risk pipe first and replacing the remaining pipe at an accelerated rate.

5. ALTERNATIVES

5.1. SOLUTION ALTERNATIVES

Proactive Replacement: The selected alternative is to replace all Older Vintage PE pipe manufactured by DuPont as part of a planned approach prior to leaks occurring.

Reactive Replacement: The alternative not selected would be to wait until the pipe leaks and then replace it. This would lead to potentially hazardous leaks and an increase in methane emissions.

Electrification: This alternative is not feasible at a program level due to the required cost of replacing all customer equipment, as well as an obligation to serve customers with natural gas per their request under current tariffs. On a project-specific basis, electrification may be evaluated as part of a Beneficial Electrification pilot intended to develop an understanding of incentives needed to motivate full electrification of end-uses required for pipeline retirement.

5.2. FUNDING ALTERNATIVES

No Action: Without a plan in place, PSE would face the risk of leaks due to brittle-like cracking and fusion failure. If they are not remediated, leaks can be hazardous and lead to an increase in methane emissions

Increased Funding: With increased funding, Older Vintage PE pipe could be replaced at a quicker rate. To fully realize the benefits of increased funding there would need to be additional field resources dedicated to the Older Vintage PE Pipe Mitigation plan and the ability of jurisdictions to accommodate increased permitting and scheduling.

Decreased Funding: Reducing the current funding levels would result Older Vintage PE pipe being replaced at a slower rate. DuPont pipe is prone to brittle-like cracking and fusion failure and the longer it remains in the system the more likely it will leak.

6. PLAN DOCUMENT HISTORY

Date	Reason(s) for Update	Summary of Significant Change(s)	Modified By
1/27/2020	Initial Program Documentation - New plan template	Initial Program Document – Summarize historical plans	Parker Indorf
4/30/2021	2021 Business Case Update	Revised language throughout. Updated program summary and background	Parker Indorf
9/20/2021	Used and Useful Policy guidance	Updated benefits. Added alternative and cost information	Parker Indorf
12/17/2021	Annual Review	Minor word and format changes	Parker Indorf
9/7/2023	2024 MYRP update	Includes Equity, remove ISP, remove plan budgetary info	Parker Indorf

7. SUPPORTING DOCUMENTATION

Document Name
DIMP SUMMARY OF ADDITIONAL AND ACCELERATED ACTIONS
PIPELINE REPLACEMENT PROGRAM PLAN
CONTINUING SURVEILLANCE ANNUAL REPORT
DIMP RISK GRAPHIC