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May 31, 2013

Steven King, Acting Executive Director & Secretary  
Washington Utilities and Transportation Commission  
1300 S Evergreen Park Drive SW  
Post Office Box 47250  
Olympia, Washington 98504-7250

**Re: UG -120715 – NW Natural’s 2013 Washington Pipeline Replacement Plan**

Dear Mr. King:

Northwest Natural Gas Company, dba NW Natural (“NW Natural” or the “Company”), hereby submits an original and two copies of its 2013 Washington Pipeline Replacement Plan filed in compliance with the Commission’s Policy Statement on the Accelerated Replacement of Pipeline Facilities with Elevated Risk, issued December 31, 2012, in Docket No. UG-120715.

In accordance with the Commission’s policy statement, the Company’s Pipeline Replacement Plan provides 1) a master plan for the identification and removal of facilities in the Company’s Washington service territory that have been identified as having an elevated risk of failure; 2) a two-year plan for replacing pipe with an elevated risk of failure, and 3) generally, an explanation of how pipelines with an elevated risk are identified.

In addition to requiring the biannual filing of a pipeline replacement plan, the Commission’s policy statement also provides utilities the opportunity to request a Cost Recovery Mechanism (“CRM”) for the recovery of costs associated with the accelerated replacement of pipelines identified as having an elevated risk for failure. The Company appreciates the Commission’s recognition of the financial challenges local distribution companies face when needing to accelerate pipeline replacement, and further, for offering a solution to this challenge in order to encourage safer distribution systems. NW Natural is not requesting a CRM at this time. As a result of NW Natural’s aggressive pipeline safety programs, the Company has a very limited amount of facilities with elevated risk. These facilities will be replaced under the initial two year plan.

The Company currently has approximately 3.6 miles of bare steel main in Washington which is scheduled to be replaced prior to the end of 2014. Beyond this, the Company is not aware of the existence of other infrastructure that might pose an elevated risk. However, in the event that new information is gained or additional pipeline safety regulations are adopted, the Company may request the CRM in the future.

If you have any questions, please call me at (503)226-4211, extension 3590.

Sincerely,

*/s/ Jennifer Gross*

Jennifer Gross

Enclosures



**NW Natural<sup>®</sup>**

**Washington  
Pipeline Replacement Plan  
May 31, 2013**

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## I. Introduction

NW Natural Gas Company, dba NW Natural (hereafter referred to as NW Natural or Company) submits the following in response to the Washington Utilities and Transportation Commission's (WUTC's) request for the Company's Pipeline Replacement Plan as referenced in docket UG-120715.

NW Natural is committed to pipeline safety and to the implementation of enhanced pipeline safety programs that legitimately improve the Company's already safe pipeline infrastructure.

At the beginning of 2013 NW Natural's distribution system in Washington contained cathodically protected coated steel mains and services, medium density polyethylene (PE), 0.6 miles of cathodically protected bare steel main, 3 miles of bare steel mains that are not cathodically protected, and a very limited number of acrylonitrile-butadiene-styrene (ABS) services (pre-1983).

Both bare steel and vintage plastic (pre-1983) have been identified in NW Natural's Distribution Integrity Management Program (DIMP) Plan as having an elevated risk of failure as compared to coated steel and post-1983 PE facilities. This plan describes NW Natural's replacement plan for bare steel mains and ABS services.

In preparing this Pipeline Replacement Plan, the Company's TIMP and DIMP plans were reviewed. At this time, transmission pipelines covered under the Company's TIMP Program do not pose an elevated risk of failure. Therefore, no transmission lines have been identified for replacement under the Company's Pipeline Replacement Plan.

## A. NW Natural's Historical Approach to Integrity Management

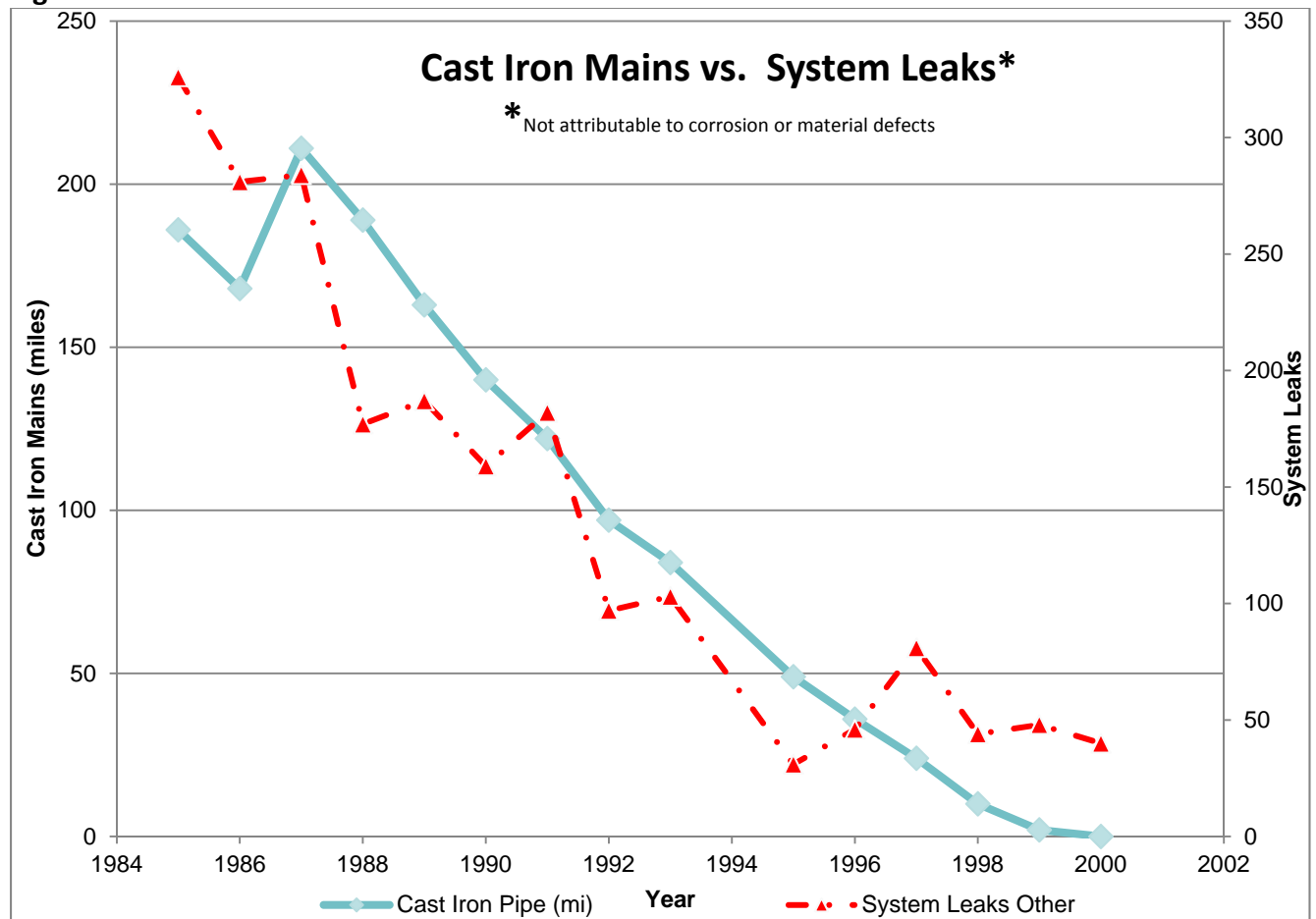
NW Natural has a long history of voluntarily implementing Integrity Management programs focused on further improving the safety of our pipeline system, reducing risk, and enhancing reliability to customers. Continual improvement is at the heart of providing safe and reliable service and will remain a focus of Integrity Management at NW Natural.

### 1. Cast Iron

Cast iron pipe was widely installed across the nation for distribution mains until the 1950's. NW Natural installed cast iron main until approximately 1920. Cast iron pipe sections were connected by bell and spigot joints sealed by jute packing, lead, and cement. Over time these joints were susceptible to leaks that required excavation and re-packing.

In 1985 NW Natural voluntarily commenced a system-wide cast iron replacement program that was completed in 2000. The success of this program is demonstrated in Figure 1 below, which shows the reduction in cast iron mains and associated reduction in leaks (leaks not attributable to corrosion or material defects).

**Figure 1**

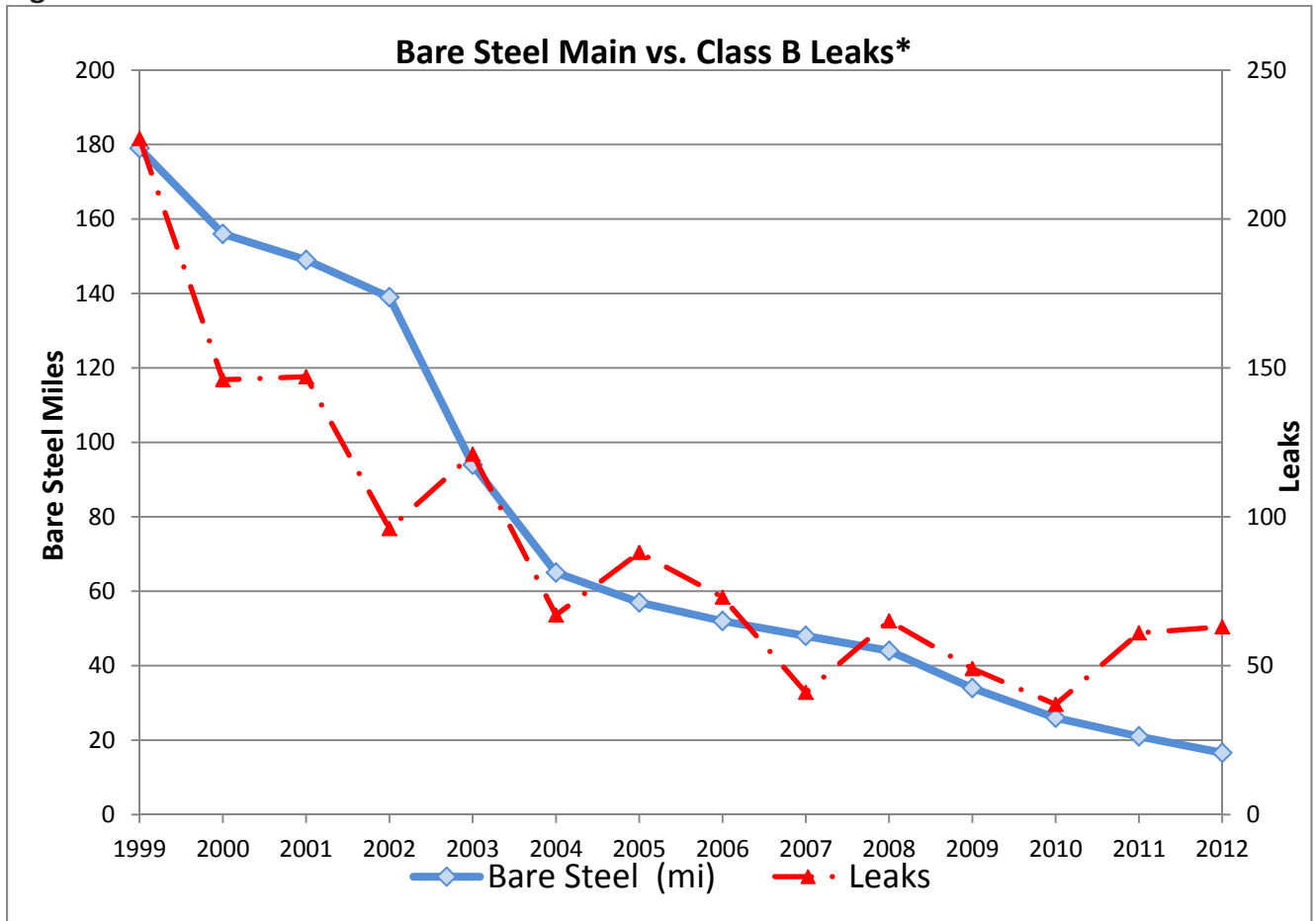


## 2. Bare Steel

After completion of the cast iron replacement program in 2000, NW Natural voluntarily initiated a system-wide bare steel replacement program. The Company's bare steel replacement program accelerated the replacement of bare steel mains and services from 40 years to 20 years.

The Company's bare steel replacement program is well ahead of schedule in the State of Washington. All bare steel service lines have been replaced and the remaining bare steel main is scheduled for replacement by the end of 2014. Figure 2 shows the current bare steel main mileage and corresponding end of year "B leaks" for the time period from 1999-2012. A "B-leak" is defined as a leak that is non-hazardous, but justifies scheduled repair.

Figure 2



\* Class B – A leak that is non-hazardous but justifies scheduled repair.

### **3. Geographic Information System (GIS)**

In 1985 NW Natural implemented a GIS (Geographic Information System). The GIS has allowed the Company to accurately map the location of facilities and provides for enhanced asset and data management. NW Natural has made significant investment in GIS upgrades including an enhanced data model in 2009 and data conflation in 2011 to enhance the accuracy of facility data allowing for refined spatial data analysis and risk modeling. These investments have provided valuable tools to assist the Company in managing the pipeline infrastructure and support the TIMP and DIMP Programs.



## **II. Master Plan**

NW Natural's planned pipe replacement projects are scheduled to be completed by the end of 2014. While the transmission and distribution systems in the State of Washington present a low level of risk, NW Natural will refine existing TIMP and DIMP programs to identify threats and enhance system integrity. The Company will also remain active in trade associations and the industry in the development and implementation of best practices to maintain the safe reliable delivery of natural gas.

## **III. Two Year Pipe Replacement Plan**

### **A. Risk Assessment**

NW Natural assesses risk to natural gas distribution facilities inside the GIS using ESRI's Model Builder platform. The risk model is composed of nine sub-models. Eight dedicated to Likelihood of Failure (LOF) and one dedicated to Consequence of Failure (COF). A Master Model is then used to calculate Relative Risk using the basic formula:  $(COF) \times (LOF) = Risk$ . This Risk score is used by the Company to prioritize replacement projects and/or identify additional or accelerated actions to be applied to facilities or groups of facilities.

LOF models are derived from the eight system threats identified in 49 CFR, Part 192 Subpart P. Each threat is weighted based on factors including but not limited to pipeline safety records such as leak surveys, cathodic protection records, pipeline patrols, in addition to, operating experience, facility data, Subject Matter Expert (SME) input, geology, topography, and weather data.

Eight threat models:

1. Corrosion
2. Natural Forces
3. Excavation Damage
4. Material, weld, joint failure
5. Equipment Failure
6. Incorrect Operations
7. Other Outside Force Damage
8. Other

The COF model is used to establish potential impact to people in the event of a gas release. Five factors make up the COF model.

1. Population Density: Modified census data is used to assign a weighting based on highest occupancy regardless of time of day. This is achieved by comparing standard census data against workplace occupancy. The data is cross referenced and the higher of the two values is used.
2. Business Districts: Higher weighting is assigned based on identified areas.
3. Pressure Class: Weighting is assigned based on system operating pressure.
4. Pipe Diameter: Weighting is assigned according to pipe size.
5. Excess Flow Valve (EFV): A service line protected by an EFV results in a lower risk weighting compared to services without an EFV.

NW Natural has identified bare steel mains and vintage plastic services as the materials in its distribution system in the State of Washington with an elevated risk of failure. An overview of each as well as a two-year mitigation plan is provided below.

## **B. Bare Steel Replacement Plan**

Bare Steel was installed in NW Natural's distribution system between approximately 1920 and 1960. NW Natural's distribution system in the State of Washington currently includes approximately 3 miles of unprotected bare steel main and .6 miles of cathodically protected bare steel main. All bare steel services in the State of Washington have been replaced using current state of the art materials.

These bare steel mains are susceptible to the threat of external corrosion and associated leakage. As identified in NW Natural's DIMP Risk Model, bare steel main represents the largest corrosion threat in NW Natural's distribution system.

NW Natural has allocated resources and is actively replacing bare steel pipe system-wide. The Company plans to complete the replacement of the remaining bare steel main in the State of Washington prior to the end of 2014. Replacement projects are prioritized by relative risk, scope of work, and are coordinated with municipalities to minimize impact to the infrastructure (e.g. roads) and the public. Washington bare steel main replacement projects and associated costs are identified in Figure 3.

**Figure 3**

Install Date	City	Length	Street	Cross Street	Action	Estimated Cost	
						2013	2014
01/01/59	VANCOUVER	2100	E MILL PLAIN BLVD	90th to 97th	2013 Construction	\$ 142,000.00	\$ 250,000.00
01/01/56	VANCOUVER	7750	E MILL PLAIN BLVD	DEVINE RD to Leisner	2013 Construction	\$ 750,000.00	
01/01/56	VANCOUVER	5600	NW LINCOLN AVE	NW BERNIE DR TO NW 44TH ST	2014 Construction	\$ -	\$ 750,000.00
01/01/58	CAMAS	401	SE 6TH AVE	SE 3rd	2013 Construction	\$ 450,000.00	
01/01/56	VANCOUVER	38	F ST	40th	2013 Construction	\$ 15,000.00	
01/01/61	VANCOUVER	20	Q ST	E. 29th St	2013 Construction	\$ 10,000.00	
01/01/25	VANCOUVER	13	K ST	E. 29th ST	2013 Construction	\$ 5,000.00	
01/01/54	CAMAS	11	NE DALLAS ST	SE 6th	to be validated	\$ 1,500.00	
01/01/25	VANCOUVER	7	E 26TH ST	Fort Vancouver Way	to be validated	\$ 1,500.00	
						\$ 1,375,000.00	\$ 1,000,000.00

### **C. Vintage Plastic Replacement Plan**

NW Natural installed a very limited number of ABS services from approximately 1961 through the early 1970's to renew ¾" steel services. Since then, the industry has identified ABS as a potential threat because of failures due to brittleness. ABS has been designated for replacement in NW Natural's DIMP Plan because of its susceptibility to brittle cracking.

Beginning July 1, 2012, NW Natural utilized the GIS to identify potential vintage plastic services in the State of Washington. Based on the results of the query, 393 possible ABS services were identified and subsequently field-verified resulting in positive identification of 19 ABS services in the State of Washington.

In May 2013 NW Natural completed the replacement of all remaining ABS services in the State of Washington.

### **III. Identifying Pipe for Replacement**

Facility data including the location of bare steel and vintage plastic is recorded in NW Natural's GIS. Facility data includes pipe attributes such as:

- Diameter
- Material
- Pressure class
- Installation date
- Installation method.

Pipe attribute data was instrumental in populating and developing the Company's DIMP Risk Model using ESRI's Model Builder. The model aligned attribute data with pertinent third party data sets including census and land use records to better understand consequence in relation to system threats. Results of the risk model are then used to make decisions regarding pipe replacement and other accelerated actions.

### **V. Public Interest**

The Company's pipe replacement plan for bare steel main included in this replacement plan has been developed considering many factors. These factors include:

- Further improving the safety of the distribution system by replacing pipe based on the relative level of risk for each material and location
- Minimizing the replacement costs and associated rate impact by maximizing efficiencies and productivity
- Minimizing the impacts to municipalities and the general public

## **VI. Conclusion**

NW Natural will complete the replacement of bare steel mains in Washington prior to the end of 2014. As a result of the Company's aggressive pipeline safety enhancement programs, the Company will have no remaining high risk facilities in Washington. Under NW Natural's TIMP and DIMP Programs, there are policies, procedures and practices in place to continually gather and analyze information regarding the performance of the remaining infrastructure.

In addition, NW Natural will continue to participate with peers, industry associations, and regulators in tracking trends and applying that knowledge to further enhance public safety and system reliability.

NW Natural is firmly committed to continuous improvement and will actively refine and improve current programs associated with system knowledge, threat identification, evaluation of risk, implementation of measures to address risk, and measuring past performance to ensure the safe reliable delivery of natural gas to customers in the State of Washington and throughout our service territory.