APPENDIX M

GROUNDWATER MONITORING AND MITIGATION PLAN FOR THE CAPACITY REPLACEMENT PROJECT

Northwest Pipeline Corporation

Groundwater Monitoring and Mitigation Plan

Capacity Replacement Project

November 2004

Table of Contents

1.1 INTRODUCTION M-1

1.1.1 Identification of Groundwater Resources M-1

1.2.1 Determination of Susceptibility M-1

2.1 SAMPLING M-2

2.1.1 Samples Collected for Laboratory Analysis M-2

2.2.1 Methods of Sampling and Analysis M-3

2.3.1 Sampling Schedule M-3

3.1 MEASURES TO PREVENT WELL IMPACTS M-3

4.1 MITIGATION FOR WELLS IMPACTED BY CONSTRUCTION M-3

GROUNDWATER MONITORING AND MITIGATION

1.1 INTRODUCTION

This Groundwater Monitoring and Mitigation Plan outlines Northwest Pipeline Corporation's (Northwest's) proposed measures to determine if pipeline construction activities result in impacts to groundwater yields or water quality. The plan includes discussions relating to the identification of groundwater resources, a determination of susceptibility, and monitoring and mitigation to protect potable and non-potable groundwater sources.

1.1.1 Identification of Groundwater Resources

Northwest has completed the initial identification of groundwater wells and springs. Initial identification included communications with state, county and local agencies and searches of a groundwater well database maintained by the Washington State Department of Ecology. General locations of known or potential resources have been identified.

Final identification and confirmation of the existence and location of groundwater resources and identification of additional resources will be conducted through field investigations and contacts with landowners prior to construction. Landowners will be requested to identify groundwater supply wells and potable springs, identify the use of the well or spring (municipal, self-supplied, irrigation, industrial, or livestock). Ownership of the well/spring will be identified in consultation with the landowner or through appropriate agency records.

Landowners will be supplied with documentation explaining the field investigation, the proposed pipeline construction, and potential impacts on groundwater resources. The documentation will also indicate how the landowner can contact Northwest for further information. Landowners of wells and potable springs potentially susceptible to impacts will be advised that pre-construction monitoring is recommended to establish baseline water quality and yield. Landowners will be requested to give permission for Northwest to conduct the testing.

1.2.1 Determination of Susceptibility

Private groundwater supply wells and potable springs within 200 feet (400 feet for municipal water supplies) of the pipeline construction right-of-way or temporary extra workspaces will be considered potentially susceptible to impacts from proposed construction activities. These groundwater resources will be included in the monitoring program. Additionally, potentially impacted groundwater resources beyond the distances

mentioned above will also be monitored if unique construction activities (such as blasting) are required in the area.

During construction, landowners with water supplies located outside of the 200-foot monitoring area may request pre- and/or post-construction water sampling. In these cases, sampling would follow the same schedule and utilize the same methods described for water wells and potable springs located within the 200-foot monitoring area.

2.1 SAMPLING

Wells and potable springs for which landowner approval has been received will undergo pre-construction baseline sampling to establish baseline water quality and yield data. Northwest will attempt to schedule sampling activities at a time convenient to the landowner and in a manner that does not damage the resource. In the event that a source cannot be tested within the required schedule, a contingency agreement with the landowner will be negotiated.

Monitoring will be conducted on each well using the existing fitted pump and discharge line where possible. Testing will occur upstream of any water treatment system such as water softeners or purifiers. A submersible pump will be used to sample and test wells not fitted with operating pumps. Where there is a non-operating pump obstructing access, Northwest will request permission from the landowner to re-open the well to the extent required to insert a submersible pump. Springs will be tested at their source. Following testing, wells and springs will be restored to their pretest condition unless the owner requests otherwise (e.g. the landowner does not want a non-operating pump installed).

Prior to sample collection, the well or water system will be allowed to run in order to ensure that the water sample is representative of the aquifer. A minimum of three sets of temperature, pH, and conductivity readings will be taken at five-minute intervals. When these measurements become consistent, the well or water system is stabilized and ready for water sampling.

Water yield will also be determined at each location. Yield in gallons per minute (gpm) will be calculated using a container of known volume and a timer. Yield in gpm will be calculated by dividing the collected volume in gallons by the time in minutes required to fill the vessel.

2.1.1 Samples Collected for Laboratory Analysis

Water samples collected for water quality analysis will be tested for specific conductance, temperature, pH, turbidity, nitrate, fecal coliform and TPH. Northwest will also record date regarding water level or flow rate, horsepower of the existing pump, date and time, location, weather (if outside), and number of samples taken.

2.2.1 Methods of Sampling and Analysis

Sampling methods will adhere to the prevailing EPA and state sampling and analytical procedures in place at the time of construction. All samples will be collected and properly preserved so that they are delivered to a certified laboratory and tested within the holding times required by the EPA and applicable state groundwater quality standards.

2.3.1 Sampling Schedule

Water samples will be collected and yield will be calculated prior to construction to obtain baseline water quality and yield data for each sampling point. Northwest will conduct post-construction sampling as requested by the owner or for disputed situations, to determine the effects of construction on the water source. Sampling methods, locations, and analytical parameters of the post-construction sampling will be consistent with that of the pre-construction sampling.

3.1 MEASURES TO PREVENT WELL IMPACTS

Trench excavation will range from 6 feet to 8 feet in depth, which is too shallow to have a direct impact on the major aquifer systems underlying the proposed pipeline right-of-way, and no producing aquifers will be encountered at this depth.

Northwest has prepared a Spill Prevention, Containment and Countermeasures (SPCC) Plan that outlines proper storage, containment, and handling procedures to prevent the inadvertent release of fuels, solvents, or lubricants used during construction. The SPCC Plan also describes measures to be implemented by company personnel and contractors to prevent and control inadvertent spills of materials.

A review of bedrock depths indicates blasting will not be required during installation of project facilities. However, should blasting become necessary, Northwest would limit the blasting contractor to a peak particle velocity of 4 inches/sec at the location of an in-service pipeline (20 feet from the proposed pipeline). Based on this maximum allowed velocity the peak particle velocity at 45 feet would be approximately 2.0 inches/sec and 0.3 inches/sec at 150 feet. These limits should protect water wells and other nearby structures from any structural damage.

4.1 MITIGATION FOR WELLS IMPACTED BY CONSTRUCTION

Should it be determined after construction that there has been an impact on groundwater supply or water quality, Northwest will work with the landowner to ensure a temporary supply of water, and if necessary Northwest will replace a permanent water supply. Mitigation measure would need to be coordinated with the individual landowner in order

to meet the landowner's specific needs. However the likely solutions would be accomplished by providing potable water until a new well can be drilled, if necessary.

Within 30 days of placing project facilities in-service, Northwest will file a report with FERC regarding any landowner complaints received and the remedial action taken to address the complaint.