Annex T

PG&E Gas Transmission Main Crossings Modification Plan

Annex T: PG&E Gas Transmission Main Crossings Modification Plan

T.1 General

The concepts and costs for this water intake modification plan derive from a separate report prepared for the Corps by Thomas, Dean & Hoskins, Inc., titled *Snake River Drawdown Feasibility Study for: Gas Transmission Main Crossings – PG&E Gas Transmission* (TDH, 1998c). Modifications described here are not considered as part of the project implementation costs. The plan and costs were developed for economic evaluations of local, regional and national impacts.

Pacific Gas and Electric (PG&E) Gas Transmission Northwest of Portland, Oregon, serves the Northwest with natural gas. Natural gas is supplied to eastern Washington gas providers via two gas transmission mains, referred to as the "A" Line and the "B" Line. Two Snake River crossings exist near the town of Starbuck, Washington, in Columbia and Whitman Counties, Washington, in Section 33, Township 13 North, Range 37 East, Willamette Meridian. The two crossings lie within the Lower Monumental Dam reservoir approximately 46 meters (150 feet) apart.

According to PG&E, the "A" Line was constructed in the 1950s and the "B" Line was constructed in the 1980s. Each gas main is 914-millimeter (36-inch) diameter steel pipe with thickness varying from 9.65 millimeters (0.380 inches) to 15.9 millimeters (0.625 inches). Typically, the pipe thickness increases in sensitive areas, including river crossings. The existing pipes were installed below the stream bed using open cut trenching methods and bedded and covered with granular backfill. The average trench depth is 3 meters (10 feet). Underwater pipe installations were made by encasing the pipe with concrete to prevent possible buoyancy.

T.2 Standards

T.2.1 Relevant Codes and Standards

The U. S. Department of Transportation regulates natural gas transmission mains constructed within the United States. Design, construction, and maintenance requirements are specified in Title 49, Part 192 - "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards" of the *Code of Federal Regulations.* Additional requirements are specified in American National Standards Institute/National Fire Protection Association 58 and 59, "Standard for the Storage and Handling of Liquefied Petroleum."

T.2.2 Design Criteria

For the two Snake River crossings, the pipeline is within a Class 1 location. A Class 1 location is any area 1.6 kilometers (1 mile) in length and 201 meters (220 yards) in width, measured on either side of the centerline of the pipeline, within which there are 10 or fewer buildings intended for human occupancy.

Maximum allowable operating pressure is 6.3 by 10^3 Pascal (Pa) (911 pounds per square inch, gage pressure [psig].

Postdrawdown stream characteristics are as follows:

1. Gas Pipe “A”:

- Minimum stream bottom elevation (at proposed location): 146.2 meters (479.8 feet) (source: Corps)
- Low-water elevation (at 566 m^3/s [20,000 cfs]): 149 meters (490 feet) (source: Corps)
- 100-year high water elevation (at 9,062 m^3/s [320,000 cfs]): 156 meters (513 feet) (source: Corps)

2. Gas Pipe “B”:

- Minimum stream bottom elevation (at proposed location): 146 meters (479 feet) (source: Corps)
- Low-water elevation (at 566 m^3/s [20,000 cfs]): 149 meters (489 feet) (source: Corps)
- 100-year high water elevation (at 9,062 m^3/s [320,000 cfs]): 156 meters (512 feet) (source: Corps)

T.3 Pipeline Modifications

T.3.1 Options

Because there are many unknowns concerning the effects of drawdown, such as river high-water elevation and velocity and stream bottom elevations, the options included in this report were selected for the “worst-case” scenario, which is total reconstruction of the utility within the area of impact.

The existing natural gas transmission main locations are shown in Figure T1. Effects on the transmission line associated with the drawdown may include the following:

- Significant variations in high water elevation
- Increased stream velocities
- Possible scour and/or sedimentation of the streambed.

Measures to mitigate the potential effects could include construction of two new pipelines parallel to the existing mains. It is feasible to construct the new mains immediately adjacent to the existing pipelines (within 25 feet). Based on conversations with PG&E, it may be desirable to the utility company to construct the two new crossings downstream of the existing pipelines. To establish quantities, however, this study team assumed that the pipelines would be constructed adjacent to existing mains.

In addition to constructing two new crossings, it may be necessary to stabilize existing stream banks to preclude scour. The study team assumed that the preferred method for stabilization would include placing riprap along the new pipelines for a distance of 30 meters (100 feet) upstream and downstream of the crossings.

T.3.2 Construction Methods

There are two primary construction methods used for this type of in-water construction.

A common method is to surround the construction area with a sheetpile cofferdam system that allows the construction area to be dewatered. The installation of the pipeline section can take place in relatively dry conditions. See Figure T2 for typical cross section of pipe and trench. After completion of the installation, the sheetpile is removed.

Underwater construction would include use of a barge with a clamshell excavator to excavate and backfill the trench. This procedure would use four divers, two diver tenders, and a crew to support the excavation and dry land connections of pipe. Underwater construction could be used only if construction takes place before drawdown occurs. This is because stream velocities would be much higher after drawdown, making construction with divers difficult. Higher stream velocities might apply undue stresses that could break preconstructed welds.

The study team selected cofferdam construction rather than underwater construction for installation of the pipeline sections. The primary reason was that underwater construction created turbidity in the water caused by excavation and backfill of the trench.

The construction method for reconstructing the natural gas transmission mains is summarized as follows:

1. Trench Excavation

   A 1.5-meter (5-foot) wide by 3-meter (10-foot) deep trench would be constructed using open cut trenching methods (trackhoe). Based on the study team's site visit and information from PG&E, the team is confident that rock excavation would be required on the north side of the river. For this analysis, the team assumed that half of each pipeline trench would require rock excavation, which would be accomplished by ripping or blasting. Within the stream, trenching operations would require cofferdams and dewatering equipment. The bottom 305 millimeters (12 inches) of the trench, in areas where no concrete encasement is proposed, would be bedded with suitable granular bedding material.

2. Pipeline Installation

   A new 914-millimeter (36-inch) pipeline would be constructed within the open trench. The "A" Line installation would be 518 meters (1,700 feet) in length, and the "B" Line would be 472 meters (1,550 feet) in length.

3. Concrete Encasement

   Any pipe installed below the 100-year high water elevation would require concrete encasement. The primary purpose of the encasement is to preclude flotation. Based on the study team's analysis, the minimum depth of concrete, assuming a 1.5-meter (5-foot) wide trench, is 1.5 meters (5 feet) to provide a factor of safety of 1.25 against buoyancy. Because the natural stream width is unknown, the study team assumed that 80 percent of the replaced pipeline would require encasement. The total length required, therefore, would be 415 meters (1,360 feet) for the "A" Line and 378 meters (1,240 feet) for the "B" Line.

4. Trench Backfill

   Trenches would be backfilled with pit run material from the top of the concrete encasement to the existing ground surface. Sources for the backfill material are available within the local area, minimizing long haul charges.

5. Bank Stabilization

   Existing slopes would be stabilized with heavy riprap. The study team estimates that the material size would be between 457 millimeters (18 inches) and 914 millimeters (36 inches) in size (D_{50} = 610 millimeters [24 inches]). Riprap would be placed a distance of 30 meters (100 feet) upstream and downstream of each pipeline. It is assumed that riprap would be hauled from a nearby quarry, and that some haul costs would be incurred.

6. Connections to Existing Mains

   Once the previous work is complete, connections could be made to the existing natural gas mains. In order to maintain service to natural gas providers, one main would be taken out of service at a time, leaving the other main in service. Natural gas would be evacuated from the existing pipeline at compressor stations on either side of the river crossing. The existing main would then be cut and fittings welded in place to make connection with the new gas main. Upon completion of the connections on both sides of the river, the new gas main would be placed in service to allow work on the other gas main to commence.

7. Abandon Existing Mains

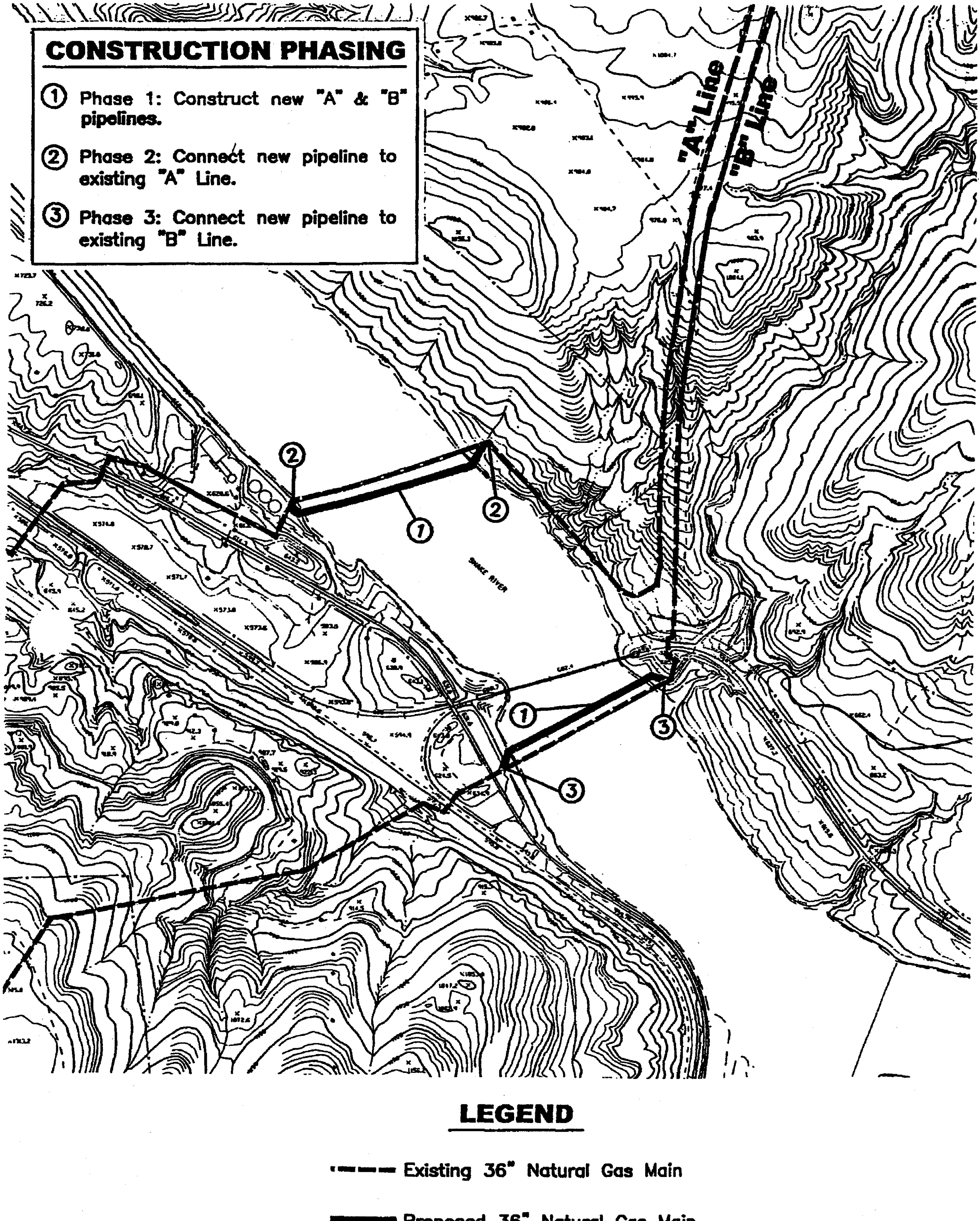
   Existing gas main crossings would be abandoned in place. The existing pipelines would be filled with high slump concrete, and steel caps would be welded on each end.

T.3.3 Construction Materials

1. Pipe: 914-millimeter- (36-inch-) outside diameter (OD) by 16.0-millimeter (0.630-inch) W.T. API 5L by 70 steel
2. Pipe joints: welded butt joints
3. Pipe coating: fusion bonded epoxy coating
4. Valves: not required
5. Compressor stations: not required
6. Cathodic protection: provided by pipe coating

T.4 Schedule

Based on discussions with PG & E, the ideal time for the construction of the new gas pipeline is before drawdown occurs between October and November so that stream velocities are minimal. However, this timeframe may conflict with the in-water construction periods specified by the National Marine Fisheries Service. The actual construction window must be established as part of the environmental scoping process for the project.



Thomas, Dean & Hoskins, Inc.

SHEET MAIN SCALE:

US Army Corps of Engineers
Walla Walla District

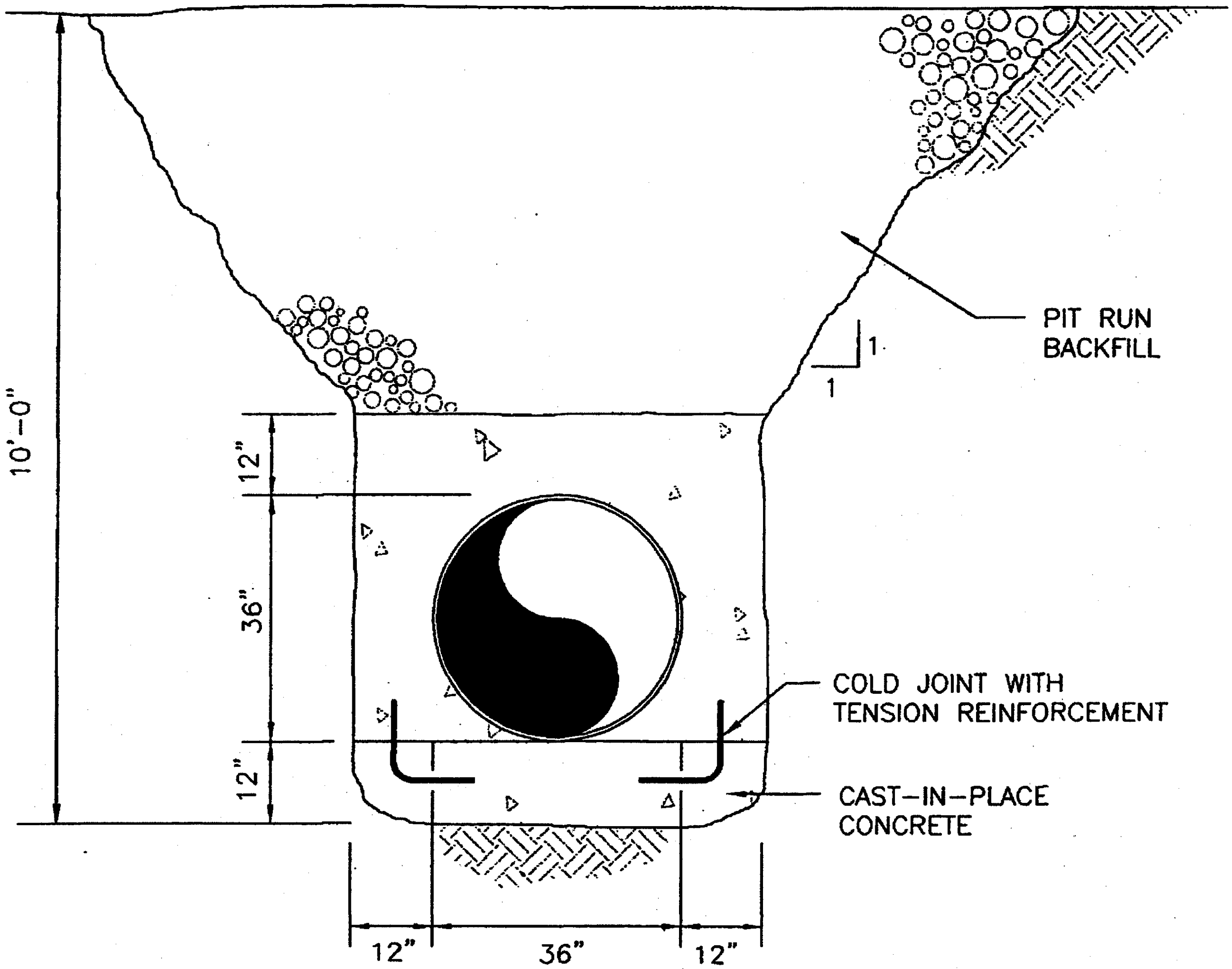
LOWER SNAKE RIVER JUVENILE SALMON MIGRATION FEASIBILITY STUDY

PG&E GAS TRANSMISSION LINES

SITE PLAN

Figure:
T1

CADD FILENAME:E:\drawdown\plates\tdh\platet1.dgn PLOT TIME:17-SEP-1999 12:23



TYPICAL GAS PIPELINE TRENCH SECTION

NOT TO SCALE

Thomas, Dean & Hoskins, Inc.

SHEET MAIN SCALE:

US Army Corps of Engineers
Walla Walla District

LOWER SNAKE RIVER JUVENILE SALMON MIGRATION FEASIBILITY STUDY
TYPICAL GAS PIPELINE TRENCH SECTION

Figure:
T2

CADD FILENAME: E:\drawdown\plates\tdh\platet2.dgn PLOT TIME: 17-SEP-1999 12:24