NORTHWEST CASCADE INC.

CASE STUDY
Rock Excavation

DATE: March 1999

JOB NAME: LaGrande Powerhouse

OWNER: Tacoma Power

LOCATION: LaGrande Dam, Washington

GENERAL CONTRACTOR: Northwest Cascade Inc.

ENGINEER: Tacoma Power

The LaGrande Powerhouse is operated by Tacoma Power to supply electricity to the metropolitan Tacoma area. Water is diverted from a reservoir into a penstock, which flows down through the power turbine. Unfortunately, no bypass between the penstock and the turbine was constructed with the original Powerhouse. The lack of a bypass made it impossible to control the level of water in the reservoir and the river in the event of a turbine failure. Tacoma Power allocated the funds to install this bypass and Northwest Cascade, Inc. was awarded the contract.

Construction started with the mobilization of all the equipment and materials to the remote site via a rail tram. Once the equipment was on site a 40'x18'x15', temporary containment structure was built around the area to be drilled. This containment was necessary to keep the dust and debris out of the powerhouse equipment during construction. The new bypass tunnel ran parallel to the existing penstock for 45' before the two of them connected. Concrete and rock excavation was accomplished by drilling 3" holes, at 12" on center, 3-4' in length around the diameter of the 9' tunnel. After these grid holes were drilled a Darta rock splitter, hoe-ram, and hand tools were used to excavate the tunnel. This process was repeated until the entire 45' length of the bypass was completed. The penstock and the bypass were connected together with a large gate valve, completing the project.

NWC also constructed several large concrete thrust blocks. All concrete, 150 yards, had to be moved in buckets down the rail access tram, a 20 minute trip each way. Once the concrete reached the powerhouse level it went into a concrete pump and was pumped 150' to the thrust block locations and into the void between the tunnel walls and the steel pipe inside.