MEMORANDUM

INTERMOUNTAIN POWER SERVICE CORPORATION

TO: George W. Cross

FROM: Dennis K. Killian

DATE: February 13, 2003

SUBJECT: Boiler Testing Equipment Rental, PR# 185848

Please approve the attached Purchase Requisition for the rental of test equipment to measure combustion gas properties (NOx, CO, O2 & CO2) to establish boiler baseline pre-outage conditions and conduct post-outage tuning of the overfire air system plus determine final acceptance of modified boiler components (superheat platen extension and overfire air). Rental includes 11 analyzers, 1 data logger and controller, plus a technician for initial setup and training. Total estimated cost is $65,000.

We have recently been directed by the Utah State of Air Quality, as part of the Notice Of Intent (NOI) approval process, to document baseline combustion conditions on IGS Unit 1 prior to the Spring Outage 2003. This has moved up our original timeline two months for conducting post-Outage testing. IPSC Engineering Group will be conducting the performance testing. However, we do not have NOx, CO, O2 & CO2 gas analyzers, plus data logger and controller for electronic data acquisition. We do have the boiler outlet test probes (16) and thermocouples (64), bubblers, chillers, knockout bottles, desiccant filters, vacuum pumps and supporting hardware.

Post-Outage testing on the boiler will consist of several weeks of tuning and diagnostics for setup of the burners and overfire air system, prior to the final acceptance testing. The primary objective of the overall testing is to see if the manufacturer has met contractual guarantees on the superheat platen extension and overfire air system. Secondary test objectives are to determine where best the overfire air system works and to establish operator guidance for use of this system.

Tuning and diagnostics will be accomplished using the combustion gas analyzers, by conducting multipoint gas sampling at the boiler outlet duct to establish NOx, CO, O2 , CO2 & temperature conditions at both 875 MWgross and 950 MWgross load levels. There will be a 64 point grid (32 points of both east and west sides) to determine the degree of gas stratification. Knowing the amount and location of stratification (high and low zones),

it can be used as a diagnostics tool to tune burners or overfire dampers to minimize this effect. Typically, extremely high or low values for CO and NOx reflect bad actors (incomplete combustion) which should be tunable. The CO2 and O2 analyzers will be used to determine air flow balancing, plus will be used for boiler efficiency (gas loss method) calculations. Additionally, the test O2 analyzers will be used to reconcile accuracies with the station O2 analyzers (both test grids are at the same location).

Obviously during the performance testing, we will also determine the following conditions:

- Main Steam and Hot Reheat temperatures
- Main Steam and Hot Reheat attempering spray flows

- Boiler Section Cleanliness factors
- coal quality levels (proximate and ultimate analysis)
- fly ash LOI (unburned carbon content)
- bottom and air heater ash (unburned carbon content)
- Boiler Efficiency (heat loss method)

The boiler testing schedule is listed below. We will work around the turbine performance testing schedule. Note, it is important to setup the burners and overfire air system as quickly as possible, to ensure and support unit startup. However over the following three weeks, tuning and diagnostics will be conducted
to get the system balanced and optimized for NOx, CO, LOI that maintain Main Steam and Reheat temperatures. Final acceptance testing will be conducted four to five weeks after startup to allow the boiler to get fouled and seasoned to typical operating conditions.

Tune and perform diagnostics testing on the burners and overfire air system. Balance secondary air flows on OFA system. Monitor boiler conditions for maximum capacity during turbine tests.

April 4th or 5th weeks- boiler acceptance testing
Final acceptance testing of the boiler is targeted for the 4th or 5th weeks following Unit 1 startup. One of the primary reasons for the delay is not to interfer with the turbine acceptance testing, plus allows the boiler and waterwalls to season and foul up to normal operating conditions.

At this time, we haven't had an opportunity to interface with Babcock Power Inc. (BPI) to determine their plans for burner and overfire air system tuning, balancing and testing.

If there are any questions, please contact Jerry Hintze at ext. 6460 or Aaron Nissen at ext. 6482.