BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition by Progress Energy Florida, Inc. to recover costs of the Crystal River Unit 3 Uprate as provided in Section 366.93, Florida Statutes, and Rule 25-6.0423, F.A.C.

DOCKET NO. 070698-EI
Submitted for filing:
November 21, 2007

DIRECT TESTIMONY
OF DANIEL L. RODERICK

ON BEHALF OF
PROGRESS ENERGY FLORIDA

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IN RE: PETITION BY PROGRESS ENERGY FLORIDA, INC. TO RECOVER COSTS OF THE CRYSTAL RIVER UNIT 3 UPRATE AS PROVIDED IN SECTION 366.93, FLORIDA STATUTES, and RULE 25-6.0423, F.A.C.

FPSC DOCKET NO. 070698-EI

DIRECT TESTIMONY OF DANIEL L. RODERICK

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Daniel L. Roderick. My business address is Crystal River Energy Complex, Site Administration 2C, 15760 West Power Line Street, Crystal River, Florida 34428.

Q. By whom are you employed and in what capacity?

A. I am employed by Progress Energy Florida ("PEF" or the "Company") in the Nuclear Generation Group and serve as the Vice President Nuclear Projects and Construction. Formerly, I was Director of Site Operations at Crystal River Unit 3 ("CR3"), PEF's nuclear plant.

Q. What are your responsibilities as the Vice President Nuclear Projects and Construction?

A. I am an officer of PEF and I am responsible for all aspects of major projects and construction of nuclear generating assets in Florida. Formerly, as director of Site Operations, I was responsible for the safe,

efficient, and reliable generation of electricity from CR3 and all plant functions reported to me and were under my supervision.

Q. Please summarize your educational background and work experience.

A. I have a Bachelor of Science and Master of Science degree in Industrial Engineering from the University of Arkansas and a Senior Reactor Operator License. I have been at CR3 since 1996, serving in my current position as Vice President Nuclear Projects and Construction and, prior to that position, Director of Site Operations, Plant General Manager, Engineering Manager, and Outage Manager, respectively. Prior to my employment with the Company, I was employed for twelve years with Entergy Corporation at its Arkansas Nuclear One plant in Russellville, Arkansas with responsibilities in Plant Operations and Engineering.

II. PURPOSE AND SUMMARY OF AMENDED TESTIMONY

Q. What is the purpose of your direct testimony?

A. The purpose of my direct testimony is to support the Company's request for cost recovery for the CR3 Uprate as provided in Section 366.93, Florida Statutes, and Rule 25-6.0423, F.A.C.

Specifically, I generally describe the Crystal River site and CR 3. I explain the current planned changes to the nuclear plant that are necessary to support the power uprate project. I also generally describe

the expected impact of the power uprate on the transmission system and thermal limits on the discharged cooling water that must be addressed to obtain the full benefits of the power uprate project at CR3. I also present the Company's current cost estimates for the project, explain the processes in place to ensure the costs incurred for the project are reasonable and prudent, and explain that the project will provide additional, reliable base load nuclear capacity and energy to customers with all the attendant benefits, including environmental, fuel savings, and fuel diversity.

Q. What is the CR3 Uprate project?

A. The CR3 uprate project increases the power output at CR3 in three phases, with the expected completion of the first phase of the project during the 2007 nuclear refueling outage, followed by additional uprate project phases during the 2009 and 2011 refueling outages, respectively. The result of a power uprate at the nuclear unit will be increased generation capacity from the Company's lowest cost fuel source. The power uprate is made possible through improved technology, increased efficiency, and increased licensed output from the reactor core. This will allow PEF to replace or reduce higher cost generation from alternative fuel sources, resulting in significant fuel savings for customers, greater PEF fuel diversity, and reduced greenhouse gas and other emissions. The Commission approved the Company's petition for determination of need

for the CR3 Uprate project in Order No. PSC-07-0119-FOF-EI on February 8, 2007.

Q. Do you have any exhibits to your testimony?

A. Yes, I have supervised the preparation of or prepared the following exhibits to my direct testimony.

- Exhibit No. ___ (DLR-1), an aerial view of the Crystal River complex, including CR3.
- Exhibit No. ___ (DLR-2), a picture of the primary plant configuration for the pressurized water reactor nuclear plant at CR3 that shows the major components of the nuclear reactor and primary coolant system.
- Exhibit No. ___ (DLR-3), a schematic of the major components in the primary system and the balance of the nuclear plant that shows the major components in the secondary systems, including the main turbine and main generator.

All of these exhibits are true and accurate.

Q. Please summarize your testimony.

A. The CR3 power uprate project is an innovative application of technological advancements and efficiencies during existing planned outages at CR3 to obtain increased nuclear fueled generation capacity. The result of this increased production with low cost nuclear fuel will be the reduction in or replacement of higher cost fossil fuel and purchased

power generation resources. This yields substantial fuel savings at a net cost savings for the customers. The power uprate will increase the level of nuclear production in the fuel supply mix on PEF's system, increasing fuel diversity for PEF and the State of Florida. The CR3 power uprate project represents a unique opportunity to achieve fuel savings, increase fuel diversity, reduce the reliance on fossil fuel generation, and reduce greenhouse gas and other emissions.

III. THE CRYSTAL RIVER SITE AND CR3 UNIT

Q. Please describe the Crystal River site.

A. The Crystal River site is a 4,700 acre site located in Citrus County, Florida that contains four coal-fired generating units, one nuclear generating unit, and related support facilities, such as fuel transportation and storage facilities. The site generators are connected to two transmission substations. The Crystal River substations interconnect with the 230 kv or 500 kv transmission lines that supply power generated at the site to the Company's transmission system. The four coal-fired and one nuclear power units at the site generate approximately 3,200 MWe. Exhibit No. ___ (DLR-1) is an aerial photograph that accurately depicts the Crystal River site, including CR3.

Q. Please describe the nuclear generating unit at the Crystal River site.

A. CR3, the nuclear generating unit, is a B&W pressurized water reactor that includes a Primary and Secondary System. The Primary System is located within the containment building and includes the reactor vessel, pressurizer, steam generators, primary coolant system, and related equipment. Exhibit No. ___ (DLR-2) is a depiction of the major components of the Primary System, including the nuclear reactor and the primary reactor coolant system.

The Primary System is a closed loop system. The nuclear reactor produces heat that turns water into steam that drives the electrical generator which produces electricity. The heat is removed from the reactor by water in the primary coolant system that is continuously pumped around the Primary System. Heat transfers from the fuel pellets to the surrounding metal fuel rods which in turn heats the water flowing between and around the fuel rods. The heated water then travels from the core through pipes to the steam generators. In the steam generators, heat is transferred from the reactor primary coolant system to the physically separated secondary coolant system producing steam in the secondary system. The Primary System operates at about 600 degrees F and 2150 PSI. The high pressure prevents the water in the primary system from turning to steam.

The secondary water coolant system is under less pressure, operating at over 450 degrees F and 850 PSI, and when the water in the secondary coolant system is heated it turns to steam, which turns the

turbine that powers the generator. The steam exiting the turbine is then cooled, condensing it back into water. The water is pumped back to the steam generators by a series of pumps and heat exchangers where it is once again converted to steam, thereby completing the cycle. Exhibit No. ___ (DLR-3) is a schematic of the major components of the Primary and Secondary Systems, including the main turbine and main generator. It also shows the electricity produced in the generator passes through some transformers before being passed on to the 500 kv switchyard at Crystal River, and then onto the transmission grid. The Company's transmission system is part of the peninsular Florida interconnected electrical grid of all transmission-owning electric utilities in the State and also part of the interface with the transmission facilities of utilities in the Southeastern United States at the Florida border.

CR3 was the third generating unit constructed at the site and it currently produces about 900 MWe gross generation. CR3 provides power into the 500 kv transmission system connected to the Crystal River site and uses the 230 kv system for off-site backup power. CR3 supplies its own power needs during normal operation.

IV. THE CR3 POWER UPRATE PROJECT

Q. What is the CR3 power uprate project?

A. The power uprate project for CR3 increases the electrical power output

from the plant from about 900 MWe by approximately 180 MWe to 1,080 MWe gross. The joint owners of CR3 have indicated that they will take their proportionate share of the additional MWe produced by the uprate. Collectively the joint owners are entitled to 14.795 of those MWe (8.2194 percent), leaving 165.205 MWe (91.7806 percent) for the benefit of PEF's customers. I explain later how the joint owners will also bear their pro rata share of the power uprate project costs.

The power uprate project involves increasing the power or thermal MWs produced in the reactor core. The costs associated with the uprate are for making the physical changes to the secondary coolant loops described above so that the additional heat generated can be utilized in a safe and economical fashion. The additional heat will be transferred between the Primary and Secondary Systems, creating more steam flow to turn the turbines. In addition, some modifications to supporting equipment are necessary to accommodate all design requirements in the plant under these new, higher-power conditions.

In the design of these plants in the 1960's, the analytical modeling that exists today was not available, and the result was that the best designs of the time included built-in assumptions having very large safety margins to ensure adequate protection was in place to accomplish all intended functions. Many of these initial safety margins, given today's analytical engineering tools and advanced testing capabilities, allow for an increase in reactor power with limited impact to the primary system.

The major modifications resulting from the power uprate involve the secondary system specifically, the turbine generator set, which has three parts, two low pressure and one high pressure rotors, and the generator, plus supporting systems and equipment. The secondary system must be modified to accept the additional heat produced by the reactor core. This is accomplished by increasing the secondary system water flow to the steam generators. Increasing the flow requires larger pumping capacity than currently exists, which requires modification or replacement of some existing pumps and heat exchangers. A detailed study has defined which pumps and motors will need to be upgraded or replaced based on the best value to achieve the necessary secondary system water flows.

In addition to the reactor power increase, design improvements to some major system components will allow for increased efficiencies, providing additional steam power beyond that obtained from the increased primary system output. These design improvements to obtain the steam efficiencies are factored into the CR3 power uprate costs. For example, when the steam turbine high pressure rotor was designed in 1962, a multi-piece assembly was made. These multi-piece assemblies cause drag on the system, but better technology did not exist at the time. Since then, in the late 1990's, technological advancements have resulted in a single piece rotor blade that has less drag and, therefore, provides increased megawatt output for the same steam input.

The CR3 power uprate project, including all modifications and technological advancements, will generate an additional 180 MWe by the end of 2011. The power uprate project will make CR3 the largest single generating unit in Florida at 1,080 MWe.

On April 25, 2007, we requested a licensed power change for CR3 from the NRC for the Phase 1 uprate project that addresses the Measurement Uncertainty Recapture ("MUR") and we have met with the NRC to develop a plan to gain approval in December 2007. We have also met with the NRC to discuss plans and submittal schedules to support the extended power uprate in 2011. The 2009 modifications do not require prior NRC approval.

Q. Has a power uprate of this kind ever been performed on a B&W pressurized water reactor?

A. While the innovative power uprate planned for CR3 has not been undertaken at any other B&W designed plant, similar power uprates have been accomplished and approved by the NRC at nuclear plants designed by Westinghouse and General Electric. The NRC has issued guidance regarding the content of Power Uprate submittals and established review schedule standards for their review of such applications.

Q. What is the likelihood that the NRC will approve the license extension for CR3?

A. The power uprate project assumes that the ongoing activities to renew the license of CR3 will be successful and that the license now due to expire in 2016 will be extended to 2036. License renewal of nuclear power plants is an ongoing nuclear industry process that requires technical information be submitted by the applicant and approval by the NRC for the operating license to be extended for 20 years. License renewals have been granted for Progress Energy's Robinson Unit 2 and Brunswick Units 1 and 2 plants. In addition, four of the seven plants of a similar design to CR3 have already received approval for license renewal. No license extensions for plants have been rejected after a detailed NRC review and no utility has been told that it would not be able to renew its license. As a result, there is a high likelihood that the license renewal for CR3 will be granted by the NRC and therefore the 2036 date used in the economic model for the power uprate can be achieved.

Q. Are there any environmental benefits from the CR3 power uprate project?

A. Yes, there are. The CR3 power uprate will use nuclear fuel, which is the cleanest fuel source on PEF's system. During normal operations, there are no greenhouse gas emissions and no emissions of other pollutants common to other fuel sources for power production such as carbon monoxide, sulphur dioxide, aerosols, mercury, nitrogen oxides, and particulates or photochemical smog. Further, because the CR3 power

uprate will displace higher cost fossil fuels with nuclear fuel there likely will also be a reduction in the greenhouse gas and other emissions from fossil fuel resources. From an environmental viewpoint, the CR3 power uprate project is an attractive means of obtaining cost-effective generating capacity.

Q. What is the schedule for the CR3 uprate project?

A. The CR3 power uprate project is planned for the scheduled refueling outages for CR3 in 2007, 2009 and 2011. Phase I, the MUR, is being installed during the 2007 refueling outage. The MUR is a series of minor modifications to support measuring the "secondary heat balance" with improved accuracy. The improved accuracy in measuring the secondary heat balance allows the rated thermal power to be increased by 12 MWe. NRC approval is required but the process for obtaining such approval is well-documented because the MUR has been successfully completed at a number of nuclear plants throughout the nation.

Phase 2 of this project is a series of improvements to the efficiency of the secondary plant also known as the Balance of Plant ("BOP"). The Company currently anticipates, for example, that the low pressure turbine and electrical generator upgrades can be completed during the BOP phase. Phase 2 is scheduled concurrently with the steam generator replacement during the 2009 refueling outage. Other modifications and replacements will be evaluated for inclusion in the 2009 refueling outage if the outage is

not extended, appropriate resources are available to support the changes, and the impact of further modifications or replacements for the power uprate project on the duration of the scheduled 2011 refueling outage can be minimized.

The changes during the BOP phase do not increase the licensed output of the nuclear reactor but they will improve the efficient use of that output to produce a higher electrical output. The estimated increase in output is 28 MWe.

The completion of the full power uprate, or Phase 3, is scheduled for the 2011 refueling outage, when the remaining work necessary to provide the full 180 MWe power uprate, called the Extended Power Uprate ("EPU") phase, will be completed. The BOP phase improvements will be sized to support the EPU. The EPU increases the output of the reactor and the BOP to their new design capacity.

The modifications and equipment changes necessary to support the CR3 uprate will be scheduled to minimize plant outage time while assuring that appropriate resources are available to support the changes. To meet the schedule and ensure that the CR3 uprate project is performed during the scheduled outages, PEF has already ordered long lead-time equipment and material.

Q. What are the current estimated costs for the CR3 power uprate project, before consideration of joint ownership?

A. The total cost for the uprate project is currently estimated at $382.7 million. Of this amount, approximately $316.2 million is for the power uprate itself. The additional costs address anticipated modifications to address Point of Discharge ("POD") issues caused by the additional heat and flow rate generated by the power increase, which are currently estimated at about $66.5 million.

Q. Have these estimates been updated since the estimates previously provided in proceedings regarding the CR3 power uprate project?

A. Yes, the estimates have been updated. Consistent with my prior testimony, the Company has continued to refine its studies of the various components of the CR3 power uprate project. After these refinements, the Company adjusted its estimates for the transmission modifications, the power uprate, the POD issues, and included indirect costs. The prior testimony did not include indirect costs.

Q. Taking first the transmission modifications, how has PEF's original estimate for transmission changed?

The Company originally provided for an estimate of $89 million, excluding indirect costs, to accommodate potential impacts to the transmission system from the 1,080 MWe that CR3 would generate after the uprate project. As I indicated in prior testimony, the transmission estimate was designed to be a bounding estimate, and the Company was

considering various options to address the transmission issue. Consistent with that testimony, after the transmission study was completed, PEF concluded that no changes would be required to the transmission system as a result of the CR3 power uprate. Therefore there are no anticipated costs to address transmission modifications.

Q. Turning now to the updated estimate for the power uprate, please explain how and why that estimate has been updated.

A. The Company originally estimated $250 million, excluding indirect costs, for the cost of the power uprate. This estimate was developed using the best available information. Since then, the Company has continued to conduct the necessary engineering studies, and that analysis shows that additional plant modifications are needed to achieve the uprate. In addition, labor costs increased more than anticipated, so some of the contract bids have come in higher than the Company originally estimated. In particular, the Company expected a certain fixed-price bid for the turbine, and while PEF still obtained a fixed-price bid, it was higher than the original estimate. Based on this updated information, the Company has revised its estimate for the uprate to $275 million, excluding indirect costs, or $316.2 million, with indirect costs but excluding AFUDC.

Q. Finally, what changes have been made to the estimates for the POD issue?

A. Originally, the Company anticipated that it would cost approximately $43 million, excluding indirect costs, to address the POD issues resulting from additional heat generated by the power uprate. Specifically, the power uprate from the project will generate additional heat and steam thereby increasing the water temperature of the cooling water for the CR3 unit. This additional heat will likely cause the Company to exceed the thermal permit requirements for the cooling water discharge. As I indicated in prior testimony, the Company had not identified an optimal solution, but it was evaluating all reasonable options.

After initiating the formal study of the heat issue, PEF became aware that there is an additional issue relating to POD. The power uprate will likely also cause the Company to exceed its current permit requirements related to the flow speed of the cooling water discharge. The Company has initially identified a solution to this flow issue, which requires the construction of a type of bypass canal to slow down the flow of the water. While the Company will continue to evaluate its options as to an optimal solution for the flow rate issue, it estimates the identified solution will cost approximately $15 million., excluding indirect costs. PEF is still estimating $43 million to address the heat issue. Thus the total estimate to address the POD issues associated with the power uprate is estimated at $58 million, excluding indirect costs, or $66.5 million with indirect costs but excluding AFUDC, reflecting the additional cost needed to resolve the flow rate issue.

Q. What effect will the joint owners have on the costs that PEF seeks to recover for the CR3 power uprate project?

A. Because the joint owners have elected to take their share of the additional megawatts, they will be responsible for sharing in the costs of the uprate project, pursuant to the terms of their joint ownership agreement. Collectively, the joint owners will take their ownership interest and thus PEF's customers will only be responsible for approximately $356.7 million, with indirect costs but excluding AFUDC, using the current cost estimates.

Q. Are the costs of the power uprate project reasonable and prudent?

A. Yes. The Company will conduct competitive bids for the purchase of major components for the power uprate project. This process involves a detailed review of designs and pricing to make sure the best quality for the price is obtained. In addition, benchmark comparison to power uprates performed at other plants in Progress Energy's system will be made to factor in the latest experience gained from those uprates. By incorporating a competitive bidding process and relying on efficiencies achieved from experience, the Company will ensure that the power uprate costs are reasonable and prudent.

V. CONCLUSION

Q. Please summarize the benefits of the CR3 power uprate project.

A. By undertaking and completing the CR3 power uprate project PEF will generate substantial fuel savings for its customers that will be a significant benefit to them and the Company. The Company will also increase fuel diversity to its benefit and the benefit of the state, all by providing additional, reliable base load generation from an environmentally friendly source. We urge the Commission to approve the cost recovery of the CR3 power uprate project as provided in Section 366.93, Florida Statutes, and Rule 25-6.0423, F. A.C.

Q. Does this conclude your testimony?

A. Yes, it does.

Exhibit 1
General Site Layout

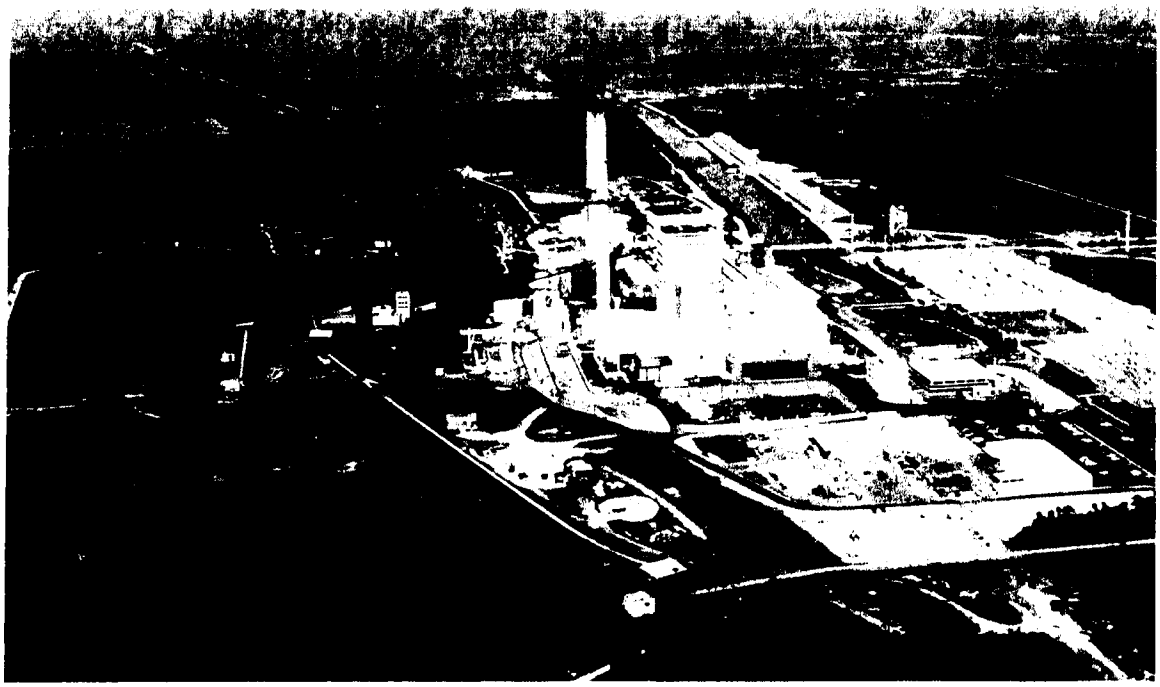

Exhibit 2

Primary Plant Configuration

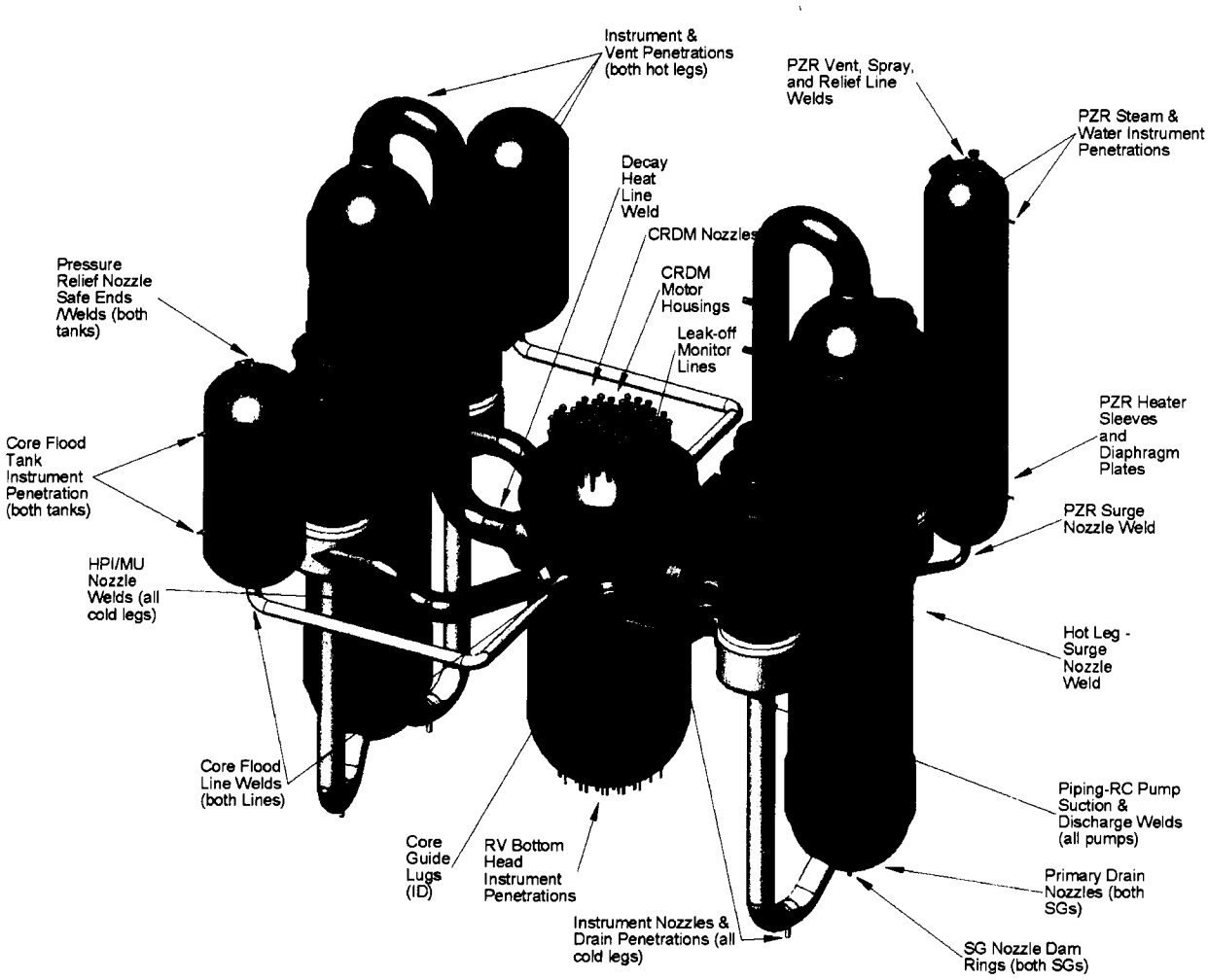

Exhibit 3
Secondary Plant Interface