PacifiCorp Energy **Date:** February 6, 2007

Title: Blundell Unit 3 Expansion Project Feasibility Study

Objective: Satisfy commitments made:

- To perform an economic feasibility study of an increase in capacity of the Blundell facility by 25 megawatts per the *Settlement of Excess PacifiCorp Income Tax Cost Monies Collected in Rates – Docket No. 05-035-98* (the Settlement) before the Public Service Commission of Utah.
- To evaluate increasing the generation capacity of the Blundell geothermal facility per commitment 52 that was made a part of the order approving the acquisition of PacifiCorp by MidAmerican Energy Holdings Company.

Decisions Required:

To reach a decision about the possible expansion of the Blundell geothermal facility by 25 megawatts based on the analysis presented in this report and thereby satisfy:

- The commitments made by the company.
- The company resource requirements and risk tolerances.
- The customers and stakeholders' interests.

Conclusions:

The evaluation of expanding the Blundell facility by 25 megawatts was analyzed and determined not to be economically viable when compared to avoided market purchases because:

- The total cost of the 25 megawatt expansion project is estimated at a total cost of $5,538 per kilowatt and a plant-only cost of $4,259 per kilowatt, both of which exceed the Settlement not-to-exceed cost of $3,600 per kilowatt (*Settlement*, section3.c.(vi)).
- The present value revenue is a negative ($3.4) million and falls short of the Settlement minimum required benefit of $10 million (*Settlement*, section 9.b.).

Summary of Feasibility Study:

The technology investigated was a single flash design, which is discussed in more detail in the technology section of this report.

The total expected capital investment for a 25 megawatt capacity plant is estimated to be $138,444,000. The overall project scope of work includes drilling additional wells, securing an engineer-procure-construct contract for the new power generator facility, upgrading the transmission line to Cove Fort (approximately 16 miles), allowance for funds used during construction, taxes, escalation and development costs, which include permits, preparation of bid specifications and engineering. This results in an estimated complete project cost of $5,538 per kilowatt. The Settlement not-to-exceed amount of $3,600 per kilowatt was based upon capital costs for the plant-only. Accordingly, if you exclude the costs that are not germane to the construction of the plant itself, the cost for the 25 megawatt expansion is $4,259 per kilowatt, which still exceeds the $3,600 per kilowatt figure in the Settlement. (Table 3 provides an itemized breakdown of the project costs for both the total cost scenario and the plant-only cost scenario.)

Based upon an economic evaluation and the risk factors presented in this paper, and complying with the threshold amounts set forth in the Settlement, it is recommended that the 25 megawatt expansion at Blundell not be pursued at this time.

However, the company will periodically monitor the merits of any future Blundell expansion at a later date.

Background:

Settlement of Excess Income Tax Cost Monies Collected in Rates

On October 6, 2005, the Utah Committee of Consumer Services filed a request for agency action alleging, among other things, that PacifiCorp improperly retained certain monies that were collected in rates. The parties involved and MidAmerican Energy Holdings Company (MEHC) concluded that it was in the public's best interest to settle the dispute. As a result of this Settlement, MEHC agreed, among other things, to transfer stock ownership in Intermountain Geothermal Company (IGC), the steam supplier for the Blundell geothermal facility, to PacifiCorp, and the expansion of the Blundell facility by approximately 11 megawatts of production by means of installing an 11 megawatt heat recovery unit at a cost of no more than $3,100 per

kilowatt and with the expansion to be completed by the fourth quarter of 2007. The Settlement also required PacifiCorp to undertake a study to verify the economic feasibility of an additional 25 megawatt expansion at Blundell.

Commitment 52

As a result of the MEHC acquisition of PacifiCorp, certain commitments were made to the various state public service commissions that regulate PacifiCorp. Commitment 52 provides that upon closing, MEHC and PacifiCorp would evaluate increasing the generation capacity of the Blundell geothermal facility. Such evaluation would be summarized in a report and filed with the state public service commissions in California, Idaho, Oregon, Utah, Washington, and Wyoming. This document is being provided in satisfaction of that commitment.

Feasibility Study:

PacifiCorp contracted with GeothermEx, Inc. and Power Engineers, Inc. to perform studies with respect to the potential steam production capacity of the Roosevelt Hot Springs geothermal reservoir and the estimated capital expenditures necessary for a plant expansion. In order to determine incremental generation capacity for the Blundell facility, GeothermEx, Inc. developed simulations based on historical steam production quantities of the individual wells through the middle of 2005. The results of the simulations indicated the reservoir could support a production increase sufficient to support a 25 megawatt plant expansion. The findings also indicated that the geothermal reservoir has the capacity to operationally support all units (including the proposed 25 megawatt expansion) operating at full capacity for approximately 30 years. Beyond 30 years it is speculated that the plant may experience a 400 kilowatt de-rate annually. The limiting factor is reservoir pressure decline, which might be able to be managed by supplying additional water to the reservoir.

Technology and Economics

The following is a description of the technology that was investigated and the economic assumptions that were made in performing the feasibility study.

Technology and Operational Benefits

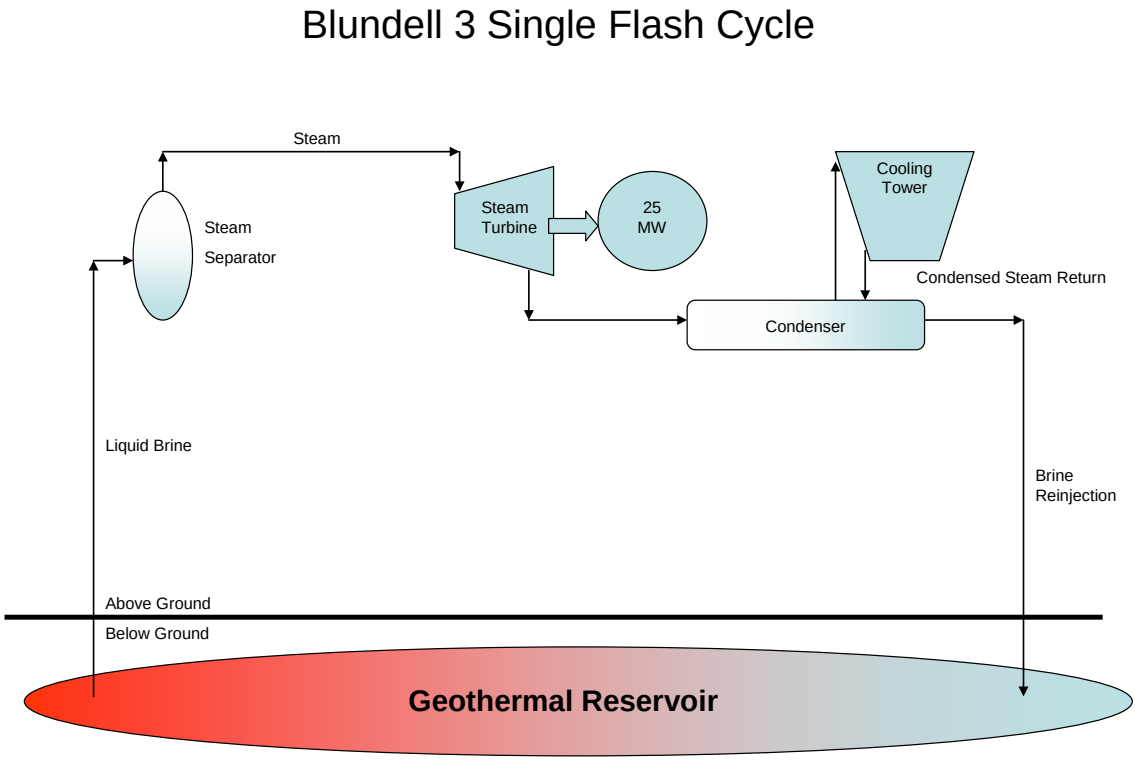
The technology that was considered with respect to the Blundell expansion was a single flash design. Construction of a new plant on the Blundell site could provide operational benefits to the existing Blundell plant units; these benefits include:

- Improved reservoir management by combining existing injection wells with the new injection wells, which could result in returning more water to the reservoir. Current operation returns a portion of the reservoir water to a well outside the field. The new injection wells could be located such that there may be a reduction in pumping costs.
- Optimized steam usage by connecting new production wells to the existing production well circuit. This would provide the production well system with the ability to compensate for poor performing wells and limit the amount of de-rate of the unit until the well can be repaired during a regularly scheduled outage.

25 Megawatt Single Flash

The single flash unit undertakes a process whereby a portion of the geothermal brine is “flashed” into steam in a steam separator; the steam then enters a steam turbine which turns a generator. The remaining portion of the brine that remains liquid is re-injected into the geothermal reservoir. Figure 1 is a simplified schematic of the single flash process showing how the energy is extracted from the geothermal brine to produce electricity.

Figure 1 - Single Flash – 25 Megawatt Expansion



Economic Assumptions

Since the Blundell 25 megawatt expansion project will be a regulated project it was assumed that the investment would be included in rate base and earn the allowed return from each jurisdiction. For modeling purposes, a 10.5% return on equity was assumed. The Blundell 25 megawatt expansion project economics were measured against market purchases for the life of the project.

Additional transmission capacity is required to support 25 megawatts of incremental generation at the Blundell facility. The system impact study report completed in July 2006, indicates that a new 16 mile 138 kilo-volt line from the Blundell plant to Cove Fort would be required and would have a target cost of $17.0 million (+50%/-25%). Additional transmission facility studies during the detail project planning phase would be required to improve the target cost estimate and accuracy.

The Settlement requires all Production Tax Credits (PTC) to be returned to customers. However, the PTC for renewable resources that was scheduled to expire at the end of 2007 was recently extended by action of the United States Congress, but only through the end of the calendar year of 2008. This extension is too short and is not favorable to meeting the long design/procure/construction periods typical of a new geothermal plant. As such, the feasibility determination of the Blundell expansion excluded PTC because this expansion would not be placed in service prior to the expiration of the tax credits. Green tags are also not included in the analysis due to the fact they would be attached to the market purchases of renewable energy and therefore provide no incremental benefit in the analysis.

Economic Analysis

The results of the economic analysis for the 25 megawatt expansion project are provided in Table 1 through Table 3. The customer benefits are calculated as the differential present value revenue requirement [PVRR(d)] of the Blundell 25 megawatt expansion project compared to market purchases.

Table 1 – Economic Analysis[1]

Economic Analysis				
Case Study	Estimated Cost $(000)	PVRR(d) $(000) WITHOUT PTC	Cost $/kW	Net Margin $/MWh WITHOUT PTC
25 MW plant	138,444	(3,356)	5,538	(1.45)

As shown in Table 1, the PVRR(d) for the proposed 25 megawatt expansion is a negative $3.4 million, which is well below the minimum required benefit of $10 million (as per the *Settlement*, section 9.b.).

The following spreadsheet in Table 2 provides a detailed breakdown of the assumptions and data that are depicted in Table 1 with respect to the 25 megawatt expansion.

[1] **Notes for Table 1**
1) Estimated cost is based on 2006 dollars.
2) PVRR(d) is calculated using the December 29, 2006 official market price forecast (forward price curve) supplied by PacifiCorp's commercial and trading organization.
3) The 25 megawatt case study is based on Power Engineers, Inc.'s capital cost study performed in March 2006 along with cost estimates to connect plant boundary items for a fully functional generating unit.

Table 2 - Economics for Single Flash - 25 Megawatt Expansion

Project Name: Blundell 25MW Base Case to CY2038

(In Thousands of Dollars)

Without Production Tax Credit
Without Green Tag Credit

Project Economics:

	Customer Revenue Requirement	Cash Flows Prior to Regulatory Adjustment	Cash Flows After Regulatory Adjustment *
PVRR Benefit or (Cost) Total Project	($3,356)		
PVRR Benefit or (Cost) PPW Share	($3,356)		
Project NPV		($1,739)	$343
Project IRR		7.1%	7.3%
Discount Rate Used		7.3%	7.3%
Capital Productivity Ratio		1.0	1.0
Payback Period (years)		16.2 Years	12.3 Years

	2006	2007	2008	2009	2010	2011
Capital Spending w/o AFUDC	$1,121	$38,759	$41,670	$42,823	$0	$0
Capital Spending w AFUDC	$1,143	$40,490	$46,910	$49,901	$0	$0
Net Cash Flow Without Regulatory Recovery						
Annual	($1,126)	($38,968)	($42,115)	($33,400)	$19,001	$13,212
Cumulative	($1,126)	($40,095)	($82,210)	($115,610)	($96,609)	($83,397)
Net Cash Flow With Regulatory Recovery						
Annual	($1,121)	($38,759)	($41,670)	($31,066)	$25,500	$19,020
Cumulative	($1,121)	($39,880)	($81,550)	($112,616)	($87,115)	($68,095)
Incremental Earnings Before Interest & Taxes						
Without Regulatory Recovery	($9)	($337)	($717)	$177	$3,589	$2,888
With Regulatory Recovery	($0)	$0	$0	$3,939	$14,064	$12,249
Incremental Earnings						
Without Regulatory Recovery	$8	$843	$2,008	$2,803	($231)	($315)
With Regulatory Recovery	$14	$1,052	$2,453	$5,137	$6,268	$5,494
Annual Revenue Requirement						
Calculated	$9	$337	$717	$3,761	$10,475	$9,361
Recovered	$9	$337	$717	$3,761	$10,475	$9,361

* Includes regulatory lag of zero months.

Based upon the economic analysis performed by PacifiCorp Energy, it has been determined that the costs and subsequent benefits associated with the Blundell 25 megawatt expansion project are slightly above market purchases and would provide no benefit to customers. The total cost of the Blundell 25 megawatt expansion project is estimated to be $5,538 per kilowatt, which exceeds the $3,600 per kilowatt not-to-exceed amount set forth in the Settlement; and the present value revenue requirement benefit is actually a detriment of ($3.4) million, which is well below the $10 million minimum required benefit.

Comparison to MEHC Analysis:

MEHC provided the settlement parties a confidential analysis of the estimated revenue requirement impact resulting from the transfer of the stock ownership in IGC from MEHC to PacifiCorp. This section reconciles the cost per kilowatt installed cost differences between the PacifiCorp Energy analysis and the MEHC analysis.

Cost per Kilowatt

The findings of the feasibility study indicate that the total estimated cost for a 25 megawatt plant is $5,538 per kilowatt. This amount is significantly greater than the $3,600 per kilowatt provided for in the Settlement; however, the feasibility study costs need to be adjusted to reflect plant-only costs. The total project cost of $5,538 per kilowatt includes amounts for transmission system upgrades, taxes, allowance for funds used during construction, and escalation. A comparable plant-only dollar amount for the 25 megawatt project would be $4,259 per kilowatt, which is still greater than the $3,600 per kilowatt not-to-exceed amount set forth in the Settlement.

Table 3 is an itemized reconciliation of the cost differential between the MEHC estimate of $3,600 per kilowatt and the PacifiCorp Energy estimated project costs for the 25 megawatt expansion project.

Table 3 - Blundell 25 megawatts expansion Project

Blundell 25 megawatt Expansion Project	PacifiCorp Project Estimate	MEHC Blundell Analysis
Adjustments to PacifiCorp estimates that are not included in the MEHC Blundell Plant analysis of $3,600 per kW settlement figure	Total Project cost per kW	
	$5,538 per kW	$3,600 per kW
Estimated Transmission work and switchyard	$514	
Escalation	$174	
Capitalized property taxes	$29	
AFUDC	$563	
SUBTOTAL	$1,279	$0
Cost per kW less adjustment	$4,259	$3,600

Therefore, the 25 megawatt expansion project, at a price per kilowatt of either $5,538 or $4,259 does not meet the not-to-exceed amount set forth in the Settlement.

Net Present Value

The Settlement (section 9.b.) also references a requirement that the net present value of the project be at least $10 million for an additional 25 megawatts of new plant generation. The PVRR(d) for the 25 megawatt expansion, excluding PTC and green tags, is a negative ($3.4) million. As such, the 25 megawatt expansion project also fails to satisfy the NPV requirements of the Settlement.

Additional Key Risks:

The Blundell 25 megawatt expansion project includes a number of additional project and operational risks that require special consideration. The following are the additional key risks associated with the Blundell facility.

- Uncertain geothermal reservoir dynamics, short circuiting between injection and production wells and production well interactions could result in less steam supply than projected for the Blundell expansion project, these issues could also negatively impact steam supply to the existing units thereby limiting generation output.
- Uncertain steam supply provided from the south end of the reservoir could result in less than the estimated generation output from the Blundell 25 megawatt expansion.