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**CONFIDENTIAL**

REVIEW OF  
PROPOSED STEAM SALES AGREEMENT  
between  
NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY  
and  
PUNA GEOTHERMAL VENTURE

for

NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY  
KAILUA-KONA, HAWAII

by

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Proposed Steam Sale Agreement  
Puna Geothermal Venture and NELHA  
Discussion Outline

August 20, 1990

- I. Update on the status of the project and current negotiations with Puna Geothermal Venture ("Puna")
  
- II. Proposed compensation to be paid by Puna to NELHA for steam
  1. Review of Puna proposal
  2. Methods of determining the value of steam
    - a. Other steam sale contracts
    - b. Steam valuation for royalty calculations
    - c. Cost alternatives to Puna
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- III. Puna's desired option to drill additional wells
  1. NELHA reservation of rights
  2. Benefits to additional drilling
  
- IV. Operation and maintenance of the HGP-A well and site
  1. Reasons to be the operator
  2. Reasons for Puna to be the operator
  
- V. Other issues

Review of  
Proposed Steam Sales Agreement  
between  
Natural Energy Laboratory of Hawaii Authority  
and  
Puna Geothermal Venture

I have reviewed the proposed Steam Sales Agreement between the Natural Energy Laboratory of Hawaii Authority ("NELHA") and Puna Geothermal Venture ("Puna") (the "Agreement"). Set forth below are my comments, questions and discussion points. Except as defined herein, capitalized terms are those defined in the Agreement.

1. Recitals

The recitals will need to be modified to reflect the agreed upon terms of the transaction.

2. Paragraph 1 - Purchaser of Steam from Seller's Existing Well.

This provision allows Puna to use the Well as they choose, or not to use the Well at all. Allowing Puna to use the Well in this manner, creates an obvious economic issue for NELHA. The less the Well is used, the less steam is produced and the lower the revenues to NELHA. In addition, allowing this type of well usage potentially creates a technical issue. If the Well is used intermittently, the cycling process can be damaging to the Well.

It is not unreasonable for a developer to want maximum flexibility to operate the steam field in the most efficient and economic means possible. However, it is also not unreasonable for the resource owner to want its steam used on a priority basis for both economic and technical reasons.

Puna has effectively set forth a possible means of resolving these issues by offering a Well Availability Fee and a minimum Steam Fee. This method of compensation, if appropriately priced, can eliminate economic impact of any reduced Well usage. It also establishes an economic incentive for Puna to use the Well, since it must pay regardless of usage. Economic incentive is probably the best method of assuring the Well will be used in a consistent manner. Attempting to mandate well usage in the Agreement can be difficult. Puna should clarify its intended use of the Well and state the intended use in the Agreement.

The issue of whether the proposed compensation to NELHA for use of the Well is adequate is discussed in Comment 4.

Does the Well have a history of problems when it is cycled?

Are there any issues regarding the quality of the steam (non-condensable gasses or impurities) that would affect Puna's desire to use the Well relative to other wells?

3. Paragraph 2 - Delivery of Steam.

"...then Buyer shall make such improvements at Buyer's expense, or Buyer may have the option of making such improvements as Seller's contractor." These concepts appear to contradict each other. Puna will need to clarify.

It is not unreasonable for Puna to want the right to exercise some control over the entire steam field system, particularly in matters of safety to field personnel or plant equipment. However, the extent of the control should be determined by, among other things, who pays for necessary improvements. It's clear in Paragraph 3(b) that Puna expects NELHA to pay for maintaining the Well regardless of the operator. If NELHA is paying for improvements, it should have significant input in deciding how and where money is to be spent.

4. Paragraphs 3 & 4 - Consideration for Exclusive Purchase Agreement; Well Availability Fee; Steam Fee.

While the Agreement is being called a steam sales agreement, the compensation structure proposed by Puna is, in many ways, more characteristic of a well acquisition and mineral lease. If viewed in this manner, the one time fee of \$250,000 would represent the acquisition of the Well, the Steam Fee would be equivalent to a royalty payment and the Well Availability Fee would be to compensate NELHA for the cost of maintaining the Well.

To help decide the appropriateness of the compensation being proposed by Puna, below is a calculation converting the total proposed compensation to an annual compensation, and then comparing that amount to various methods used in the geothermal industry for determining steam value.

Puna is proposing to compensate NELHA for use of the Well (See 1 below) by paying the following amounts:

|  | <u>Annual<br/>Compensation</u> |
|--|--------------------------------|
| * One time fee \$ 250,000  | \$ 25,000 (2)                  |
| * Well Availability Fee (Annual)   | 50,000                         |
| * Steam Fee  |                                |
| Based on actual pounds of steam<br>delivered at a price of \$ 0.11415<br>per 1000 pounds, with a minimum<br>annual payment of \$50,000 | <u>60,000 (3)</u>              |
| Total annual compensation  | <u>\$135,000</u>               |

(1) For purposes of evaluating Puna's proposed compensation, it is assumed that the payments relate only to the steam taken from

the Well. See Comment 6 regarding Puna drilling additional wells on the property.

(2) For purposes of calculating annual compensation, it is assumed that the \$250,000 fee paid at the time of signing the Agreement is amortized over a ten-year period.

(3) Assumes the Well is produced at full capacity, estimated to be 60,000 pounds per hour. The Steam Fee per year would be approximately \$ 60,000. This amount is calculated as 60,000 pounds x 24 hours x 365 days x \$ 0.11415/1000 pounds per hour.

#### Other Steam Sale Contracts

In the Geysers area of Northern California, the world's largest producing steam field, some steam producers are paid for their steam based on the number of pounds of steam delivered to the plant. This method of payment is similar to Puna's proposed Steam Fee. The price paid for steam in the Geysers is reported to be between \$1.60 and \$1.80 per thousand pounds per hour. The developers are responsible for drilling the wells, delivering the steam to the plant and all steam field operating and maintenance costs.

Assuming a 60,000 pound well and a contract price for steam of \$1.70 per thousand pounds per hour, annual compensation for the steam would be approximately \$ 893,500. This amount is calculated as 60,000 x 24 hours x 365 days x \$1.70/1000 pounds per hour. This amount is considerably higher than the amount being proposed by Puna. To make the analysis comparable, one should consider that the capital costs of drilling and constructing gathering systems and the maintenance costs in the Geysers may be higher than in Hawaii, and therefore, require a higher price.

#### Steam Valuation for Royalties

When steam is sold from one party to another on an arm's length basis, the amount paid for the steam clearly establishes the value of the steam. This value is the basis for calculating royalties due to surface and mineral owners. Many developers are now producing steam for consumption by their own power plants. Electricity, not steam, is the end product. Because these projects do not sell steam, an alternate method of establishing the value of the steam is required to calculate royalties. Many of these projects, including all projects on Federal leases, are using an allocation of revenue method to determine the steam value. Under this method, a negotiated percentage of the electricity revenues is allocated to the value of the steam. This percentage ranges from as low as 35% to as high as 50%.

Let's assume that the Puna project sells 25,000 Kwh of electricity 90% of the time, at an energy price of six cents per

Kwh, and that the Well represents 10% of the steam field (2.5Mw). If the steam is valued at 42% of the revenue, the value of the steam would be approximately \$ 497,000 per year. This amount is calculated as 25,000 Kwh x .90 capacity factor x 24 hours x 365 days x \$ 0.6 electricity sales price x 42% attributable to steam value x 10% attributable to the Well. This method of valuation also creates a steam value considerably higher than the Puna proposal.

#### Cost of Alternatives to Puna

Another means of determining the value of the Well, at least the value of the Well to Puna, is to calculate the cost to Puna of obtaining steam from another source. In this case, the only other available source would be to drill an additional well on their existing leases.

I don't have the data to calculate this cost. However, it's fair to say that a new well would cost substantially more than the up front fee being offered to NELHA. In addition, drilling involves risk. Further, if Puna was to drill an addition well, it would have the on-going cost of royalties to the surface and mineral owners. Assuming the royalties are 10% of the value of the steam, the royalties, based on the assumptions used above, would be nearly \$ 50,000 per year. This is calculated as a 10% royalty x \$ 497,000 value of steam.

#### Specific comments

The Well Availability Fee compensates NELHA for maintaining and making the Well available. It is proposed that the first payment be made on the anniversary date of the Agreement and annually thereafter. It seems more appropriate for the fee to be paid in advance or rateably throughout the year to match the timing of expenses that will be incurred. In addition, the Well Availability Fee should continue to be paid for the term of the Agreement, not "for as long as Buyer continues to purchase Steam delivered by the Seller from the Well" as proposed. This would require that Puna continue to pay the Well Availability Fee or terminate the Agreement in the event the Well is shut down for any period of time. It does, however, appear that if steam is produced for even one day during the year, the fee is due for the entire year.

It is proposed that the Steam Fee be paid quarterly. It seems more appropriate for the fee to be paid in the same intervals as Puna is paid by HELCO for the electricity. Generally, this is monthly not quarterly.

The Well and the Site are subject to the terms and conditions of a geothermal resource lease with the State of Hawaii (the "Geothermal Lease"). The Geothermal Lease provides for royalties to be calculated at 10% of the gross amount or value of the

geothermal resources. The Geothermal Lease further provides for the State to waive the royalties for the term of the lease, but does require a calculation be made of the amount of the royalties. Are these calculations being made? What method is being used to calculate the royalties? How is the value of the steam being determined?

A final thought on compensation. In my opinion, the more flexibility that Puna receives with respect to the use of the Well, the Site and the resource, the more they should be willing to pay. Similarly, the more restrictive the terms of the Agreement as to the usage of the Well, the Site and the resource, the less Puna should be expected to pay.

5. Paragraph 5 - Seller's Reservation of Steam Use.

If NELHA desires to reserve the right to use the Steam for its research facilities, than this provision needs to be a direct statement that "the Buyer reserves the right to use the Steam," not that "the parties will cooperate in providing Steam."

Further, the reservation of rights should not be subject to the facilities being "(i) technically and economically feasible, and (ii) not prohibited by permits issued to either the Buyer or the Seller." These qualifications provide obstacles for NELHA to use the Well. Who determines what is technically and economically feasible? What is included in making that determination? Will Puna's economics be considered in the decision as to what is economic?

As to the qualifications regarding permits, Puna should clarify the purpose of this provision. Do any of Puna's development permits require demonstration of adequate reserves and/or deliverability or require maintenance of minimum levels of reserves and/or deliverability? If so, does Puna intend to include the Well and related reserves in these calculations? If they do, it would make it difficult to remove the Well from their use in the future without violating the terms of the permit.

The reservation of rights provision also should include NELHA's right to plug and abandon the Well, if in the sole discretion of NELHA and without liability to Puna, it is not productive/profitable to NELHA to continue the operation of the Well.

6. Paragraph 6 - Option for Additional Wells.

The Agreement gives Puna the option to drill additional wells on the property. Whether NELHA chooses to grant this option is a business decision that will have to be made. However, it should be considered that it may be better to have a well with a bottom hole on the NELHA property, which allows NELHA to be compensated for its

steam, than to have a well just off the property that arguably causes the steam to migrate from the property to the neighboring well. NELHA doesn't get paid for steam in that situation.

In any event, it would not be appropriate to grant Puna the option to drill injection wells on the property, when the Agreement does not provide for NELHA to be compensated for the use of such a well.

As a practical matter, because of the small size of the Site, it may not be reasonable that additional wells would be located on or under the Site. The effects of drilling any additional wells on the property should be discussed with NELHA's reservoir consultant.

This provision does not address NELHA's reservation of rights to use steam from the property. Would the new wells be available for use by NELHA? The provision also lacks standard language prohibiting new drilling from interfering with existing operations. For what period of time would Puna have the option to drill?

If Puna is to have the right to drill additional wells and/or be the operator of the Well or the Site (See Comment 8), consideration should be given to having Puna agree to be subject to the terms and conditions of the Geothermal Lease. The intent would not be to assign or sublease NELHA's rights under the Geothermal Lease, but to make Puna responsible for certain of the operating obligations of the lease.

#### 7. Paragraph 7.1 - Waste.

It seems reasonable that the NELHA would be responsible for injecting the steam it uses for its operations.

#### 8. Paragraph 7.3 - Operation and Maintenance.

This section clearly defines Puna as the operator of the Well, with NELHA to be responsible for the costs incurred by the operator. Whether Puna is to be the operator of the Well is a business decision to be made by NELHA. It's not unreasonable for Puna to want to be the operator, in that having a single operator for all the wells provides maximum efficiency in the operations.

This provision does not define the Puna affiliate that would do the work on the Well. I assume Puna would not be the actual field operator of the project. The provision also does not define any authorization process for the expenditure of funds and does not define how the operator would be compensated. Any operator or entity with access to the Site needs to have adequate insurance. These issues are mute, if NELHA decides to be the operator.



Does NELHA have operators available? Is it cost effective for NELHA to operate the Well?

Does NELHA want technical data about the Well or the reservoir produced by Puna? This can be a negotiating point.

9. Paragraph 7.4 - Obligations to be Without Recourse to Buyer.

The concept of limiting liability to the project entities is common in this type of transaction. However, it's not clear what the term "look solely to the Plant(s)" means. Is the Plant(s) an entity? Does it include the owner's interest in the steam field, the permits, accounts receivable?

~~The ownership structure of the project needs to be clarified by Puna. Further, if Puna or an affiliate is to operate the Well, liability would need to extend to the operating entity. This provision should be reviewed by legal counsel.~~

10. Paragraph 8.1 - Adequacy of Resource.

~~This provision implies that the HGP-A site might be used for injection.~~

11. Paragraph 8.2 - Permits.

This provision requires Seller "to cooperate with the Buyer" regarding permits, but does not designate the entity to pay the cost of such cooperation. What does cooperate mean? Does it require attendance at hearings, filing reports or testifying before regulatory groups? This needs to be clarified.

12. Paragraph 9 - No Rights Retained.

~~This provision clearly gives Puna all rights to the steam from the property, not just the Well.~~

13. Paragraph 10(a) - Term.

It is not unreasonable for Puna to want to have a long-term claim on the steam. The certainty of resource availability is necessary to satisfy lenders and permits. A more standard provision would be for the Agreement to run for term of the electricity sales contract or so long as the buyer continues to run the plant and use the Well. If Puna does not operate the Well for some defined period of time, NELHA should have the option to terminate the Agreement.

~~The Geothermal Lease, which commenced in 1979, has a maximum term of 35 years. Therefore, the lease terminates no later than the year 2014. The Agreement with Puna should not extend beyond the term of the Geothermal Lease without the agreement of the State.~~

14. Paragraph 10(b) - Term.

Puna needs to clarify the idea of a "material default." Sixty days is a long cure or commence to cure period, but is not unreasonable for non-monetary defaults. NELHA may want a shorter period to cure for a payment or monetary default. It's not clear what is added by (ii), since Paragraph 10(a) provides for termination with 60 days notice. Puna should clarify the need for (ii).

15. Paragraph 12 - Environmental Indemnity.

Environmental indemnities are a major issue in natural resource projects. At a minimum, this provision should be expanded to include an indemnification of the Seller for the activities and operations of the Buyer. This provision should be reviewed by legal counsel.

16. Paragraph 16 - Force Majeure.

It doesn't seem to me that the Agreement, as written, provides for the type obligations that would be affected by force majeure. The effect of this provision should be considered if NELHA proposes a period in which Puna must put the Well in operation to keep the Agreement in force.

# Analysis of Proposed Compensation for Steam

|   | <u>Annual<br/>Compensation</u> |
|---|--------------------------------|
| Puna Proposal                           | \$ 135,000                     |
| Steam Sale Contracts                    | \$ 893,520                     |
| Steam Value for<br>Royalty Calculations | \$ 497,000                     |
| Cost of Alternatives<br>to Puna         | ?                              |

# Puna Proposal

|   | <u>Annual<br/>Compensation</u> |
|---|--------------------------------|
| One time fee of \$ 250,000<br>amortized over 10 years   | \$ 25,000                      |
| Well Availability Fee   | 50,000                         |
| Steam Fee based on 60,000<br>pounds per hour of steam<br>at the proposed price of<br>\$ .11415 per 1000 pounds(1) | <u>60,000</u>                  |
|   | \$135,000                      |
|   | =====                          |

(1) 60,000 pounds x 24 hours x 365 days  
x \$ .11415/ 1000 price of steam

# Steam Sale Contracts

## Method of Payment

\$ per 1000 pounds per hour  
of steam delivered

## Range of Prices in the Geysers

\$ 1.60 - \$ 1.80 per 1000 pounds per hour

## Annual Revenue from a 60,000 Pound Well

\$ 1.60 - \$ 840,960

\$ 1.70 - \$ 893,520

\$ 1.80 - \$ 946,080

(60,000 pounds x 24 hours x 365 days  
x \$ 1.60 per 1000 pounds per hour =  
\$ 840,960 )

# Steam Valuation for Royalties

## Method of Calculation

Allocation of electricity revenues

## Range of Percentages Allocated to Steam Value

35% - 50%

## Annual Revenue from a 60,000 Pound Well

35% - \$ 414,000

42% - \$ 497,000

50% - \$ 591,000

( 25 Mw plant x 90% availability x 24 hours x 365 days x \$ .06 per Kwh price for electricity x 35% allocated to steam value x 10% allocated to 60,000 pound well = \$ 414,000 )