

Petrotherm

Oilfield Heating Equipment

Div. David Industries

November 21, 1983

Mr. Lloyd Davidson
PO Box 2182
Santa Fe, NM 87501

Re: Quote #2777

Dear Mr. Davidson:

In response to your telephone inquiry, I enclose some general data sheets on both our electric bottom hole heating systems and also the circulating hot water type. The latter normally uses one of our gas-fired hot water circulating systems as the source of heat, so data on that equipment is also enclosed, as well as a few of our other products.

I also enclose a copy of our reservoir data sheet which will enable us to help you choose the best system for your applications, if you will fill it out as fully as you can.

In general, if you have a shallow well with a very long pay zone, where 50% or more of the well (for example) is pay zone, then the circulating hot water heater may prove to be the better system - particularly if you have free, lease gas available. On the other hand we normally find that in most installations the electrical system is superior.

In general, the bottom hole heater works better the higher the viscosity or the lower of the gravity of the crude, and if the well has still some drive. Economics of course are better the shallower the well, and the lower the water cut, though these don't affect the actual functioning of the system.

We provide a variety of power levels and degrees of sophistication in our systems, and usually recommend that initial installations use the more sophisticated system which can give us the most data. Then cost savings can be achieved on subsequent units, when we know more about how your wells react to the bottom hole heat. I tried to return your call to discuss some of these areas with you, but there was no answer. Perhaps you will give us a call when you have reviewed this data and have a better feel for the questions you might want to ask as well as the answers to some of the questions we would be asking you.

RECEIVED

JUN 26 1985

OIL CON. DIV.
DIST. 3

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Thank you for your inquiry about our products. We look forward to hearing from you and providing you with the right equipment to solve your viscosity problems.

Very truly yours,



John M. Rau

JMR:bw

encl.

Please reply to:

17671 Fitch
Irvine, CA 92714

714 - ~~979-2737~~
863-9339

PRODUCT BULLETIN BHH

ELECTRIC BOTTOM-HOLE HEATING SYSTEMS

Down-hole heating systems provide electrical heat right at the producing zone to help thin down heavy crudes or prevent paraffin breakout or blockage, increasing well production from 2 to 8 times — or more. Standard systems are available for wells with primary production in ranges from 1 to 50 B/D. The heater assembly attaches directly to the tubing string and power is conducted through a copper-jacketed or steel-armoured cable. 480 VAC systems are standard for wells to 4000' depth and power ratings to 44 KW. Higher voltage models are recommended for deeper wells or higher power requirements. In order to determine which specific model best fits your application, complete reservoir and well data are required.

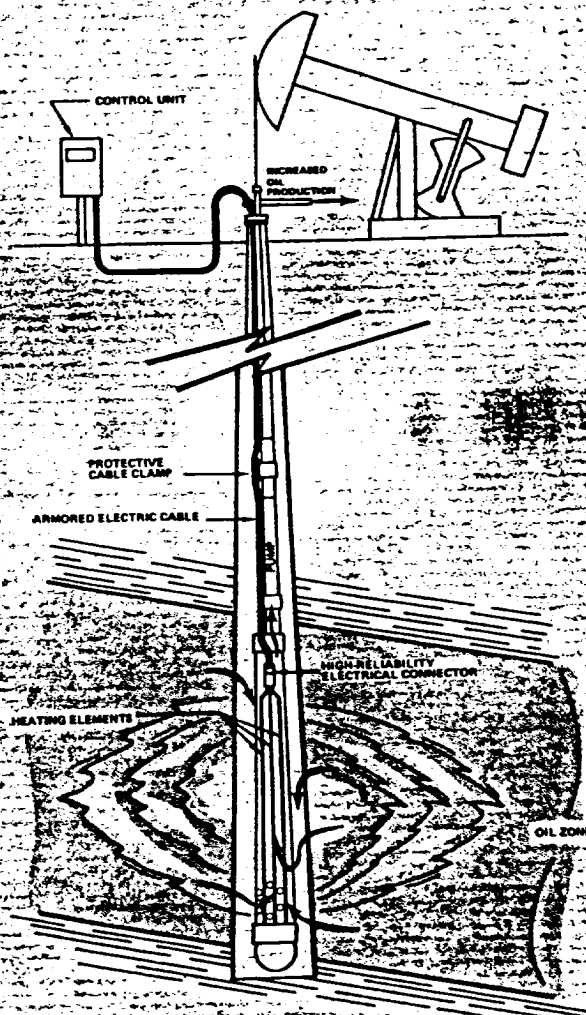
PRODUCT DATA

Heater Ratings	Unheated Well Prod.	Current @ 480 VAC	Ph.
5 KW / 17,000 BTU/Hr.	1-5 B/D	11 Amp.	1φ
10 KW / 34,000	5-10	21	1φ
15 KW / 51,000	10-20	32	1φ
22 KW / 75,000	20-30	27	3φ
29 KW / 100,000	30-40	36	3φ
44 KW / 150,000	40-50	54	3φ

- Heater Size: Standard 24" L x 3-1/2" OD (or 2-1/2" OD available up to 29 KW rating) plus cable and clamp dimension of 1-1/8" OD.
- Control Options:
- Scout Models: Down-hole temperature sensor with indication and adjustable set-point control of on-off power contactor at surface.
- Thermostat Model: Same except fixed set-point and no temperature indication.
- Payzone Model F: Open loop, fixed, continuous power setting.
- Payzone Model A: Same except with adjustable power setting and indication at surface.
- Accessory Options: Elapsed Time Meter. Time Clock Control. Convenience Power Outlet.

APPLICATIONS

- For wells with heavy asphaltic crudes or paraffin problems. Typical well candidates are less than 4,000' deep with heavy asphaltic crude of .8° to 16° gravity or paraffin problems, whose viscosity drops 10 to 100 times with a 100°F rise in temperature. Base fluid production less than 50 B/D.



ADVANTAGES

- Economical: Lowest cost of any thermal recovery method.
- Non-contaminating: No foreign or corrosive materials used. Safe — no damage to well bore or producing formation. Temperatures are maintained well below coking point.
- Efficient: Majority of the heat generated is delivered to the producing zone.
- Simple: No special well completions required. No complex support equipment.
- Continuous Operation: No downtime. The well is pumped at all times during heater operation, unlike other cyclic stimulation methods.

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Div. David Industries

January 31, 1984

Mr. Lloyd Davidson
PO Box 2182
Santa Fe, NM 87501

Ref: IQL #2777

Dear Lloyd:

Thank you for your letter of 19 January. I am sorry to hear that the original plan - using the existing well - is now out. That would certainly have saved time and money in getting to the point where we could prove the effectiveness of the bottom hole heater in this field.

We definitely concur that this application for electric bottom hole heaters sounds ideal and I believe that they would perform better both functionally and economically than the steam injection. Particularly, you have a number of factors which make the application sound and prospects favorable:

1. A short pay, with a thickness of only 12 to 38'.
2. Good bottom hole pressure.
3. Relatively shallow wells - on the order of 1000 to 1200'.
4. A proven change of 60 to 1 in viscosity with the normal amount of heat - increasing bottom hole temperature to 180 to 200°F.
5. Good results, at least in terms of increased production and decreased water cut, from some steam injection in adjacent wells.

The only disadvantage that I see in this application is of course the 220-volt single-phase power, which is something that can be dealt with. The other disadvantage, initially, was the 4" ID well; but with new wells being drilled we would have an option to change the size.

We have not studied the logs which you furnished in detail, but it sure looks like a good application. It is possible that the recovery might even exceed the 50% that you estimate, with the proper application of heat.

We may have to re-evaluate the size of heaters to be furnished, initially, based on the initial water cuts that the other wells have. This of course could change operating and acquisition costs; but we would not be so restricted in our choice of alternatives. New wells being drilled large enough to avoid

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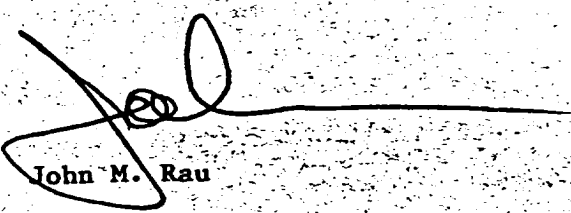
any difficulties with the 4" casing would give us lots of flexibility of choice and perhaps some savings there. Again, as I think I told you before, as we gather experience with the first one or two wells, we can optimize the design configuration to be furnished from then on, and get our costs lower.

Your cost estimates for the 15KW heater might be higher than actual, since at 25 bbls a day of oil production with a 10% water cut, and heat transfer in the formation stabilized, even the 15 KW heater would only have to run approximately half of the time. If that were the conditions, then your electric bill would only be \$250. On the other hand, if production went up to 50 bbls per day then you would be running full tilt - but think of the money you would be making!

I have three different people who might be interested in one way or the other in the project; one as a corporate investor and the other two as "promoters" - if you will. These all have experience with the oil patch, but only one has worked with our heaters in the past in a paraffin oil situation. I also have a couple of other people who might be interested in the tax aspects of the deal, purely as an investment, who really don't have any background in oil at all.

Let's continue to stay in touch and please let me know if there is anything that we can do to help you with your promotion of the funds. While we don't normally get into such deals, it is not totally beyond the realm of possibility that we could help somewhat in your financing through providing equipment on a leased basis, or for a share of production. I guess what I am saying is that we shall do our best to help you get started, because we think there are excellent possibilities for heaters on your lease, and it would be real nice to have you drill 23 wells and install 23 systems!

Very truly yours,



John M. Rau

JMR:bw