January 10, 1955

Dr. C. G. Suits
The Knolls

Dear Dr. Suits:

Herb Nichols' press releases on diamond synthesis indicate that there is not a clear understanding of my contributions to the super pressure program. This disturbs me considerably, as I feel that my contributions should rank as the outstanding scientific achievements of recent years.

CAPS

My contributions are:

1. The design of equipment which delivers proven pressures to 100,000 atmospheres and extrapolated pressures to 130,000 atmospheres and at temperatures in excess of 3,000° C. for hours on end.

This apparatus, which I have called "The Belt" was designed over two years ago. No other person on this program has made any basic contribution to high-pressure, high-temperature work since "The Belt" was designed. "The Belt" stands as the only 100,000 atmosphere, high-temperature apparatus in existence.

The closest approach to it is an apparatus of Dr. Strong which has a proven pressure to 53,000 atmospheres. I wish to point out, however, that this design of Dr. Strong's achieves this pressure only because it uses the three basic principles of "The Belt" design. It differs from the belt only in minor detail!

The three basic principles of "The Belt" are: 1) The all-important "sandwich" gasket of pyrophyllite and metal. 2) Conical pistons and chamber. 3) "double-ending" to increase symmetry and eliminate stress concentration points.

Items

Numbers 1 and 2 are clearly my inventions. Item No 3 is an obvious extension of a principle used by Bridgeman. Without the "sandwich" gasket we would be limited to a top pressure near 40,000 atmospheres. This gasket allows increased relative motion between piston and chamber, giving larger sized reaction chambers and the attainment of higher pressures. This "sandwich" gasket also provides, particularly in combination with the conical piston and chamber, a multi-staging effect which more than doubles the load that can be placed on the carbaloy and also eliminates the necessity for a double-acting press. The connical piston, with 60° angle as used in "The Belt" makes it possible to double the thickness of the pyrophylite gasket over that which can be used between flat-faced surfaces. I have given a detailed discussion of these principles in my Research Laboratory Report #1064.

vessel and to small size reaction chamber.

2. THE FIRST SYNTHESIS OF DIAMONDS BY A PROCESS THAT CAN BE DUPLICATED.

It is obvious that the company is able to make a public announcement on diamond synthesis because of my reproducible work, yet the publicity emphasis as presently planned is on Dr. Strong's as yet unduplicated work. In view of the many unduplicated claims that have been made in the last 100 years, this emphasis seems unwise.

space → 3. STUDIES AND MEASUREMENTS AT PRESSURES TO 100,000 ATMOSPHERES AT HIGH TEMPERATURES. ~~SIX~~ FIVE PAPERS HAVE BEEN PREPARED ~~BY/MYSELF~~ ON THIS WORK. THEY ARE:

l.c.

(A) Ultra-High-Pressure, High-Temperature equipment: "The Belt".
(B) The Melting Point of Germanium to 100,000 atmospheres.
(C) Studies on Na2O-SiO2-H2O system at pressures to 100,000 atmospheres, and temperatures to 2300 C.
(D) Attempts to Synthesize Diamond by Direct Transformation of Graphite at pressures to 100,000 atmospheres and temperatures ranging to over 3000 C.
(E) Some Hysteresis Properties of Stone at Pressures to 100,000 Atmospheres.

The first two have been submitted for G.E. approval. The last three l.c → WILL BE SUBMITTED SHORTLY, Much additional work has also been ~~d~~done that will form the basis for future papers.

I request that these papers be released for publication in view of the pending announcement of diamond synthesis. They are of such scope that they will give "backbone" to the diamond announcement, ~~and~~ bring additional prestige to the laboratory, and bring delayed recognition to the author.

Because ~~of the significance of~~ my pioneering, 100,000 atmosphere, high-temperature work had not ~~been~~ received adequate recognition, I ~~had~~ planned to leave the Research Laboratory last spring. However, a token recognition in the form of financial compensation persuaded me to stay on. If at the present time, I am not to receive the recognition (financial and otherwise) that my work merits, I will feel no incentive for continuing at the laboratory.

Very truly yours,

H. Tracy Hall

H. Tracy Hall

cc. ~~1 copy to C. G. Suits~~
~~1 copy to~~ A. L. Marksall
~~1 copy to Tony~~ Nerad .
A.J.