William A. Harshaw II
6020 Deer Run Drive
Chagrin Falls, Ohio 44022

17 May 1976

Dear Dr. Harshaw:

Now that I have your letter of May 11th, I am in a better position to comment than when talking on the telephone with you. Thermodynamic data on the properties of substances at high pressure and elevated temperature are generally unavailable. Consequently, calculations on your proposed pressure device can not be made. However, from experience, I express it as an opinion that a phase change or the thermal expansion of UF_6 in a confined constant volume will not generate a very high pressure at all. UF_6 is a molecular "soft" compound and will be very highly compressible. You would need to use a "hard" substance with very strong atomic bonds (network-type structure). I do not know of a substance that would meet this and all the other requirements necessary for your proposed system to reach the pressures that you seek. With respect to your proposed fixed volume container, you should read P. W. Bridgman's book, "Physics of High Pressure". He will explain why building cylinders of larger and larger diameter is ineffective in confining pressure. The same would be true for spheres or other shapes. Also, the nickel or any other metal that you might use for your spheres are too highly compressible. The inner parts of your confining chamber must be made of highly incompressible substances such as tungsten carbide or even diamond for the pressures you desire.

continued-

continued from page one-

Your idea of using carbon of the amorphous variety and of using extruding, forging and other methods used for salts seems novel if applied to diamond. Diamond with its network structure and the most untractable substance known (the strongest three dimensional bonding network known) may offer you some challenges, however, when you treat it the way you treat sodium chloride.

I ammnot in a position to consult on your project or to recommend it or to enter into a cooperative arrangement with you but wish you luck and success.

Very truly yours,

H. Tracy Hall

H. Tracy Hall