ment was measured with a LVDT that had likewise been calibrated under pressure. We would estimate the error of both load and displacement measurements to be less than 5 per cent.

The tensile load, superimposed on the hydrostatic pressure loading, was applied to the sample by springs or lead weights. Since the pressure has only a very slight effect on the elastic modulus of steel (~1% at 10 kbar), the spring constant varies only slightly with pressure. As a result, it was possible in the creep tests to maintain constant load to within a few per cent as determined by the load cell.

The load was held from the sample while assembly in the pressure vessel and during the period preceding the actual testing by small fuse wires. After assembly and the desired pressure had been obtained, the load was applied by "fusing" this wire with a surge of electric current. In this way the "constant" load was applied for the creep tests or the samples elongated to mechanical stops for the fixed displacement or relaxation tests in a small fraction of a second. Load and displacement were recorded versus time on a Leeds and Northrup dual-channel speedomax recorder.

Two types of samples were used:

1) Bulk samples in the form of beams with three-point loading constructed from bulk low density polyethylene

2) Tensile specimens fabricated from polyethylene film (0.002 in. thick). Both were commercial grade material purchased locally. The stress distribution for beams is more complex, of course, making the viscoelastic analysis more difficult. This incidentally would not present much of a problem for a linear viscoelastic material. However, since polyethylene does not fall in this class, we will report here only the results on the tensile tests. Qualitatively, at least, the phenomena were similar in the two types of tests.

Experimental Results

Consider first the creep tests of polyethylene film. Samples were cut and the apparent compliance computed by the equation

$$1/C(t) = \frac{W/dT}{\Delta \ell(t)/\ell} \tag{1}$$

where W is the applied constant load, d is the sample width, T is the sample thickness, ℓ is the sample length, and $\Delta\ell(t)$ is the sample extension. The results of six creep samples tested at several hydrostatic pressures is shown in Figure 1. Referring to Figure 1, it can be observed that as the mean stress is increased, the compliance was significantly decreased. This observation applies to both the initial and final values of compliance. Furthermore, creep rates were generally reduced at higher values of mean stress.

Stress relaxation tests produced similar but slightly different results. As with the creep tests the apparent modulus was determined from sample geo-