L. Summary Report on H^- Ion Sources, D. R. Moffett (ANL), P. W. Allison (LASL), and R. H. Morgan (RL)

Los Alamos Scientific Laboratory (LASL) reported on their experience with the surface-plasma Penning type source (see Sec. III.F). They have run with a cesium dichromate fill and also an external cesium boiler, and feel that while both lead to much the same results the cesium dichromate fill is somewhat simpler to operate despite the interdependence of temperature and cesium release. They estimate a one-month life for a LAMPF-source candidate of 120 Hz and 40 mA but have not tested a source under these conditions. They have run at various frequencies up to 100 Hz and typically 120 mA, 1 ms, and 7.5 Hz. The extraction electrode is then at about 18 kV dc. They have no difficulty retaining a quiet cesium-mode arc for hours if required, and report no particular difficulty restarting a "run" source which has cooled down. The amount of cesium present, and the applied magnetic field, appear to have a bearing on the degree of noise in the air. Instabilities can be noticed at the start of the pulse which settle down in about 200 μs. The analyser magnet has now been field-shaped to minimize observations in the extracted beam. Typical emittances quoted are 0.05 π•cm•mrad horizontally, and 0.008 π•cm•mrad vertically. No experiments on cooling the source have been done at Los Alamos.

The rotary-cathode 100 mA continuous source for the Fusion Materials Iradiation Test Facility was briefly mentioned. Tests are in an early stage as yet on this source.

ANL was almost ready to start tests on a Penning source with a cesium boiler and an arc powered from a 90 μs delay line with Z = 1Ω. The extraction electrode will be pulsed with 20 kV. No provision is made for cooling the source, but a heater is provided to assist in starting the source. They hope to have 30 Hz operation at 40 mA and 75 μs by summer 1979.

Rutherford Laboratory has run a simplified version of the Penning source with cesium-dichromate fill, and have obtained 35 mA of extracted unanalyzed beam. However, they report difficulties in maintaining a quiet cesium arc for longer than ~ 15 min, and it was suggested that either some contamination was occurring or that the arc supply voltage should be more than the 200 V quoted. They are about to test an external cesium boiler, and a rig containing an analyzer magnet is being built.