THE N3 VAULT--A GENERAL PURPOSE USER STATION

D.P. Sanderson

The completion of Phase II of the laboratory's construction will provide five stations for nuclear physics experiments. The third vault on the north side is designed as a general purpose stations for a wide range of experiments. (See Fig. 1.)

The main feature of the vault is the 92" Scattering Chamber, previously installed in the interim vault. The cramped quarters made setting up a complicated experiment with large amounts of electronics in the vault difficult. The new spacious environs of the N3 vault will make such setups much easier.

The scattering chamber[1] is a large 234 cm diameter right circular cylinder on its side. Two cantilevered rails, 74 cm below beam height, support a removable detector/target mounting system. A square fixed baseplate (152.4 X 152.4 cm) is mounted 71.4 cm below the beam axis. Extruded aluminum rails can be attached to the baseplate for mounting fixed detector arrays.

At 58.2 cm below the beam axis, a 152.4 cm diameter turntable is mounted. A radial pattern of threaded inserts allow up to 200 kg of detectors to be mounted on the table. A radial arm, rated at 20 kg can be installed above the turntable at 46.8 cm below beam height. At the center of this assembly, a target ladder can insert up to nine of the laboratory's standard targets. All motional degrees of freedom are

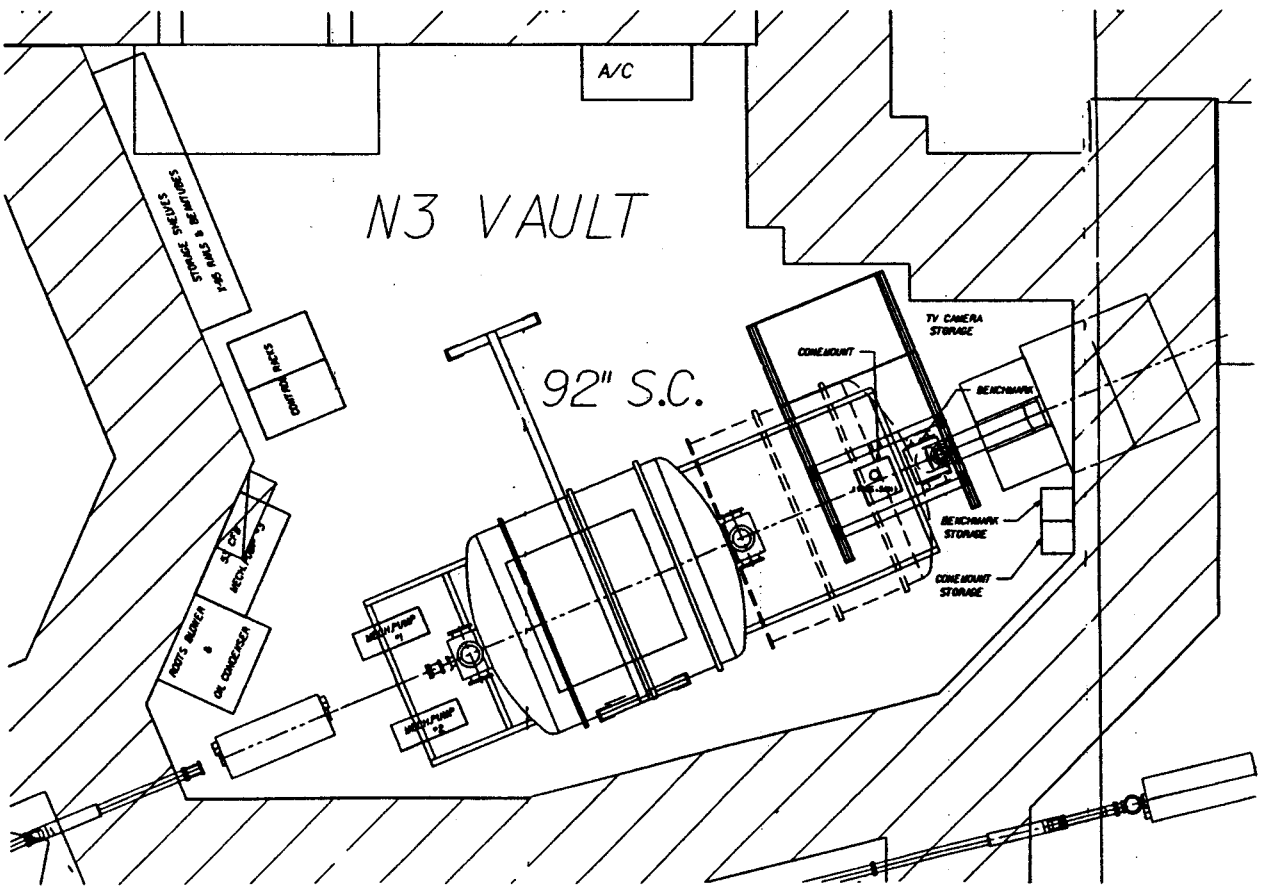

Fig. 1. The N3 Vault.

driven by high torque stepping motors with absolute encoder monitoring of position. Control is either locally, through a panel in the vault, or remotely by logging onto the control system computer.

The high vacuum system consists of two large turbo pumps and a liquid nitrogen cold trap. Pumpdown to 4×10^{-5} Torr requires approximately three hours. The vacuum system will be upgraded in late 1990 with the installation of liquid helium cryopumps. They should reduce the pumpdown time to one hour.

Detector electronics in the vault are well provided for. Camac serial and parallel highways are cabled to the chamber area. Two hundred special low noise shielded signal cables are installed on the chamber with terminations in Data-U 6. High voltage and low impedance wiring follow a noise free path back to the data-U. Crate power of up to 45 kW is available through a "clean" isolation transformer.

During the last two years of operation in the interim vault, the 92" Scattering Chamber has been extremely flexible. In some cases, a beamline was attached to the inside of the chamber to connect a user supplied scattering chamber to the main beamline. At one point, the back of the main vacuum vessel was removed and a large dipole magnet was installed at the normal target position.

In summary, the movement of the 92" Scattering Chamber to the N3 vault has created a large versatile user station with plenty of room and flexibility. Past experience in the interim vault has shown that it will be a very useful facility for years to come.

References

1. NSCL Annual Report (1987) p. 227.