

ENTRY NO. 71

NAME OF MACHINE NEN Cyclotron 1 DATE 30 Jan 1979
 INSTITUTION New England Nuclear Corporation
 ADDRESS 601 Treble Cove Rd., N. Billerica, MA

IN CHARGE J. L. Need REPORTED by J. L. Need

HISTORY AND STATUS Built by the Cyclotron Corp.

DESIGN, date _____ MODEL tests _____
 ENG. DESIGN, date _____
 CONSTRUCTION, date March 70
 FIRST BEAM date (or goal) July 70
 MAJOR ALTERATIONS None
 OPERATION, 90 hr/wk; On Target 87 hr/wk
 TIME DIST., in house 100 %, outside _____ %
 USERS' SCHEDULING CYCLE 1 weeks
 COST, ACCELERATOR _____
 COST, FACILITY, total _____
 FUNDED BY New England Nuclear Corp.

ACCELERATOR STAFF, OPERATION and DEVELOPMENT

SCIENTISTS 1 ENGINEERS 1
 TECHNICIANS 2 CRAFTS 2
 GRAD STUDENTS involved during year None
 OPERATED BY _____ Res staff or None Operators
 BUDGET, op & dev _____
 FUNDED BY _____

RESEARCH STAFF, not included above None

USERS, in house _____ outside _____
 GRAD STUDENTS involved during year _____
 RES. BUDGET, in house _____
 FUNDED BY _____

FACILITIES FOR RESEARCH None

SHIELDED AREA, fixed _____ m²
 movable _____ m²
 TARGET STATIONS _____ in _____ rooms
 STATIONS served at same time, max _____
 MAG SPECTROGRAPH, type _____
 COMPUTER, model _____
 OTHER FACILITIES _____

REFERENCES/NOTES

MAGNET

POLE FACE diameter 96.6 cm; R extraction 43 cm
 GAP, min 5.1 cm; Field 21.0 kG }
 max 10.2 cm; Field 13.5 kG } at 14 x 10⁶ ampere turns
 AVERAGE FIELD at R ext 16.5 kG }
 CURRENT STABILITY 30 parts/10⁶; B_{max} / 1.22
 NUMBER OF SECTORS 3; SPIRAL, max 5 deg
 POLE FACE COIL PAIRS: AVF None /sec;
 Harmonic correction 11 sector
 Rad grad None /sec or Circ coils None
 WEIGHT: Fe 19.5 tons; Coils 2.5 tons
 CONDUCTOR, Material and type Strap copper
 STORED ENERGY --- MJ
 COOLING SYSTEM Deionized water
 POWER: Main coils 45 max, kW
 Trimming coils 0.5 max, kW
 YOKE/POLE AREA 100 %
 SECTOR ANGLE (Sep Sec) --- deg
 ION ENERGY (Bending limit) E/A = --- q²/A² MeV
 (Focusing limit) E/A = --- q/A MeV

ACCELERATION SYSTEM

DEES, number 2 angle 90 deg
 BEAM APERTURE 2.5 cm; DC BIAS 2.5 kV
 TUNED by, coarse Tap bars fine panels
 RF 25.0 to 12.7 MHz, stable ± _____ /10⁶
 Orb 25.0 to 12.7 MHz; GAIN, max 100 kV/turn
 HARMONICS, RF/Orb F, used 1st
 DEE-Gnd, max 30 kV, min gap .40 cm
 STABILITY, (pk-pk noise)/(pk RF volt) ---
 RF PHASE stable to ± --- deg
 RF POWER input, max 55 kW
 RF PROTECT circuit, speed 5 μsec
 Type Clamps pass tube grid
 FREQUENCY MODULATION, rate None /sec
 MODULATOR, type _____
 BEAM PULSE, width _____

VACUUM SYSTEM

PUMPS, No., Type, Size 1, 10" oil diffusion
 OPERATING PRESSURE _____ μTorr,
 PUMPDOWN TIME 1.5 hrs

ION SOURCES/INJECTION SYSTEM

Gold cathode, radial

EXTRACTION SYSTEM

Electrostatic deflector - Magnetic channel
CONTROL SYSTEM
Manual

ENTRY NO. 71 cont.)

CHARACTERISTIC BEAMS

	Particle	Goal (MeV)	Achieved (MeV)
ENERGY	p	22	22
	d	12.5	12.5
	3HE	30	33
	α	25	25
CURRENT		(μ A)	(μ A)
	Internal		
	p	500	200
	d	500	200
	3HE	200	200
	External		
p	200	60	
d	200	100	
3HE	100	90	
		(part/s)	(part/s)
Secondary			

BEAM PROPERTIES

	Measured	Conditions
Pulse Width	_____ RF deg _____ μ A of _____ MeV _____	
Phase Exc, max	_____ RF deg _____ μ A of _____ MeV _____	
Extract Eff	<u>75</u> % <u>50</u> μ A of <u>22</u> MeV <u>p</u>	
Res, $\Delta E/E$	<u>16</u> % <u>5</u> μ A of <u>22</u> MeV <u>p</u>	
Emittance		
(mm-mrad)	{ _____ axial } _____ μ A of _____ MeV _____	
	{ _____ radial }	

OPERATING PROGRAMS, time dist

Basic Nuclear Physics	_____ %
Solid State Physics	_____ %
Bio-Medical Applications	_____ %
Isotope Production	<u>95</u> %
Development	<u>5</u> %
	_____ %
	_____ %

PLAN VIEW OF FACILITY, NOTEWORTHY FEATURES, OPERATION SUMMARY, ADDITIONAL REFERENCES