*If you are using a printed copy of this procedure, and not the on-screen version, then you **MUST** make sure the dates at the bottom of the printed copy and the on-screen version match.*
The on-screen version of the Collider-Accelerator Department Procedure is the Official Version.
Hard copies of all signed, official, C-A Operating Procedures are kept on file in the C-A ESHQ Training Office, Bldg. 911A.

C-A OPERATIONS PROCEDURES MANUAL

ATTACHMENT

9.1.11.c Examples of Beam Flux Corresponding to C-A Class and Dose Rate Guidelines for Beams 20 CM^2 in Size

C-A-OPM Procedures in which this Attachment is used.		
9.1.11		

Hand Processed Changes

HPC No.	Date	Page Nos.	Initials
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Approved: _____***Signature on File***_____ _____
Collider-Accelerator Department Chairman Date

J.W. Glenn

9.1.11.c Examples of Beam Flux Rate Corresponding to C-A Class and Dose Rate Guidelines for Beams 20 cm^2 In Size

Protons or ions per hour	Dose Equivalent Rate or Absorbed Dose Rate[d]	C-A Class With Access	Brief Description of Access Control
$< 2.3x10^8$ protons[a] $< 1.5x10^7$ O ions[b] $< 7.2x10^6$ Si ions[b] $< 4.3x10^5$ Au ions[c]	< 0.1 rem/h	V	Radiation Warning Signs
$> 2.3x10^8$ and $< 1.1x10^{10}$ p $> 1.5x10^7$ and $< 7.6x10^8$ O $> 7.2x10^6$ and $< 3.6x10^8$ Si $> 4.3x10^5$ and $< 2.1x10^7$ Au	> 0.1 and < 5 rem/h	IV	Barriers, Locked Gates , Authorized Individual Access
$> 1.1x10^{10}$ and $< 1.1x10^{11}$ p $> 7.6x10^8$ and $< 7.6x10^9$ O $> 3.6x10^8$ and $< 3.6x10^9$ Si $> 2.1x10^7$ and $< 2.1x10^8$ Au	> 5 and < 50 rem/h	III	Barriers, Interlocked Gates, Health Physics Supervised Access
$> 1.1x10^{11}$ and $< 3.9x10^{12}$ p $> 7.6x10^9$ and $< 1.4x10^{11}$ O $> 3.6x10^9$ and $< 5.1x10^{10}$ Si $> 2.1x10^8$ and $< 1.9x10^9$ Au	> 50 rem/h and < 500 rad/h	II	Barriers, Interlocked Gates, Access By Special Procedure
$> 3.9x10^{12}$ p $> 1.4x10^{11}$ O $> 5.1x10^{10}$ Si $> 1.9x10^9$ Au	> 500 rad/h	I	Access Prohibited

[a] Protons are 28 GeV.

[b] Oxygen and silicon ions are 13.5 GeV/nucleon.

[c] Gold ions are 11 GeV/ nucleon.

[d] The actual in-beam dose rate is 50 times higher than the 'reduced' dose rate listed in the table above. The de-rating of dose rate for small beams accounts for the fact that only a small part of the body may be directly struck by the beam, leaving most of the body intact. However, significant deterministic effects may occur along the beam path as the beam penetrates the body (see Section 5.5).