“New” task

- Target systems group needs loss sources to calculate shielding
- They need to know the magnitude and distribution losses
- Normal operation, credible accident and incredible accident (?)
- We can be conservative but realistic

What we can provide

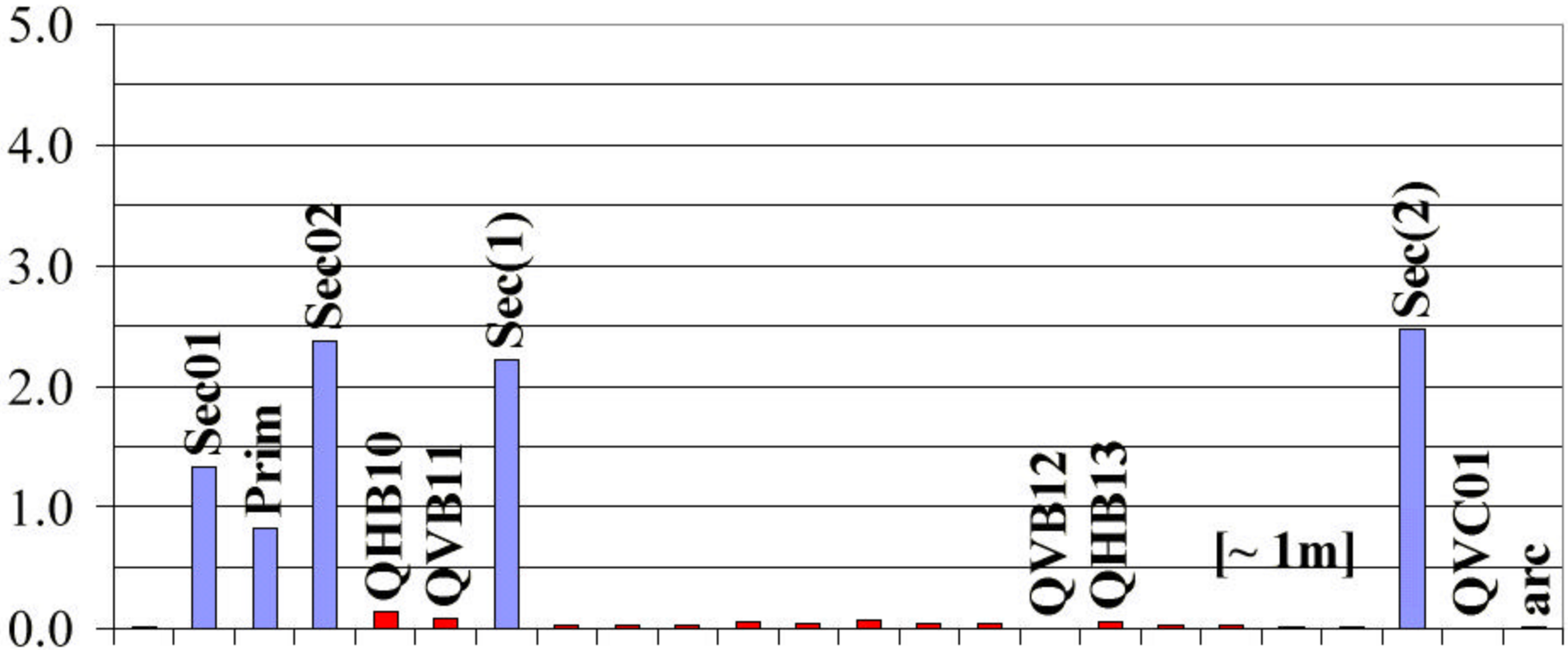
- Aperture/beam envelope plots to help determine the most probable loss locations
- Loss mechanisms, estimation of the magnitude from calculations or experience
- Where does the beam goes? (collimator, dump, homogeneous loss, quadrupoles…)
- No area in the machine is loss free

Controlled loss

Mechanism	Location	Fraction	Energy
FRONT END			
Unbunched beam	MEBT chopper	$4.2e^{-2}$	2.5 MeV
HEBT			
H^0 Ionization at the Linac	Linac Dump	$1.0e^{-5}$	$\leq$ 1 GeV
Linac tranvers tails	x-y collimator	$1.0e^{-5}$	1 GeV
Enrgy jitter/spread	z collimator	$1.0e^{-5}$	1 GeV
RING			
Excited H^0 at foil	collimator	$1.3e^{-5}$	1 GeV
Partial ioniz. and foil miss	Injection dump	$1.0e^{-2}$	1 GeV
Space-charge halo	Collimator	$1.9e^{-3}$	1 GeV
Energy straggling at foil	Collimator	$3.0e^{-6}$	1 GeV
RTBT			
Kicker missfire	Collimator	$1.0e^{-5}$	1 GeV

Distribution loss example.

Ring collimation straight section



		Sec01	Prim	Sec02	QHB10	QVB11	Sec(1)									QVB12	QHB13					Sec(2)	QVC01	arc
x10-4	0.006	1.330	0.822	2.372	0.128	0.072	2.218	0.016	0.020	0.026	0.046	0.036	0.058	0.032	0.038	0.000	0.054	0.020	0.026	0.012	0.006	2.468	0.000	0.006

Uncontrolled loss

Mechanism	Location	Fraction	Energy [MeV]	Length [m]
FRONT END				
RFQ transmision	Uniform??	$8.0e^{-2}$	0.065 - 2.5	3.72
DTL				
Vacuum H^- striping	Uniform	$7.5e^{-7}$	2.5 - 185	91.74
Magnetic H^- striping	Uniform		2.5 - 185	91.74
Emittance growth	End of Tank 1	5.0^{-7}	7.5	–
CCL				
Vacuum H^- striping	Uniform	1.7^{-7}	2.5 - 185	91.74
Magnetic H^- striping	Uniform		2.5 - 185	91.74
Emittance growth	Begining of CCL	5.0^{-7}	86.9	–
SCL				
Magnetic H^- striping	Uniform		0.185 - 1000	235.29
Emittance growth	Beginning of medium β SCL	5.0^{-7}	185.6	–
Emittance growth	Medium - high β transition	5.0^{-7}		–
HEBT				
Vacuum H^- striping	Uniform	$1.0e^{-5}$	1000	169.49
RING				
Magnetic H^- striping	INJB2	$1.3e^{-7}$	1000	1
Nuclear scattering at foil	INJB2	$3.0e^{-5}$	1000	–
Collimator inefficiency	All ring	$1.4e^{-4}$	1000	248

- Publications, plots, experimental data ?
- Send information to N. Catalan-Lasheras, E. Tanke or J. Galambos