Comparison of ICRP 30 Models to Newer Models

David E. Allen, James W. Neton, and Larry J. Elliott

U.S. Department of Health and Human Services (DHHS), Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), 4676 Columbia Parkway MS: R-45, Cincinnati, Ohio 45226

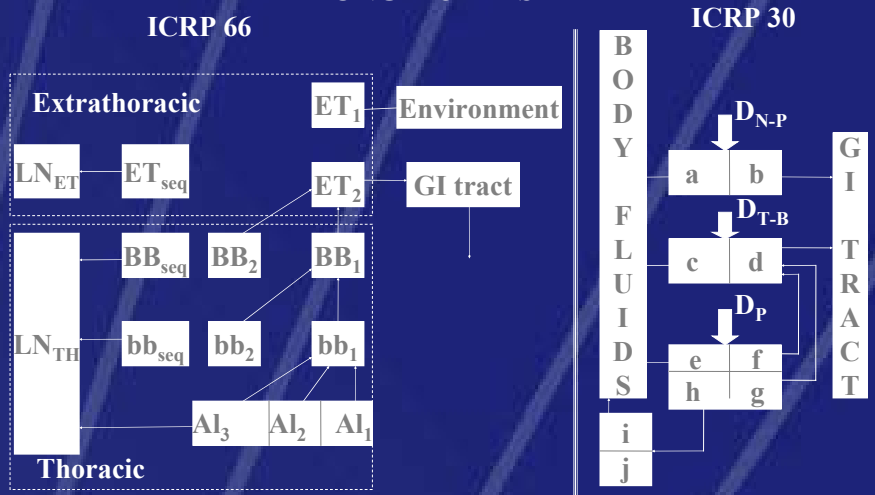
INTRODUCTION

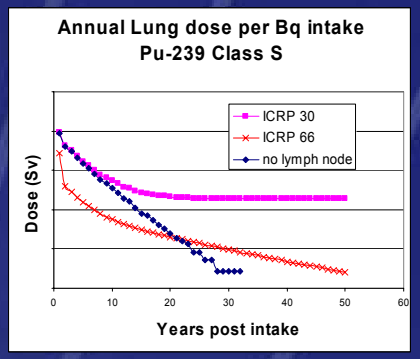
- Annual organ dose is needed for a compensation decision under the United States Energy Employees Occupational Illness Compensation Program Act (EEOICPA) of 2000.
- Internal doses have been calculated by various methods since the 1940s.
- The U.S. Department of Energy protection programs are currently regulated under ICRP 30 methods.
- Needed to compare ICRP 30 models to current ICRP models to determine effect of our dose calculation on the dose of record.

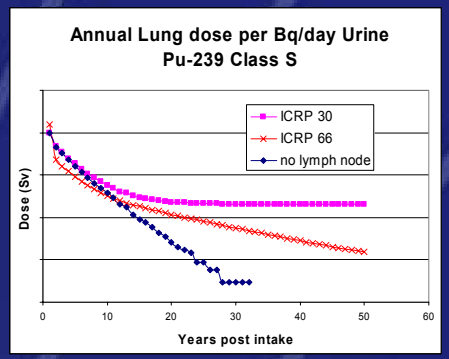
METHODS

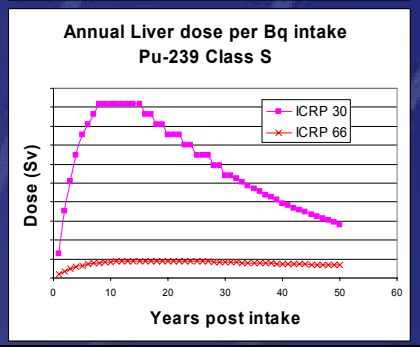
- Evaluated inhalation exposures for Pu-239
- Used ICRP recommended particle sizes (1 micron ICRP 30 and 5 micron ICRP 66)
- Used Cindy© and IMBA-NIOSH© computer programs
- Compared annual and committed doses obtained from each model.
- Compared lung and metabolic organ doses as well as non metabolic organ doses.
- Compared doses for various solubility classes

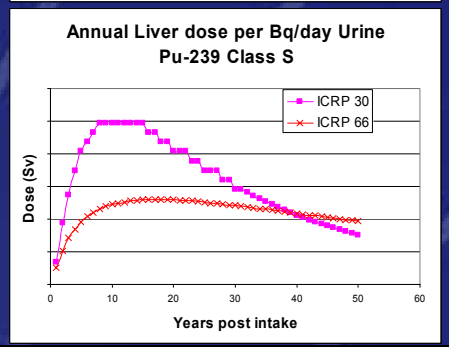
LUNG MODELS











RESULTS

New model compared to ICRP 30

Committed Dose (Sv)		Class S/Y	Class M/W
Lung	per Bq intake	0.14	1.25
	per Bq/day urine	0.75	2.52
Liver	per Bq intake	0.13	0.56
	per Bq/day urine	0.69	1.13

CONCLUSIONS

- Newer ICRP models calculated doses may be higher or lower depending on the situation.
- Difference is small for metabolic organs when dose is determined from bioassay.
- Newer models result in a much higher dose for non-metabolic organs.
- ICRP 66 lung model separates lymph node dose from lung dose. This allows proper risk coefficients to be applied.

SAFER • HEALTHIER • PEOPLE™