

Who's Empowered to Protect? How Are They Empowered? What Do They Need to Know?

Daniel J. Strom, Ph.D., CHP
strom@pnl.gov

IRPA-12 Abstract 0224, Technical Session II.2.1

International Radiation Protection Association

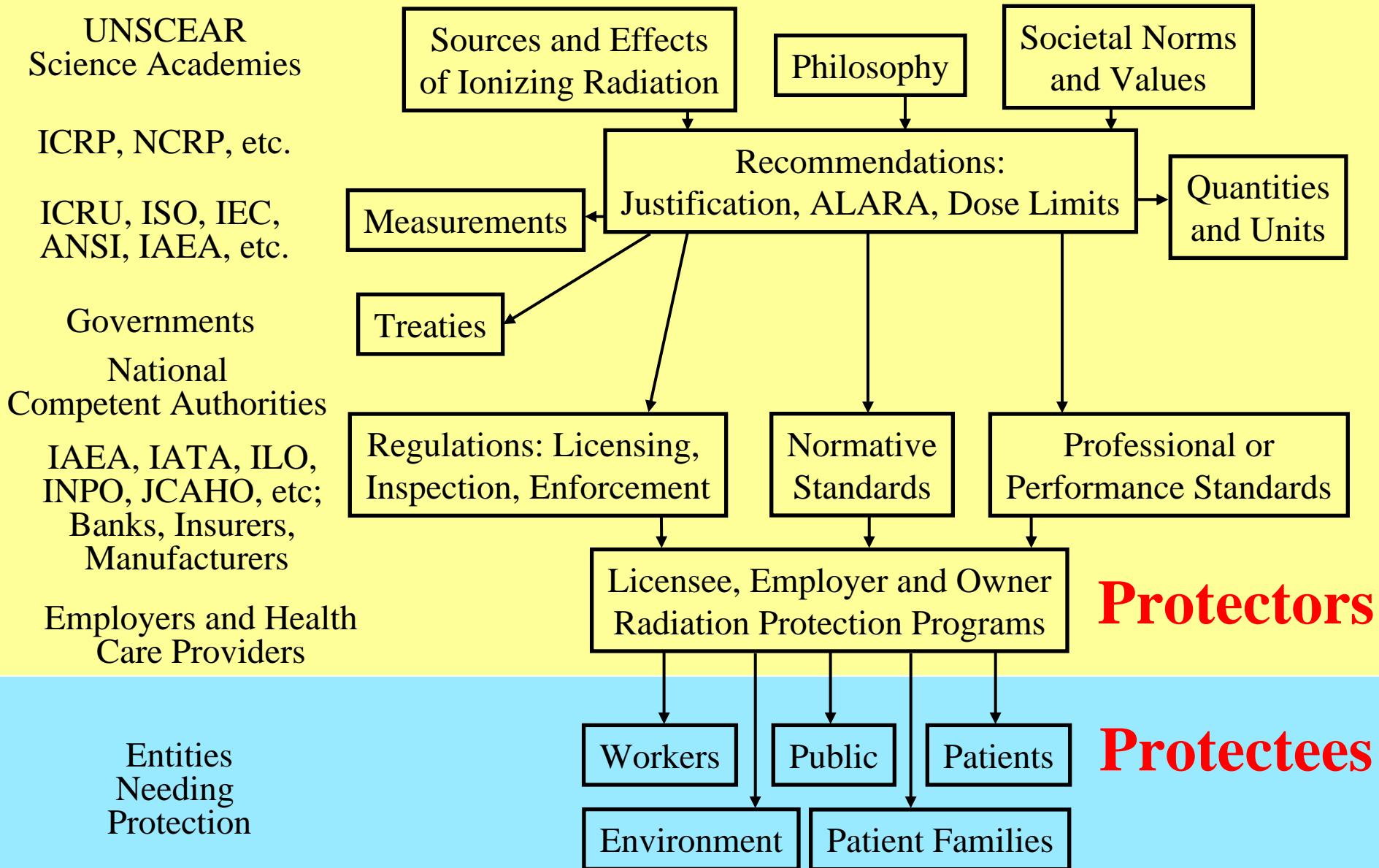
International Congress, Buenos Aires, Argentina, 20 October 2008

PNNL-SA-63006

Structure of Poster (IRPA-12 Abstract No. 0224)

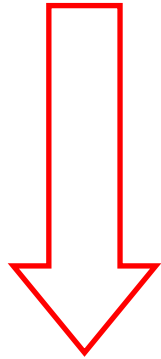
1. Who's empowered to protect?
2. How are they empowered (and disempowered)?
3. What do they need to know?
4. The old days
5. Case studies: failures of the traditional radiation protection paradigm
6. Conclusions

Traditional Hierarchy of Radiation Protection



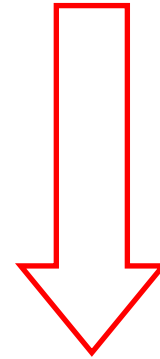
Traditional Hierarchy of Radiation Protection

Protector



Protectee

Parent



Child

10 Principles and 10 Commandments of Radiation Protection

No.	Principle	Commandment (familiar)
1.	Time	Hurry (but don't be hasty)
2.	Distance	Stay away from it or upwind of it
3.	Dispersal	Disperse it and dilute it
4.	Source Reduction	Make and use as little as possible
5.	Source Barrier	Keep it in
6.	Personal Barrier	Keep it out
7.	Decorporation (Internal & Skin)	Get it out of you and off of you
8.	Effect Mitigation	Limit the damage
9.	Optimal Technology	Choose best technology
10.	Limitation of Other Exposures	Don't compound risks (don't smoke)

Empowering the Protectee to be the Protector:



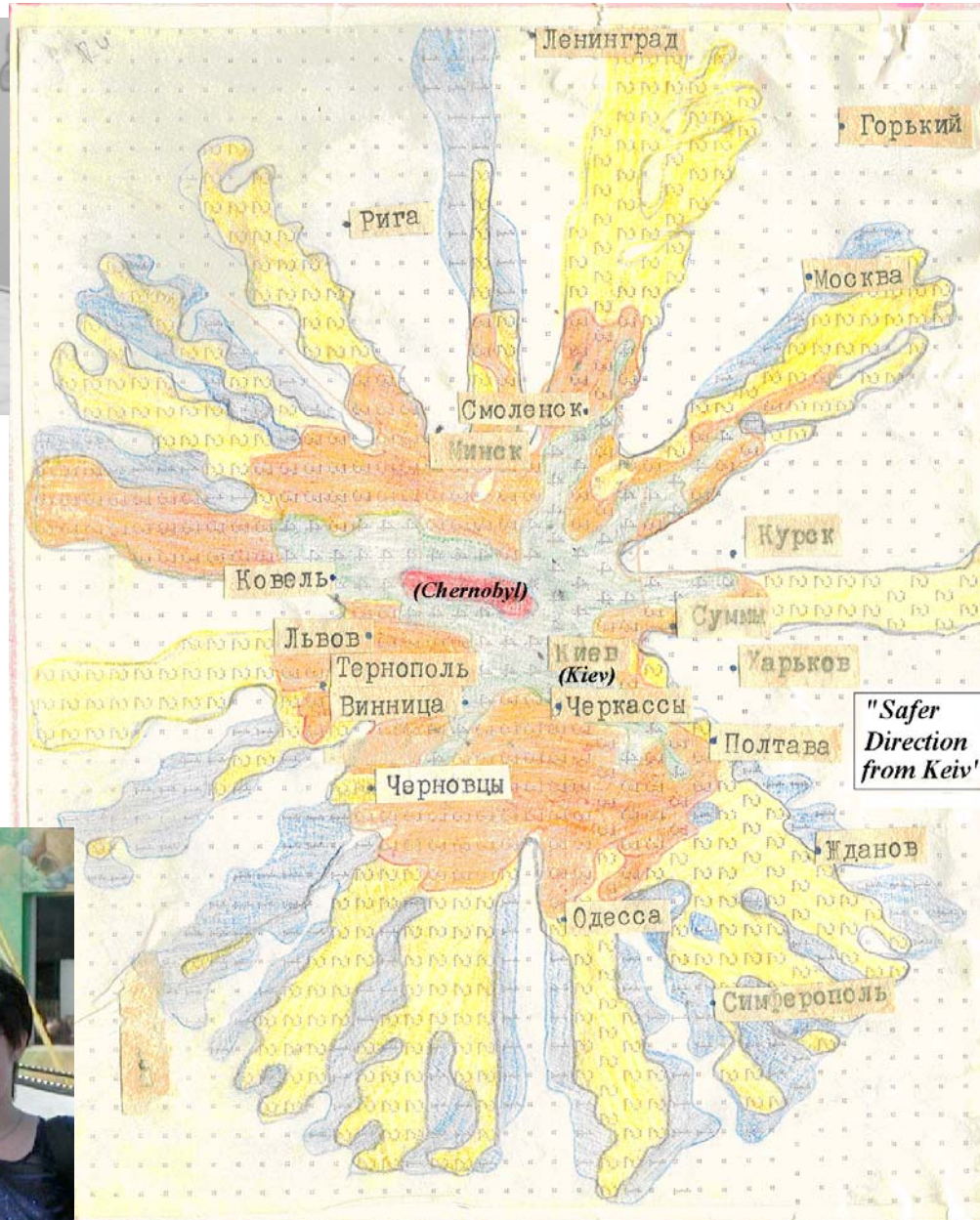
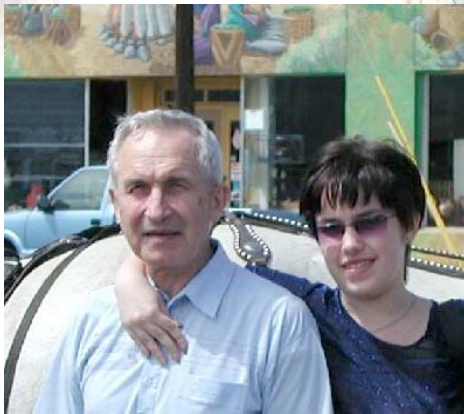
Empowering the Protector: Civil Defense

- ▶ USA during the 1950s
- ▶ Natural extension of protection against aerial bombardment experienced during World War II
- ▶ Civil Defense (CD) organization created to protect the public from a nuclear attack
- ▶ CD provided training, information, and radiological survey instruments to organizations and individuals
- ▶ CD empowered individual members of the public to protect themselves and their families in situations to which the government could not conceivably respond effectively
- ▶ One hallmark slogan of that era taught to schoolchildren was “duck and cover”

Case Studies

- ▶ Unlicensed radium
- ▶ Unlicensed radionuclides in wastewater
- ▶ Chernobyl: Vitaly Eremenko's Experience

3. Chernobyl: Vitaly Eremenko's Experience



Карт. 3
 Расчёт (Jones)
 Концентрация
 на поверхности
 в ки/м²
 106 Ru
 на 26.06.86г.

R = 1000км
 Масштаб 50x50км

Суперпозиция
 36 периодов
 усреднение по
 12 час.

Метеоусловия
 по высотам
 от Н ≈ 15км в
 1-й день до
 Н ≈ 100м в 18-й
 день.

Мощность, выбр.
 от 47 · 10⁴ ки в
 1-й день до
 0,27 · 10⁴ ки в
 18-й день.

10⁻⁵ 6 < 10⁻⁴ ки/м²
 10⁻⁶ 5 < 10⁻⁵
 10⁻⁷ 4 < 10⁻⁶
 10⁻⁸ 3 < 10⁻⁷

Conclusions

- ▶ There are situations in which the traditional radiation protection paradigm of institutions protecting people and the environment doesn't work or doesn't work well
- ▶ By analyzing protectors and protectees in the context of radiation protection principles and commandments, a need for improvement in informed individual protection actions has been demonstrated
- ▶ People can learn to protect themselves, and we should make that learning happen

References

- ▶ STROM, D.J., Ten principles and ten commandments of radiation protection. Health Phys., 70 (1996) 388-393. Available by permission of the journal at <http://www.pnl.gov/bayesian/10Principles.pdf>
- ▶ HICKEY, E.E., STROM, D.J., Technical basis for radiological emergency plan annex for WTD emergency response plan: West Point Treatment Plant. PNNL-15163 Vol. 3. 2005. Richland, Washington, Pacific Northwest National Laboratory
- ▶ EREMENKO, V.A., DROPPO, JR., J.G., A personal experience reducing radiation exposures: protecting family in Kiev during the first two weeks after Chernobyl, Health Phys, 91 (2006) S39-S46