

***Satisfying Worker's  
"Radiation Concerns"  
&  
Understanding the Safety  
Of the Radiflo Machine***

You are installing a new  
Radiflo “leak detection system”

1. The equipment is going to be isolated inside of its own room.
2. Only the people who are trained and licensed to use it will be allowed into that room.
3. The equipment is to pressure-bomb parts in a mixture of air and a trace of radioactive gas.

You are installing a new  
Radiflo “leak detection system”

4. If the part has a bad seal, (it leaks), some of the gas will leak into the part.
5. The part is then checked for traces of the radioactive gas that leaked into a bad part.
6. Any part that leaks is scrapped.

You are installing a new  
**Radiflo “leak detection system”**

7. This equipment has been used for this testing for about 50 years, worldwide.
8. The radioactive gas is totally “Inert”. That means it does not have any effects on your body.

You are installing a new  
**Radiflo “leak detection system”**

9. You will not receive any radiation exposure working in the plant.
10. Only someone who is operating the machine all the time will get any exposure.
11. How much exposure does an operator get in a year?  
**Less than a single dental X-Ray”**

# Questions

- What is the radioactive gas?

Krypton85 (kr85)

- What kind of radiation does it give off?

It emits: Gamma rays (like an x-ray)

Beta Particles (an electron)

- How much radiation is an operator allowed by international rules?

5,000 mREM / year

- Over 10,000 Kr85 operators monitored over 40 years, and all had less than 40 mREM / year.
- You get ~30 mREM / year just from the atmosphere.

# Questions

- Has there ever been a complete release of the Kr85 from a Radiflo?

*Never, in 40 years.*

- Has anyone ever been injured by this machine or process?

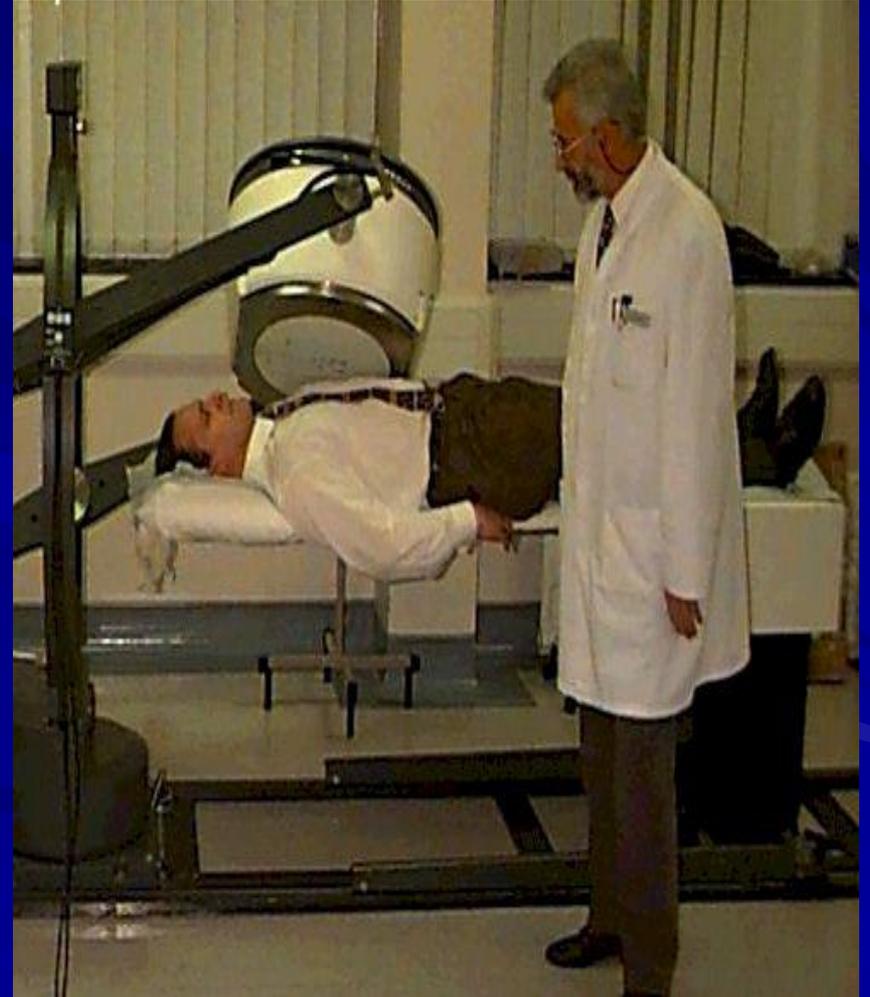
*Never*

- How many of these machines have been used?

*Over 300 throughout the world*

- **Where else has Krypton been used?**

It has been used for “Breathing-Experiments” to get an x-ray picture of the human lungs.



# Facts

- You receive more radiation exposure in 3-4 cross-country airline flights, than you would get operating the Radiflo machine for a year.
- You get more radiation exposure visiting a friend in Ft. Collins, Colorado for one weekend than running the Radiflo machine for one year.
- You get more radiation sitting beside someone on an airplane trip who has just been tested for thyroid problems, than in one year of running the Radiflo machine.

# How does the Radiflo protect the operator?

- The machine is totally shielded with lead.
- The operator will spend less than 1 minute near the machine every cycle.

## The machine also has 18 Safety Interlocks:

Alarms and Interlocks (Fix interlock and push the Reset button)		
AC Power	Radiation Alarm	Test Chamber Overpressure
Storage Tank Overpressure	Evacuation 1 Pump Down	Evacuation 2 Pump Down
Evac2 Output Overpressure	Exhaust	Compressor Timeout
Storage Pressure Lost	Auto Gas Recovery	Storage Pressure Gain
TC Transmitter Defective	SP Transmitter Defective	Vacuum Meter Defective
Test Chamber Handle	Test Chamber Pin	Test Chamber Cover

## Film Badges:

Some States don't even require film badges with Krypton<sup>85</sup>

We require film badges to be worn

## For 2 reasons:

1. They prove to the operator that they have not received any radiation,
2. They protect the company from claims.

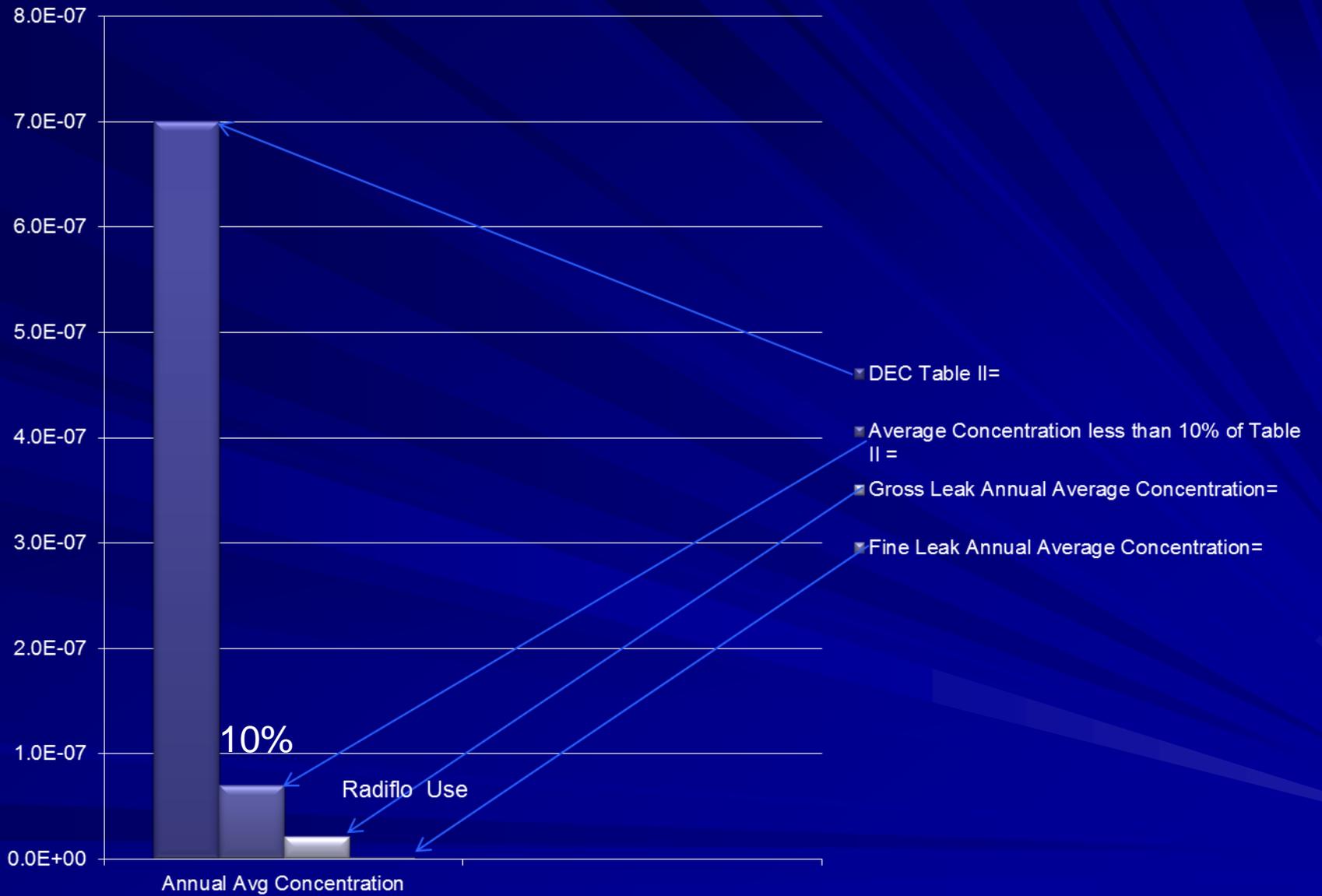
## ■ What about the environment?

The amount of Kr85 Internationally allowed to be discharged into the environment is:

**$7 \times 10^{-7}$  micro-curies/ml(air)/year**

Maximum “High-usage” Radiflo discharge is  
 **$\sim 3 \times 10^{-10}$  micro-curies/ml/year**

**That is 3 magnitudes less than the amount allowed.**



- How much Kr85 is used per year?  
1-3 curies/year.
- How much Kr85 is in the machine?  
The standard charge is 20 Curies.  
There is approximately 0.01% kr85  
in the air / radiotracer mixture.
- A commercial nuclear reactor (power  
plant) discharges to the atmosphere:  
**300,000 Curies per year.**

# Radiflo® Rejects

- Devices that are rejected in the Radiflo leak test will usually contain 0.1 to 0.5 microcuries of Kr85 gas.  
*(1 part per billion within most parts)*
- That quantity of Kr85 is considered by all government agencies to be an “Exempt Quantity”. That means it can be shipped to anyone without notice, as it is considered to be harmless.
- Devices that can be reworked will release the Kr85 gas in a well ventilated area, (such as where you solder parts, wash parts with solvents, etc.), without any concerns.