

## *Technology Development Timeline:*

**Pipe Explorer<sup>TM</sup>** 

**National Energy Technology Center  
Industry Partnerships Conference  
October 17, 2000**

**Science and Engineering Associates, Inc.  
Albuquerque and Santa Fe, New Mexico**

**Bill Lowry and David Cremer**



# **Radiological Surveys in Pipes and Drain Lines**

## *Pipe Explorer™*

- **What it is**
- **How it came about**
- **Where the business is going**



# *Pipe Explorer™ has surveyed over 15,000 feet of contaminated pipes and drainlines*



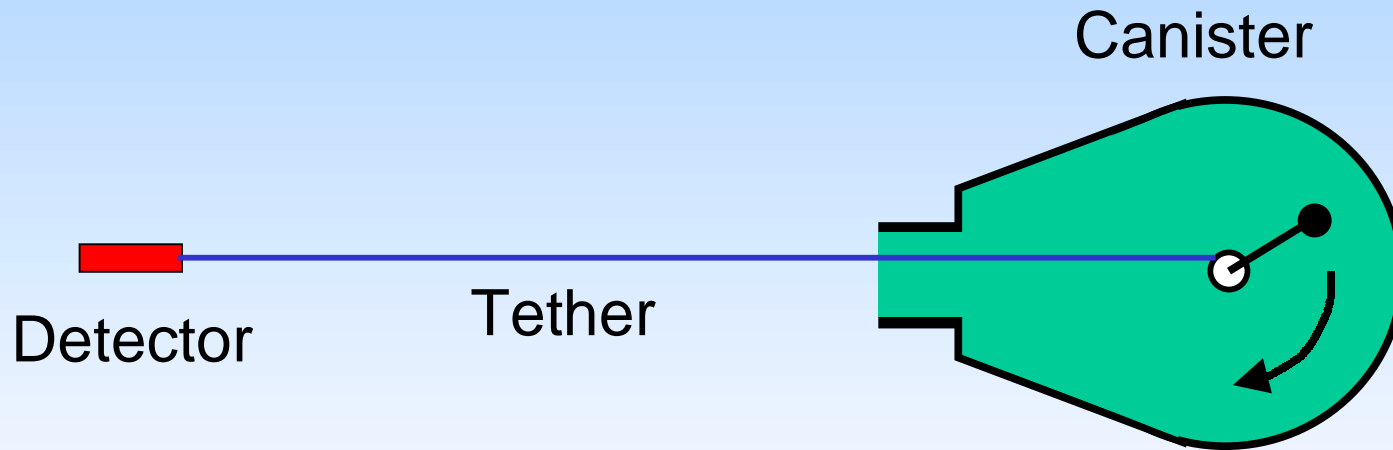
\*Denotes planned field activities in next 6 months



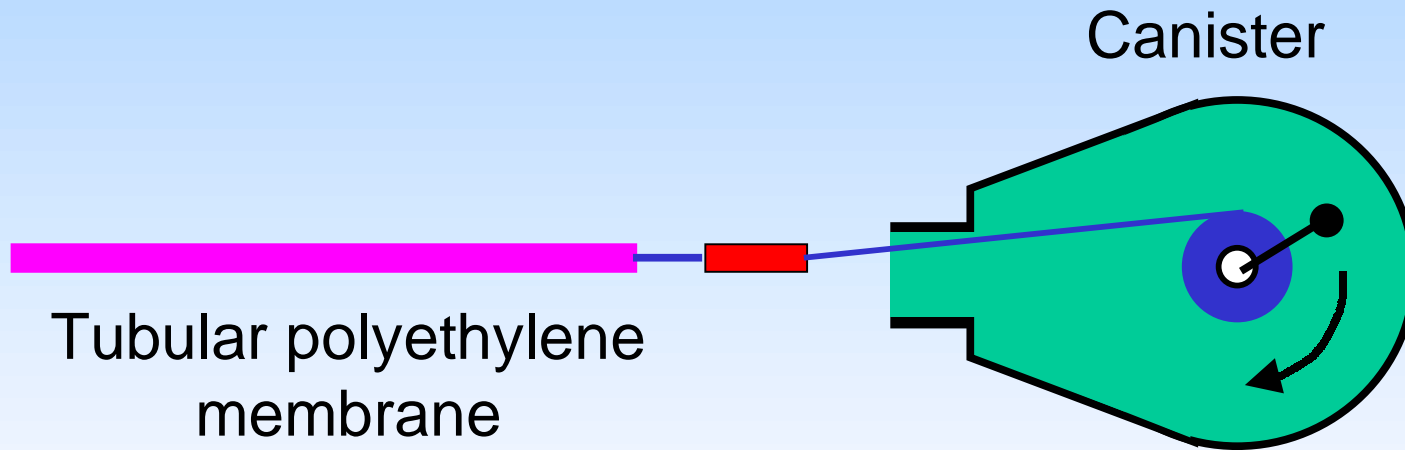
# *Pipe Explorer™ inverting membrane instrument deployment system*



***Pipe Explorer™: loading the tether and detector into the canister***

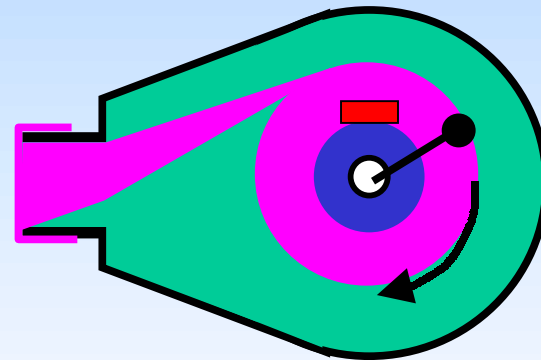


*Pipe Explorer™: loading the tubular polyethylene membrane into the canister*

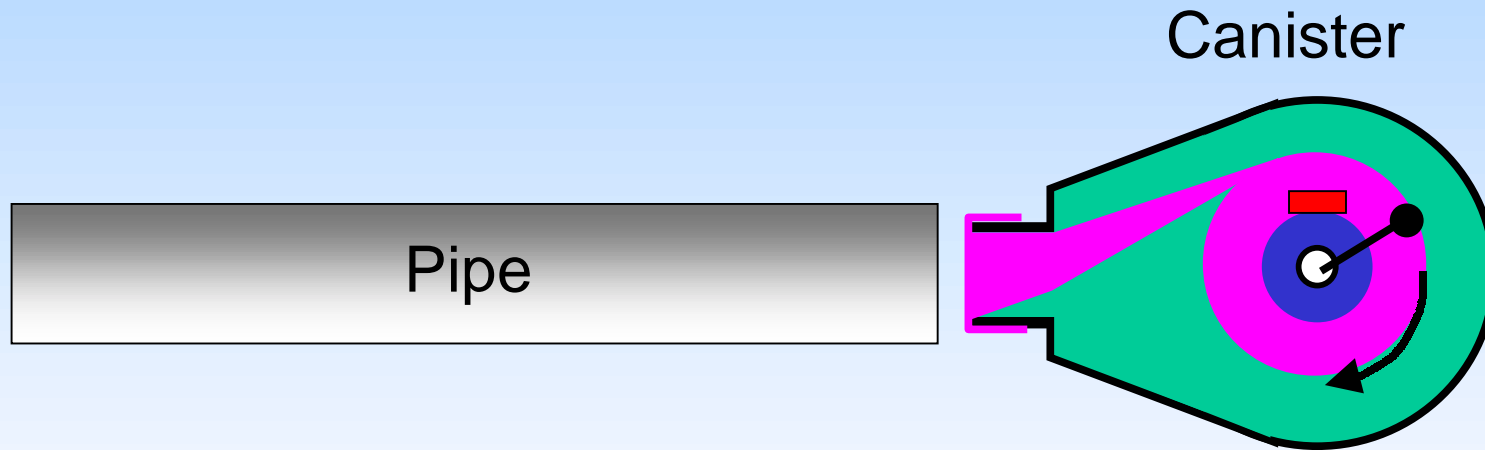


# *Pipe Explorer™: loaded and ready*

Canister

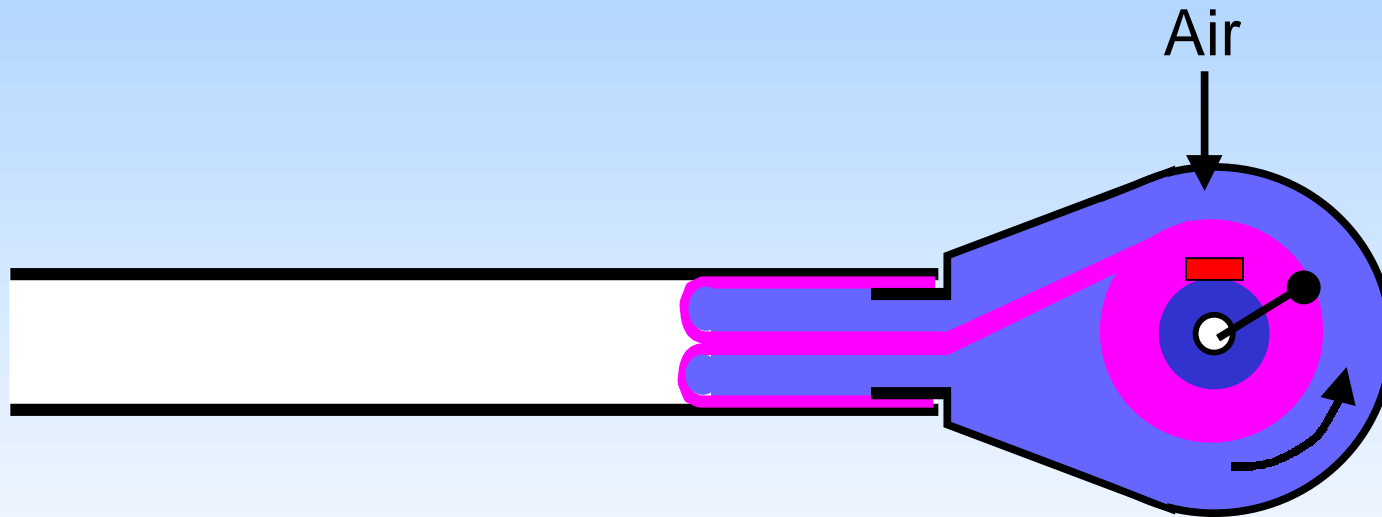


*Pipe Explorer™: locating deployment canister at entrance to pipe*

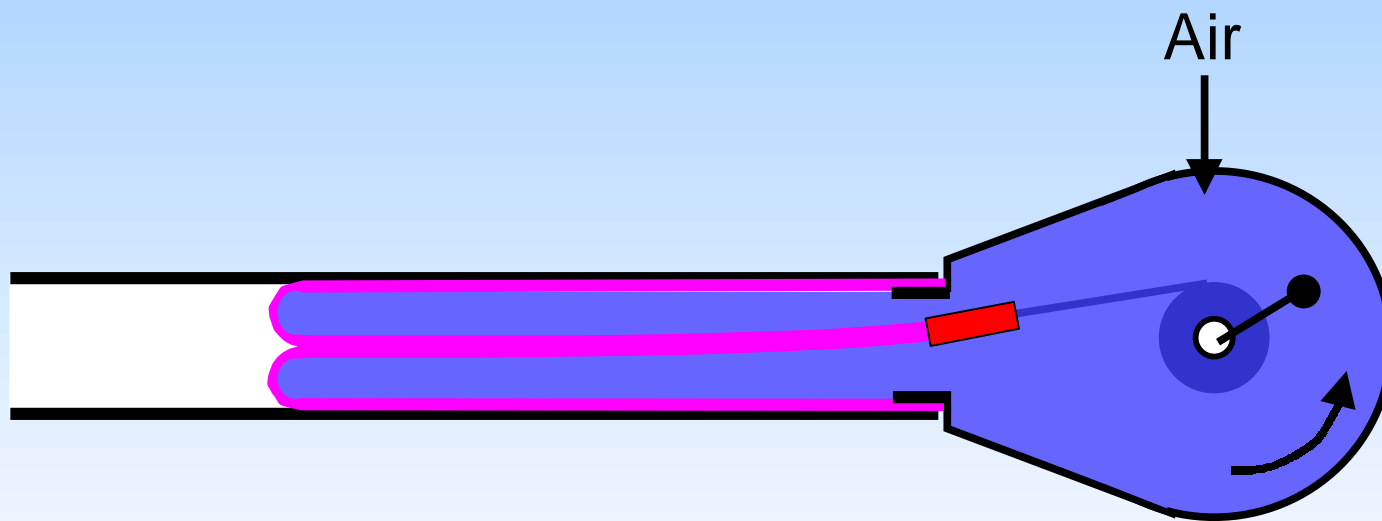




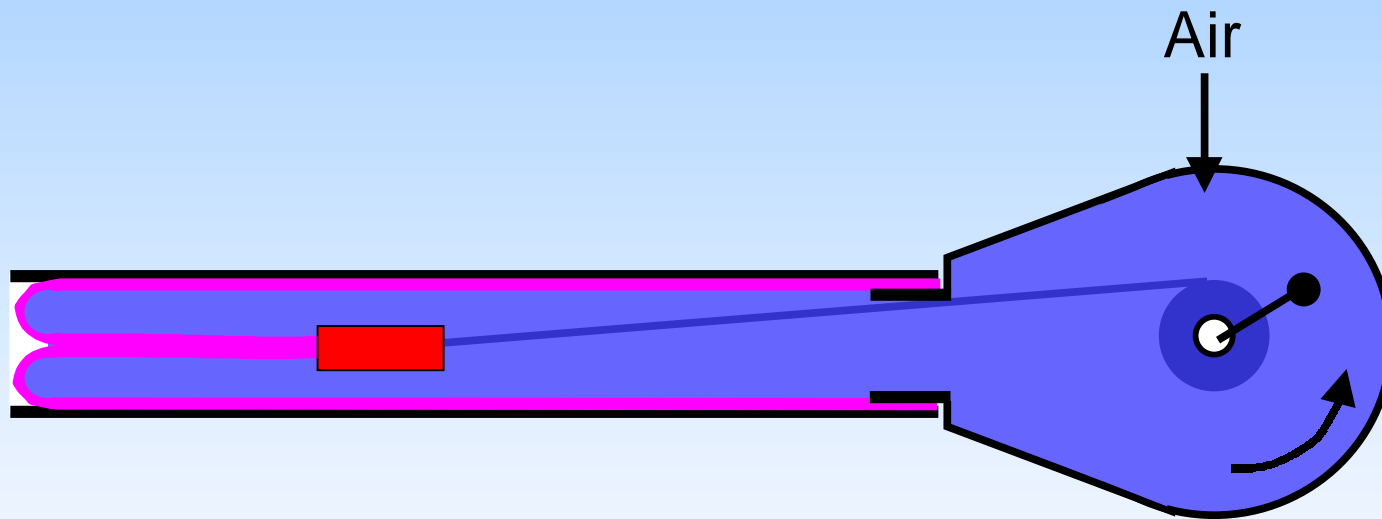
*Pipe Explorer™: pressurizing canister to  
deploy inverting membrane inside pipe*



# *Pipe Explorer™: Inverting membrane tows detector into pipe*



# *Pipe Explorer™: detector traverses pipe*



# Radiological Surveys in Pipes and Drain Lines

## *Pipe Explorer™*

- **High resolution, release level radiological surveys**
  - Gamma (NaI, CsI)
  - Beta (organic scintillator)
  - Alpha (scintillating membrane)
- **Video and locating surveys**
- **What it can survey:**
  - Pipes as small as 2" diameter
  - Ducts up to 36" dia.
  - Up to 375 ft. continuous runs



## *Pipe Explorer™: Why it is a success*



- **Simple deployment process (no robotics)**
- **Field portable system**
- **Can deploy in lines inaccessible by other methods**
- **Total protection of survey instruments by membrane**
- **Inherent safety for operators**
- **Release level measurements using standard and custom detectors**



## *Pipe Explorer™: Birth of a solution*

- Evolved from highly successful SEAMIST™ inverting membrane borehole instrumentation system technology development/commercialization
- Awarded NETL PRDA contract 1993 to develop Pipe Explorer™ for D&D program
- First demonstration at INEEL 1994
- First major deployment at FUSRAP site 1995
  - Operating General Motors plant, Adrian MI
  - Sub-grade drain lines filled with cutting oil, depleted U-238 cuttings
  - Immediate savings to DOE of over \$1M in avoided excavation costs



## *Pipe Explorer™ : been there, done that...*

<u>Site</u>	<u>Application</u>
INEEL	Scrap pipe: $\gamma$ (Cs-137)
FUSRAP (Adrian MI)	Drain lines: $\beta$ (U-238)
DOE/ALOO ITRI	Drain lines: $\beta$ (Sr-90), $\gamma$ (Cs-137), video
Grand Junction	Drain lines: $\beta$ (U-238), video
Argonne CP-5	Drain lines, ducts, fuel rod storage tubes: $\alpha$ (Am-241), $\beta$ (Sr-90), $\gamma$ (Cs-137)
Mound	Drain lines: $\gamma$ (Co-60), video
Brookhaven Nat'l Lab	Sewer lines: $\beta$ (Sr-90)
Battelle Columbus	Process drain lines: $\beta$ (Sr-90 ), $\gamma$ (Cs-137), video
Savannah River Site	Storm and process drain lines: $\beta$ (Sr-90 ), $\gamma$ (Cs-137), video
Los Alamos	Waste pit survey: $\gamma$
Nuclear power plants:	
Crystal River	Feedwater lines (video)
Trojan	Rad waste lines: $\gamma$ (Co-60)



## *Pipe Explorer™: Why did it succeed?*

- **Aggressive development program schedule**
  - Focus on getting to demonstration/deployment early as possible
- **No technological barriers to use**
- **System simplified with time and experience to reduce field problems**
  - Initial system fully automated, but bulky and problematic
  - Current system manually operated, highly mobile
  - Avoiding use of custom detectors and electronics unless absolutely necessary





## *Pipe Explorer™: But why did it take so long to really get in use?*

- **Maturation of needs in D&D program**
  - Technology development program was ahead of its time
  - D&D program in its infancy when system was ready for deployment
  - Major facility D&D plans took several years to develop and implement
  - Technologies needed to be written into plans, hence long lead time to implementation
- **Development of confidence by users (acceptance)**
  - “How many feet have you surveyed like this?”
  - Evolving experience base



## ***Pipe Explorer™: Where it is going***

- **Viable business for SEA, but we are keeping our day jobs**
  - Intense, periodic field survey programs
  - Not enough business to maintain 2 field crews (yet)
- **We've stayed in the business because the Pipe Explorer™ work is compatible with our other ER work (facility and staffing)**
- **Customization and spinoffs**
  - Ductwork at Rocky Flats
  - Sensor emplacements for DoD
- **Everything is for sale....**
  - But there are very few buyers of technologies these days

