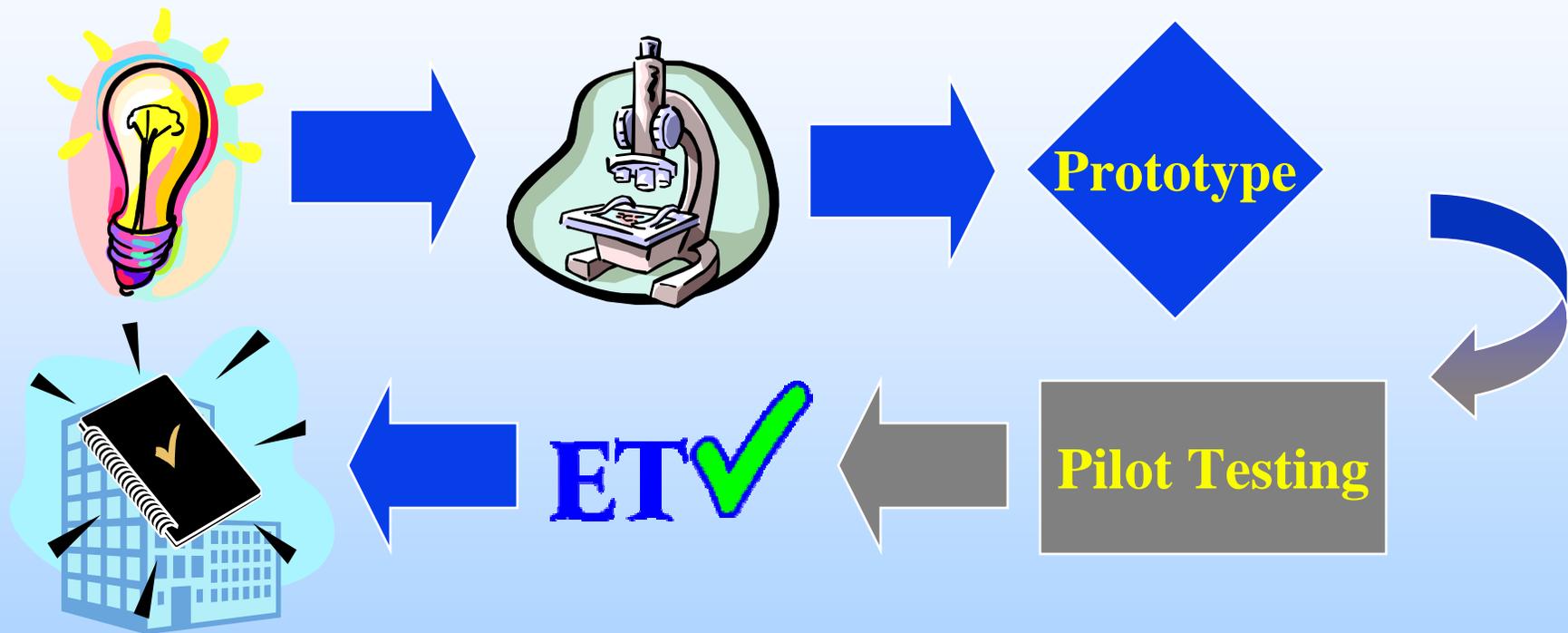


Environmental Technology Verification Program's Arsenic Drinking Water Treatment Projects

**C. Bruce Bartley
NSF International
October 04**



Commercialization of Innovative Technologies & ETV



EPA ETV Program Overview

- ◆ **Assist innovation of commercially ready technologies.**
- ◆ **Provide credible and independent performance data to assist:**
 - **Purchasers make better/informed decisions when selecting technologies.**
 - **Regulatory with decision to permit a technology.**
 - **Vendors in selling their product.**
- ◆ **Stakeholders provide input to program and test protocols and plans.**



NSF International



Drinking Water Systems (DWS) Center: *History & Background*

- ◆ **The DWS Center is one of six ETV Centers.**
- ◆ **Began October 1995 with focus on small systems technology needs.**
- ◆ **Protocols provide uniform testing and quality control procedures.**
- ◆ **Testing primarily performed under “real world” conditions.**
- ◆ **State accept ETV DWS verification.**



NSF International



Technology Areas

- ◆ **Filtration technologies (microorganism reduction: 13 verifications)**
- ◆ **Ultraviolet (UV) & other disinfection technologies (7 verifications)**
- ◆ **Arsenic treatment technologies (8 verifications)**
- ◆ **Water security: residential & building protection systems (3 verifications)**



NSF International



Arsenic Technologies

Technology	Completed	In Progress	Pending
Reverse Osmosis (RO)	3	0	0
Coagulation with Filtration	3	1	2
Adsorption (disposable, ion exchange or regeneration)	2	0	1
TOTAL	8	1	3



NSF International



Participating Arsenic Technologies

◆ Chemical coagulation.

- Pre-engineered skid mounted package plants, (ferric chloride addition followed by flocculation and then filtration).
- In-line chemical feed (rapid mix) with direct filtration (no flocculation step).
- Oxidation of natural iron to form hydroxide floc to co-precipitate arsenic, then direct filtration.
- Remote sensing & control of chemical feed and operations.



NSF International



Participating Arsenic Technologies

◆ Media:

- Iron coated natural substrate.
- Iron treated activated alumina.
- Porous activated alumina.

◆ Reverse Osmosis:

- Membrane modules with backwash and cleaning cycles for re-use (conventional approach, measure flux and water production).
- Skid system with low pressure RO with limited periodic cleaning and/or membranes disposed for small system applications.



NSF International



Typical Arsenic Media Tested



NSF International



Coagulation Package Plant Tested



NSF International



RO Modules Tested



NSF International



Arsenic Technology Test Results

- ◆ All verified technologies reduced arsenic to below the new MCL.
- ◆ Most achieved arsenic reductions to the reportable detection limit (~ 2 ppb).
- ◆ Preliminary test results of technologies in progress have similar trends.
- ◆ Performance greatly influenced by water quality & process parameters (pH).
- ◆ Reduction of arsenic in drinking water can reduce cancer risk by factor of 10 or more.



NSF International



Arsenic Technology Test Results

- ◆ **Operational parameters measured with varying results:**
 - Chemical consumption.
 - Electrical power.
 - Labor.
 - Ease of use estimated.
- ◆ **Example:**
 - Chemical feed pump break downs.



NSF International



States and ETV DWS Center

- ◆ **ASDWA involved and supported ETV DWS Center since inception.**
- ◆ **ASDWA provided members to be on steering committee.**
- ◆ **Annual states survey showed increasing member support.**
- ◆ **ETV independent third party reports, helped states in the approval of alternative technologies & streamlining approvals.**



NSF International



Summary & Information

◆ ETV Summary

- Applies to commercially ready products.
- Very focused on small system applications.
- Quality assurance is the driver.
- EPA and NSF names on final documents.

◆ Information:

- By Email bartley@nsf.org
- Web: www.nsf.org/etv or www.epa.gov/etv



NSF International

