

# **Hemispheric Center for Environmental Technology (HCET) at Florida International University**

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Since its establishment in 1995, the Hemispheric Center for Environmental Technology (HCET) at Florida International University has been steadily establishing its position as the preeminent repository for the assimilation and diffusion of information on environmental technologies within the DOE, D&D Focus Area and the western hemisphere.

HCET's successful partnership with DOE has laid a solid foundation for proactive research, assessment, development, and communication of new and innovative D&D technologies. These efforts are aimed, in the first instance, at remediating D&D-related problems at DOE nuclear facilities. For the long run, however, HCET is positioning itself to become the major conduit between academic, industrial, and governmental institutions for the development, marketing, and transfer of D&D technology throughout the U.S., Latin America, and the Caribbean. HCET's success in these endeavors would not have been possible without the crucial strategic direction, sponsorship, and promotion provided by the Federal Energy Technology Center.

DOE has tasked HCET with the responsibility of researching, developing, and demonstrating innovative environmental technologies, and with forging alliances that will support their implementation. To this end, HCET has participated in three large-scale technology demonstration projects (Chicago Pile CP-5 Reactor, Hanford 105-C Reactor, and the Fernald Environmental Management Project). Its principal roles included identifying and selecting candidate technologies for demonstration, developing test plans, and testing and evaluating these technologies. As a result of these demonstrations, several U.S. technology providers have gained invaluable exposure for their products and have actually been contracted to supply D&D services and/or equipment (e.g., Concrete Cleaning Inc., TOMCO). Moreover, the international market for D&D technologies is rapidly expanding as other nations and international organizations establish or tighten environmental regulations. This growth in demand presents new opportunities for U.S. industries to enter these markets, and HCET is strategically positioned to market and broker relationships between suppliers and purchasers of D&D technology. HCET is already fulfilling that role in several Latin American countries, such as Argentina, Mexico, and Brazil, and experience gained in this arena will provide a springboard to other countries and regions.

During FY 1997, the DOE/HCET partnership has produced extraordinary results in identifying and evaluating several promising technologies geared toward decontamination, decommissioning, and waste management. Furthermore, through its own research initiatives, HCET has successfully developed, prototyped, and tested effective technologies that are under consideration for patent application (e.g., two technologies for the clear separation of vitreous slag from molten metal, the Torsional Wave Sensor, and the Oscillating Cylinder Viscometer).

Other successes during FY 1997 include:

- **Metal and Concrete Decontamination:** A decision analysis methodology has been selected. Tests have been conducted at HCET on the Pegasus Coating Removal System, Centrifugal Shot Blast System, Advanced Recyclable Media System, EXITECH Laser Ablation Systems, various milling systems, Electrohydraulic Scabbling, and ROVCO<sub>2</sub>. Comparative assessments were made against the current baseline technologies — Blastrac and Nelco Porta Shot EC-10-2 and EC-7-2 Systems. Data have been collected on technology performance, cost benefit analysis, human health, safety and protection, and primary and secondary waste generated.
- **Large-bore Pipe Contamination:** Decontamination and characterization options have been reviewed, and work is progressing on screening and selecting appropriate technologies for demonstration.
- **Structural Demolition and Dust Suppression:** Work has been completed on identifying and establishing test parameters for technologies used in structural demolition and dust suppression for use at the DOE Hanford, Fernald, and Savannah River sites. Some 410 tests have been performed on various concrete block surrogates. The dust suppression agents evaluated were a Polymeric Barrier System, Coherex, water spray and immersion, and surfactants.
- **Equipment Dismantlement:** An extensive survey was conducted to inventory the various commercially available dismantlement technologies, as well as those currently employed by the DOE. Concrete bays have been constructed at HCET to house and demonstrate full-scale mockups of selected technologies.
- **Roof Stabilization:** Data have been collected from DOE sites on the decision criteria used in selecting appropriate roofing repair or replacement systems for various projects. Together with information from roofing experts, a decision-support tool has been developed to aid in the selection of the proper system for future roofing projects.
- **Microwave Sintering and Combustion Without Isostatic Pressure:** Extensive research and testing have been successfully performed on the use of a variable-frequency microwave furnace for the firing of ceramic materials with low dielectric constants and loss factors (such as aluminosilicates). Results indicate great promise for improved energy-efficiency, speed, and safety in furnace technology.

- **Melting, Remelting, Solidification, and Separation of Metals and Glass:** HCET has completed research, conceptualized, designed, built, and tested prototypes for two glass/metal separation systems — Centrifugal Separation, and Differential Centrifugal Separation. By the end of FY 1997, HCET will have compiled performance data on both systems using simulants of varying glass/metal compositions.
- **Strippable Coatings:** HCET has identified several commercially available strippable coating products and assessed their potential uses for decontamination, as protective barriers or as fixatives. Product performance characteristics, such as temperature sensitivity, resistance to abrasion, and so on, have been collected and will be accessible through HCET's integrated D&D information system.

To more effectively consolidate, integrate, and manage the wealth of performance data and experiences gathered during the staging of the above-mentioned technology demonstrations, HCET has completed the groundwork for the development of a comprehensive, multimedia information management and decision support system. This system will assist DOE decision makers as well as others in the D&D community in (1) assessing their D&D project remediation needs, and (2) selecting the safest, most cost-effective solutions for their projects. Users will have ready access to definitive information on available technologies, including health and safety concerns, operation and performance characteristics, primary and secondary waste management, users and providers of technologies, as well as comparative evaluations of conventional and innovative D&D techniques.

The highlight of the year will be *X-Change '97 — The Global D&D Marketplace*. From December 1 through 5, 1997, HCET, in collaboration with DOE, will be hosting what is expected to be the largest, most informative and insightful symposium of leading experts in the field of D&D. The event will also serve as a forum for representatives from governments, industry, academic institutions, special interest organizations, and other concerned partners, to showcase new operational approaches, new technologies, and other innovations for effectively and economically addressing D&D challenges. It will also serve to bring together participants who share common interests or concerns and who may wish to collaborate on joint ventures.

# Industry Partnerships to Deploy Environmental Technology



*Presented by:*

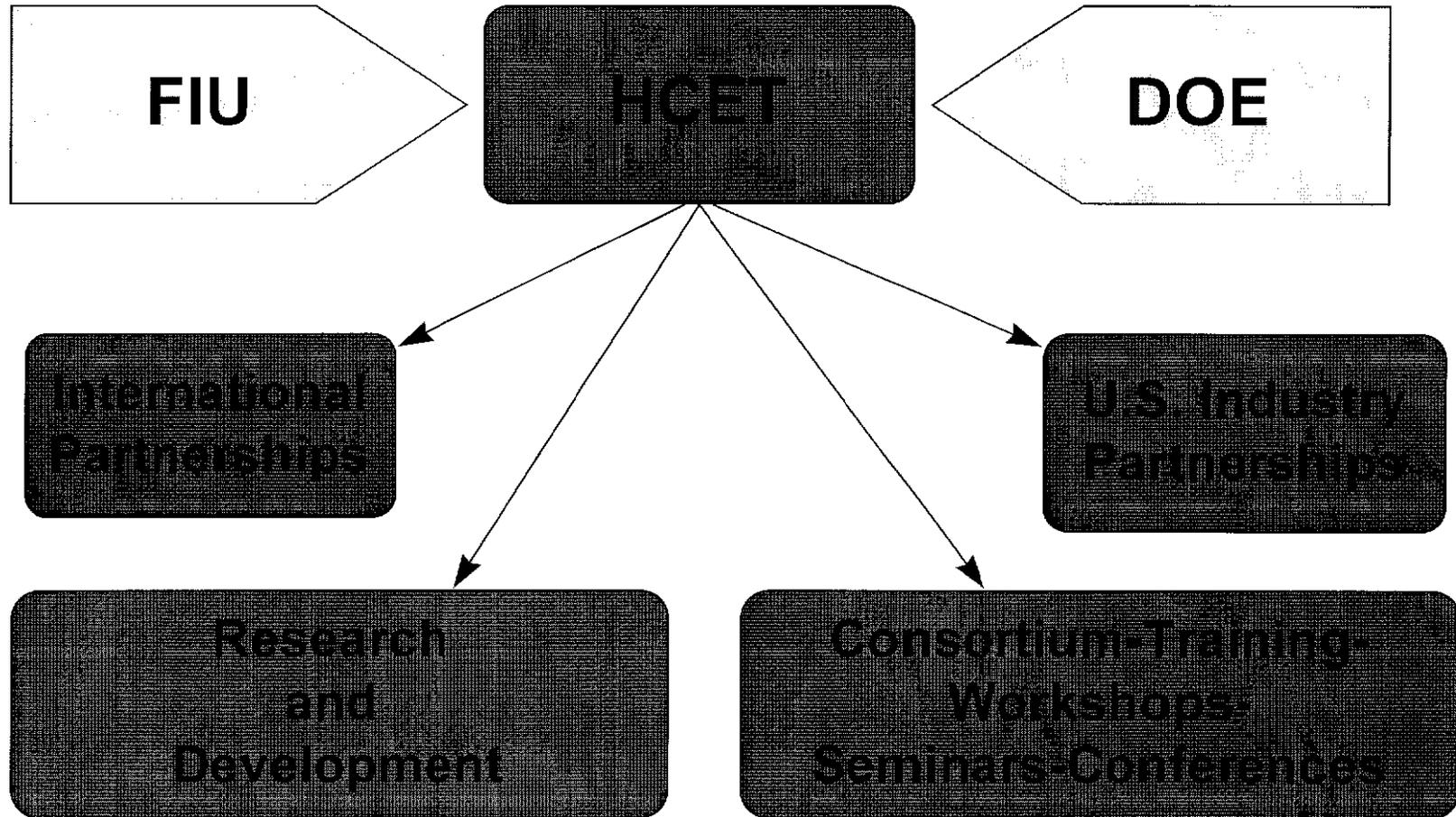
**M. A. Ebadian, Ph.D.**

**Director, Hemispheric Center  
for Environmental Technology**

**October 21-23, 1997**

environmental solutions for the world

# HCET's Activities





# Principles

- ◆ **The Hemispheric Center for Environmental Technology (HCET) was established by DOE and Florida International University (FIU) to pursue two primary business areas:**

**Technology development, demonstration, testing, and evaluation (DT&E)**

**Development of industrial and international partnerships**





# **Demonstration, Testing and Evaluation (DT&E)**

**How Cost-Effective Technologies  
are Selected and Deployed**



# Limitations

- ◆ **Historical limitations of DT&E of new technologies**
  - Expensive to set up**
  - Inconsistent due to a lack of appropriate testbeds**
  - Lack of standard methods**
  - Lack of regulatorily acceptable specifications**
- ◆ **HCET was tasked with making DT&E more acceptable to business (especially small businesses) and more applicable to specific DOE needs (such as D&D)**





# DT&E at HCET

- ◆ **During the past two years, HCET has:**

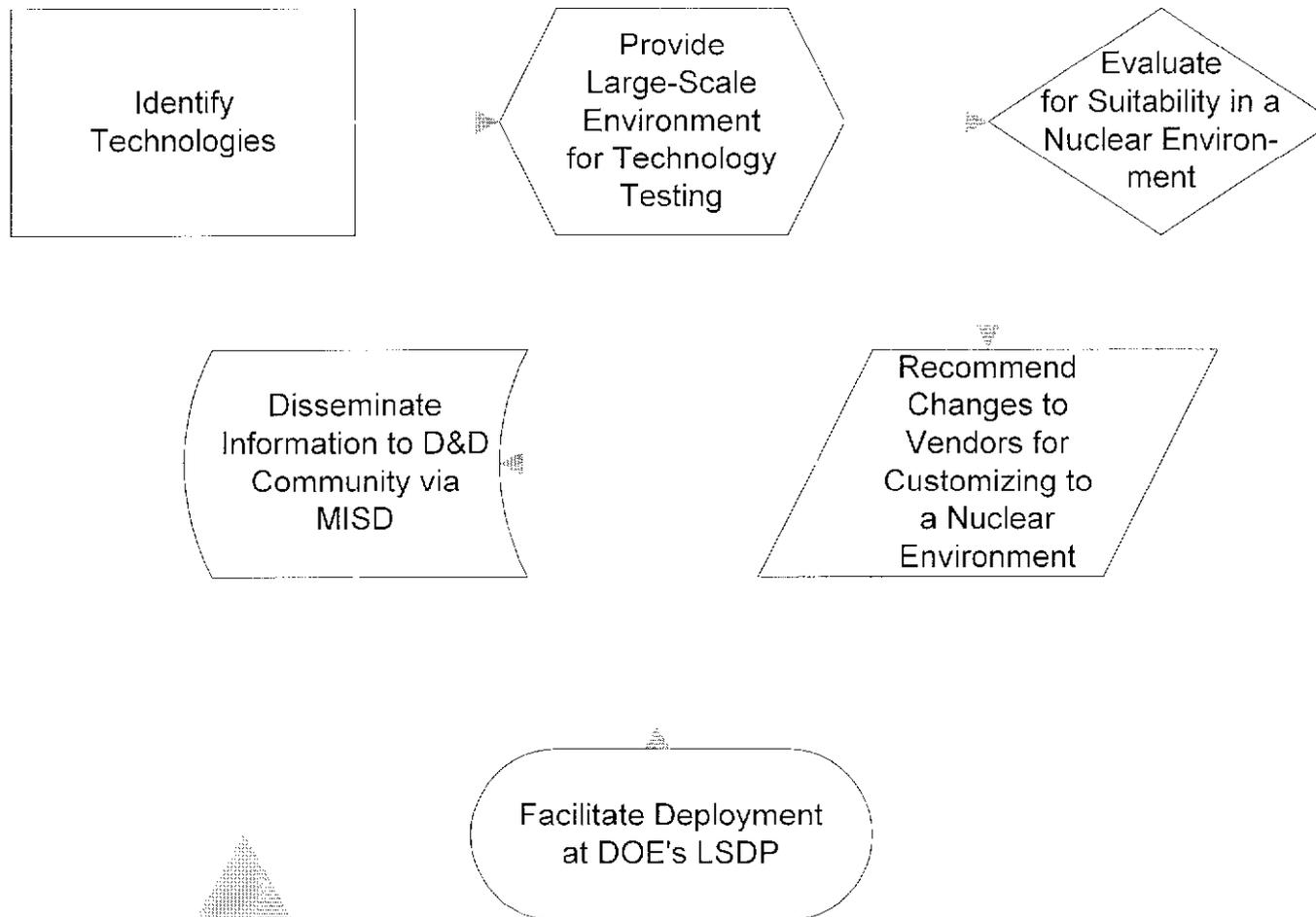
- Built the infrastructure, including testbeds and instrumentation, to evaluate and demonstrate the performance of new technologies with respect to technical characteristics, health and safety, and cost**

- Established a partnership with IUOE to evaluate the safety performance and ensure feedback at the field operator level**

- Developed DT&E software tools**



# Technology Selection and Deployment Process at HCET





# **International Union of Operating Engineers (IUOE)**

- ◆ **The HCET-IUOE partnership provides a comprehensive review of D&D technologies**
  - HCET focuses on cost and performance factors**
  - IUOE focuses on health, safety and human factors**
- ◆ **HCET and IUOE work in tandem to provide technologists with the feedback necessary to improve their technologies in the areas of operations, maintenance, and health and safety, thereby helping to enhance the technologies before they go out into the field**
- ◆ **HCET-IUOE have performed detailed analyses on 12 innovative technologies, with 5 more in progress**





# Industry Involvement

The following companies have been involved in the technology assessments:

**3M**

**LTC Americas**

**P.W. Stevens  
Environmental**

**Pentek**

**Church and Dwight**

**Pegasus International**

**Textron**

**ICESOLV**

**Bartlett Nuclear**

**AEA O'Donnell**

**Concrete Cleaning**

**Applied Radiological  
Control**

**Peirpoint Environmental**

**Exitech**

**Custom Coatings**



# Accomplishments

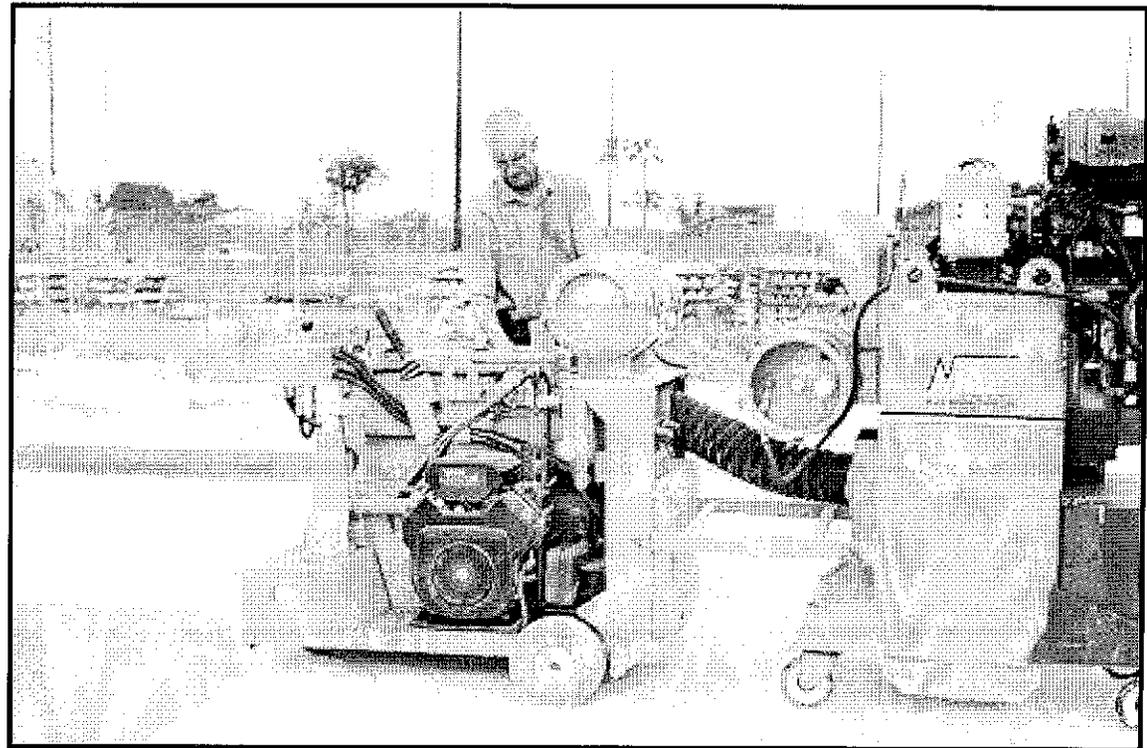
**Technology Name:**  
Nelco Porta Shot  
Blast™

**Model #:** EC-10-2

**Demonstration  
Date:** 12/9/96

**Technology Class:**  
Steel Abrasive  
Blasting

**Vendor Name:**  
J&B Diversified  
Services



# Accomplishments (cont'd)

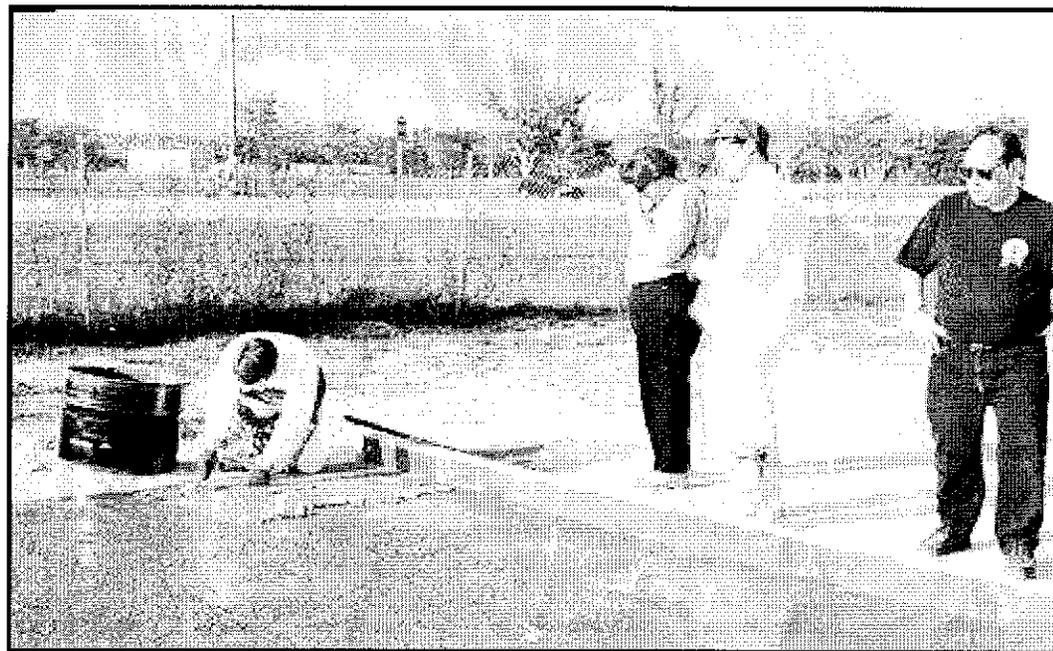
**Technology Name:**  
Pegasus Coating  
Removal System

**Model #:** PCRS-5

**Demonstration  
Date:** 3/17/97

**Technology Class:**  
Coating Remover

**Vendor Name:**  
Pegasus  
International, Inc.



# Accomplishments (cont'd)

**Technology Name:**

Nelco Porta Shot  
Blast™

**Model #:**

EC-7-2

**Demonstration Date:**

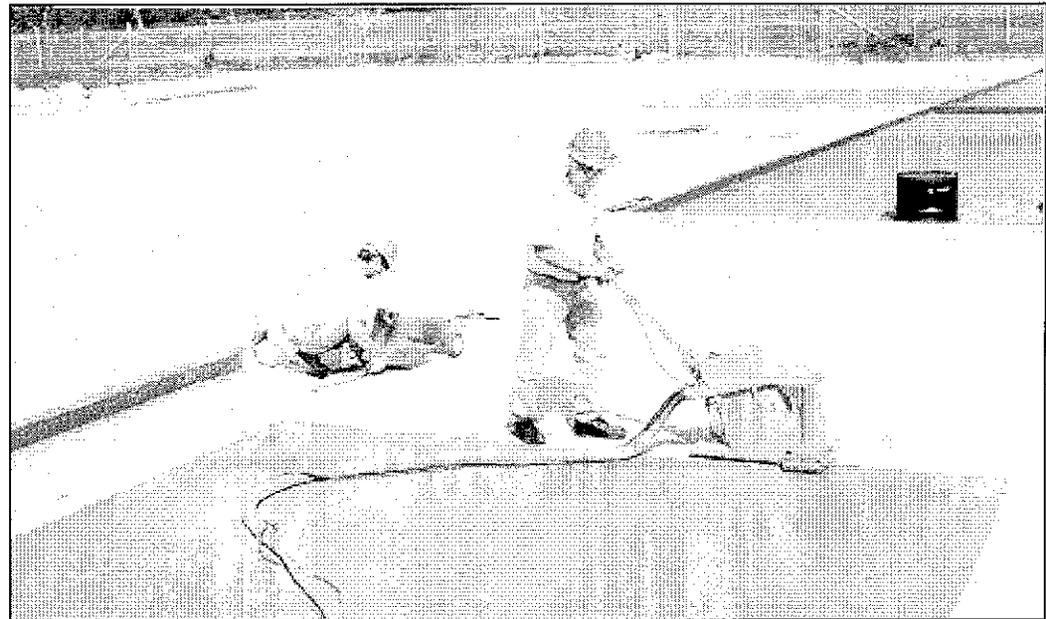
3/17/97

**Technology Class:**

Steel Abrasive Blasting

**Vendor Name:**

Pegasus International,  
Inc.



# Accomplishments (cont'd)

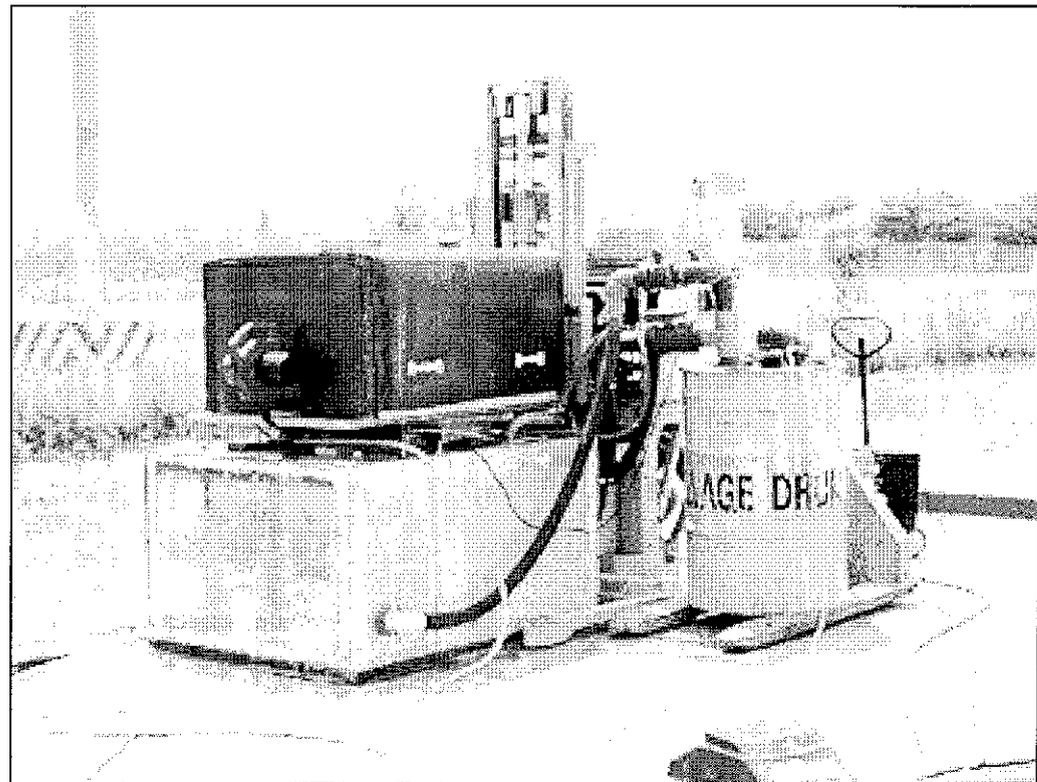
**Technology Name:**  
Electro-Hydraulic  
Scabbling System

**Model #:**  
Currently in  
development

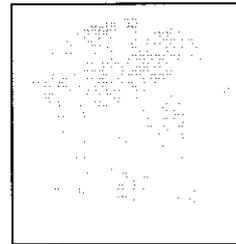
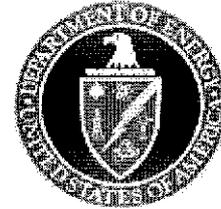
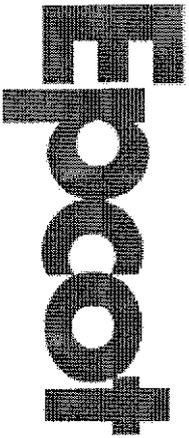
**Demonstration Date:**  
3/31/97

**Technology Class:**  
Scarification

**Vendor Name:**  
Textron Systems  
Division



# Selected HCET Partners



# Selected Past and Present Clients



**Pratt & Whitney**

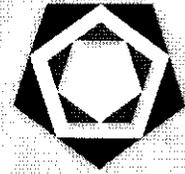
A United Technologies Company



**WPI**

Waste Policy Institute

A Virginia Tech Affiliated Corporation



**FLUOR DANIEL  
FERNALDS**



**LOCKHEED MARTIN**



**HANFORD**

*Environmental Excellence*



**DE&S**

Duke Engineering & Services



**ICF KAISER**

Worldwide Excellence in Meeting Client Needs

**omi** - *Bringing Science to Life*

**PARSONS**  
ENGINEERS AND CONSTRUCTORS



**LAW**

ENGINEERING AND ENVIRONMENTAL SERVICES, INC.



**EG&G**

*Mound Applied Technologies*



# **DT&E Software Tools**

- ◆ **DT&E software tools have been developed at HCET to:**
  - Automate and ensure consistency of application of standard methodologies and performance criteria**
  - Document test results**
  - Track and help incorporate lessons learned**
  - Make performance requirements and test results accessible through the Internet**



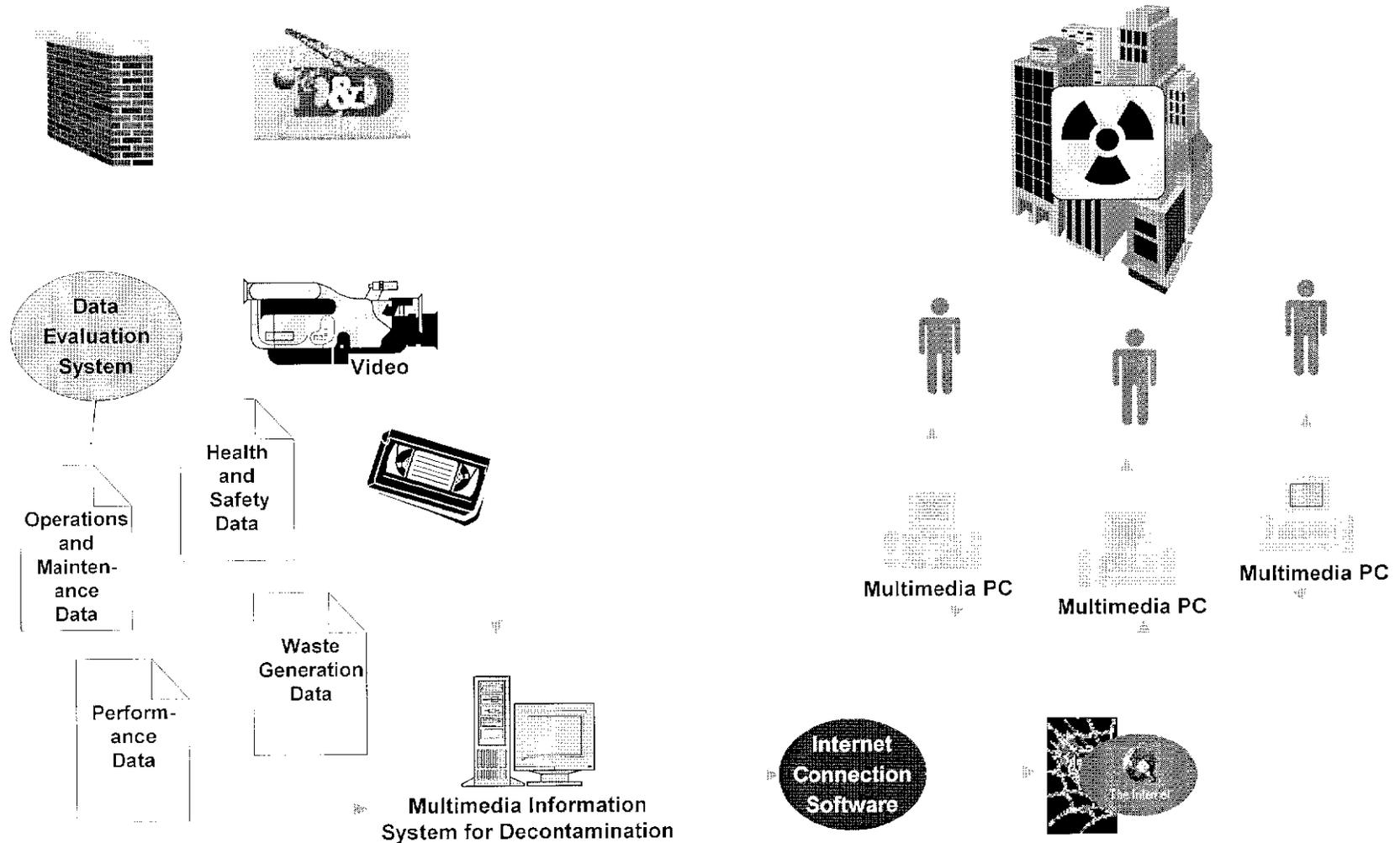


# **Multimedia Information System for Decontamination**

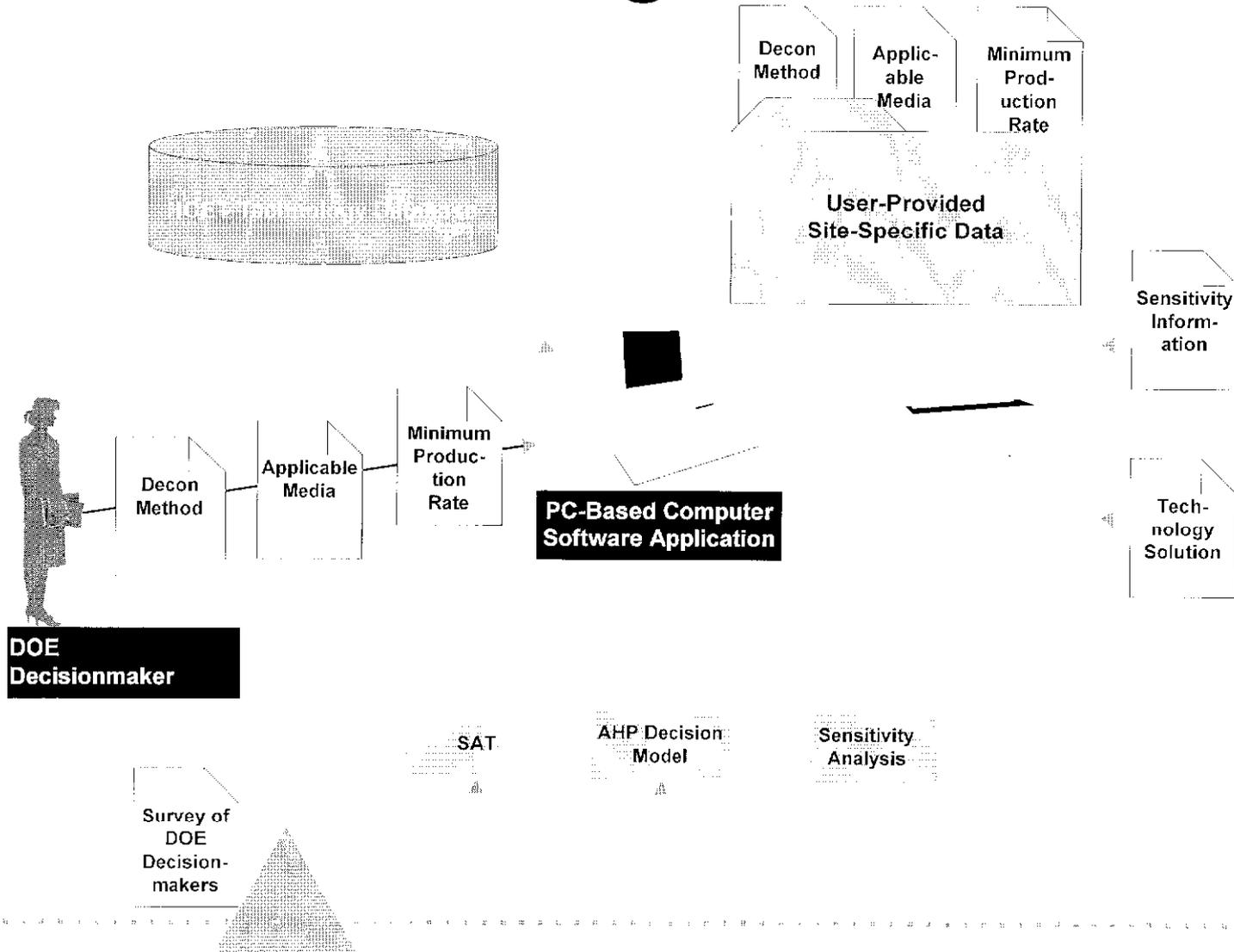
- ◆ **MISD interfaces with an interactive decision-making tool for use by D&D professionals to identify the most appropriate decontamination technology given site-specific considerations**
- ◆ **HCET is in the process of:**
  - Optimizing MISD for the Internet**
  - Providing user-defined report generation capabilities**
  - Implementing on-line help and/or a user's guide for the MISD**
  - Facilitating information system user feedback by providing an e-mail link to the systems administrator**



# MISD: Data Flow



# Environmental Technology Decision-Making Tool: Data Flow



# LSDP Technology Information System: Data Flow



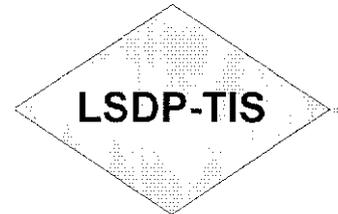
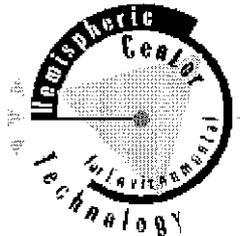
Argonne CP-5

RIGHLAND  
Environmental  
Restoration  
PROJECT

Hanford  
C-Reactor



Fernald Plant-1



LSDP-TBA



LSDP-TBA



LSDP-TBA



LSDP-TBA



LSDP-TBA



# Achievements with Industry

- ◆ **Thirty-five technologies have been assessed by FIU-HCET and the International Union of Operating Engineers**
  - ◆ **Technologies include innovative and baseline technologies**
  - ◆ **Assessments have aided five technologies to be implemented as part of the Large-Scale Demonstration Project**
  - ◆ **HCET is developing tools for DOE to help expedite their selection and deployment of the safest and most cost-effective technologies**
- 



# Upcoming Activities with Industry

- ◆ HCET will co-host *X-Change '97: The Global D&D Marketplace* to be held in Miami, Florida from December 1-5, 1997
- ◆ *X-Change '97* will:
  - ◆ Highlight new operational approaches, technologies, and innovations that can reduce the costs of D&D
  - ◆ Assess the D&D market for 1998-2000
  - ◆ Provide practical information on how to capitalize on existing and future business opportunities
  - ◆ Bring about 1,000 participants from 30 countries





# Deployment at DOE and Other Sites

- ◆ Technology assessment process and multimedia information system provided industry with exposure to D&D professionals
- ◆ Concrete Cleaning, Inc. - Centrifugal Shot Blast:
  - ◆ Demonstrated at CP-5 in January 1997
  - ◆ Scheduled to demonstrate at Fernald in 1998
  - ◆ Contracted with B&W to perform 1/4-inch surface removal on 30,000 square feet
- ◆ Pentek, Inc.:
  - ◆ Demonstrated the ROTO PEEN Scaler, VAC-PAC<sup>®</sup> and Moose technologies at CP-5





# Deployment at DOE and Other Sites

- ◆ **AEA O'Donnell, Inc. - Sponge Blasting technology**  
**Demonstrated at Fernald**
- ◆ **Pegasus International Inc. - Pegasus Coating Removal System (PCRS)**  
**Demonstrated at CP-5**
- ◆ **ICESOLVE - CO<sub>2</sub> Blasting Technology**  
**A TOMCO unit was purchased by Westinghouse SRS as a result of information gleaned by technology demonstration**





# Summary

- ◆ **HCET is aggressively pursuing new avenues and opportunities for deployment of OST-developed technologies**
  - ◆ **Through technology development, adaptation, demonstrations and evaluation, HCET is assisting DOE-EM in meeting *The 2006 Plan* goals**
  - ◆ **HCET is preparing to assist DOE in the post-closure era**
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