2007 GLOBAL DEMILITARIZATION SYMPOSIUM AND EXHIBITION

Update on Demil Technology Programs at General Atomics

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Work Sponsors

Defense Ammunition Center,
Joint Munitions Command,
and
Air Force at Tyndall AFB

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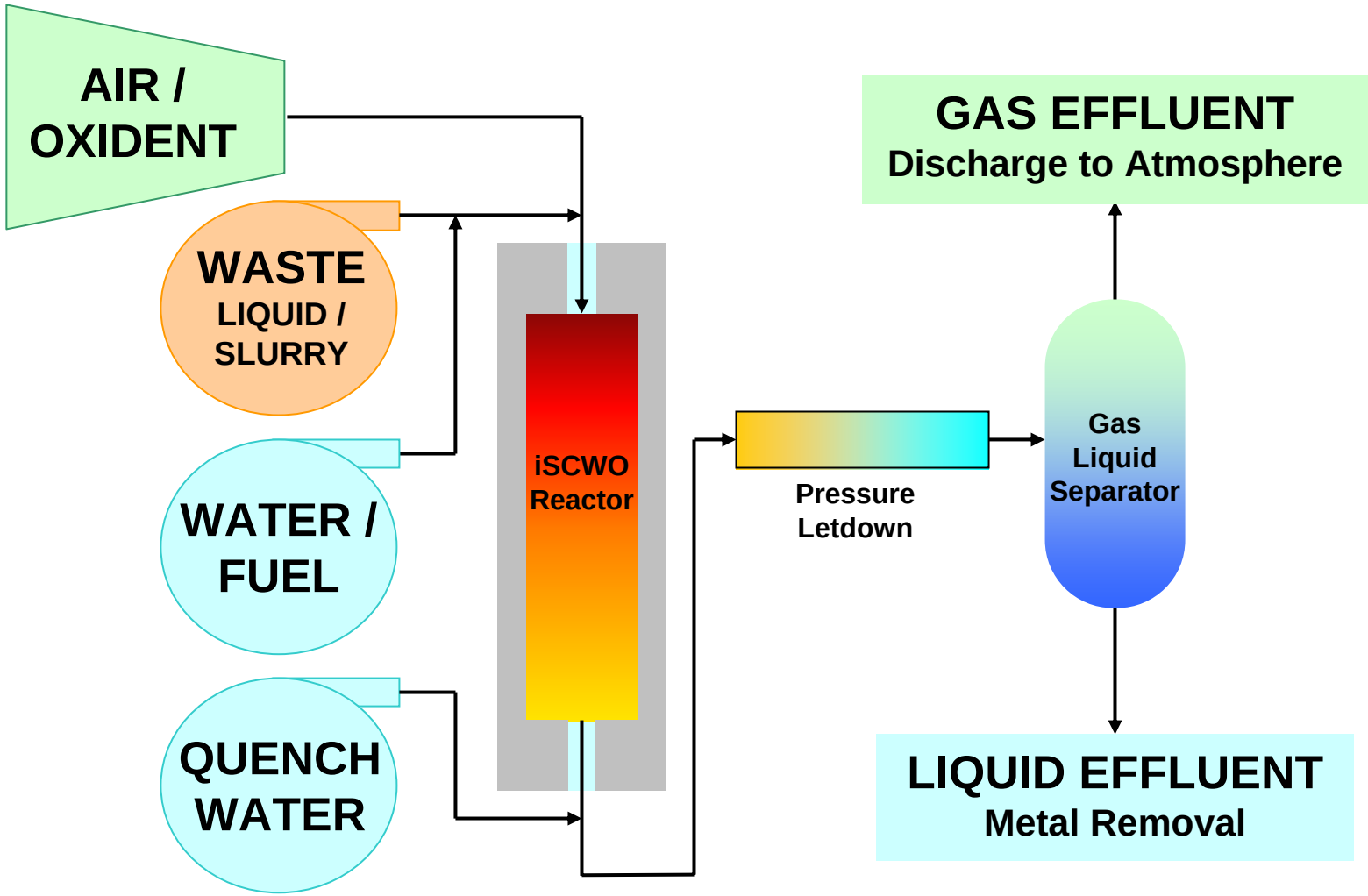
BRIEFING OUTLINE

- iSCWO & Hydrolysis overview
- Current technology transition projects
- FY07/FY08 goals
- Conclusions

iSCWO PROCESS FLOW



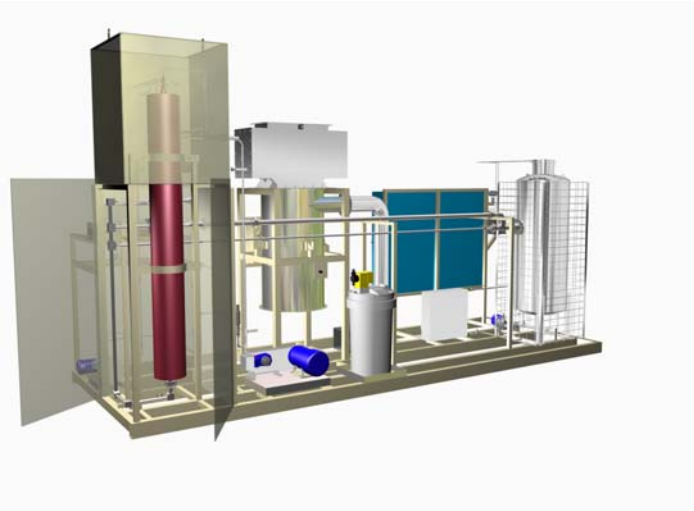
SCWO

- SCWO destroys organics with no production of NO_X, SO_X, dioxins, furans or greenhouse gasses.
- Wastes are mixed with water and oxidized at 3400 psi and 1200F
- Suitable for pumpable organics including slurry mixtures of solid wastes
- Gaseous effluents dischargable to the air
- Liquid effluents dischargable to the sewer

Environmentally friendly waste processing technology

History of SCWO

- SCWO technology issues resolved in the 1990's
- Cost & reliability became impediments to operational demil & commercial applications
- iSCWO developed to resolved cost & operational reliability issues
- iSCWOs now penetrating market for selected demil & commercial applications
- 1st iSCWO undergoing operational tests



ADVANTAGES OF SCWO

- **SCWO oxidizes organic wastes**
  - **Oxidation of a combustible material at temperatures and pressures above the critical point of water, 374°C and 22.1 MPa (3200 psi)**
  - **Complete oxidation to CO_2, H_2O, and inorganic acids (or salts) for most organic feeds**
  - **No acid gases, dioxins, furans, or particulates discharge**
  - **Minimal Gas Discharge - Low NO_X, SO_X, CO, and TOC**
  - **Destruction of organic wastes occurs very quickly**
- **Process stability**
  - **Fully automated, easy & safe operation**

Ultra clean, environmentally friendly waste processing technology

GA INDUSTRIAL SCWO (i-SCWO)

- **Objectives**
  - Simplified design targeted at specific applications
  - Low capital cost
  - Easy & quick fabrication
  - Robust, reliable & industrial hardened
  - Easy shipment & installation
  - Small foot print
  - Readily permitted
  - Suitable for 7/24 operation
  - Compatible with future energy conversion, HMRS or special feed prep modules
  - Low risk

10 ton/day liquid waste processing unit

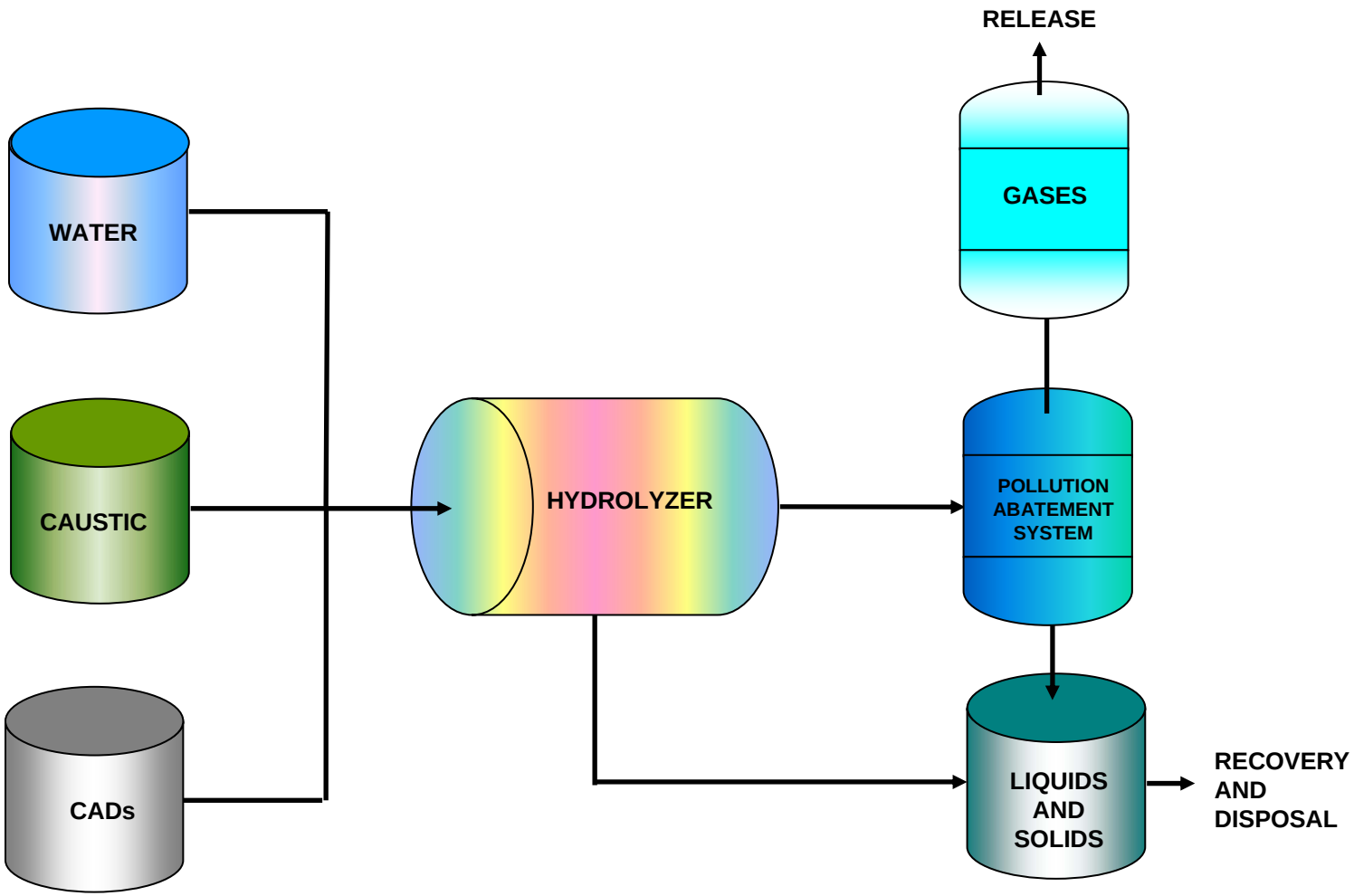
iSCWO EQUIPMENT LAYOUT

Hydrolysis

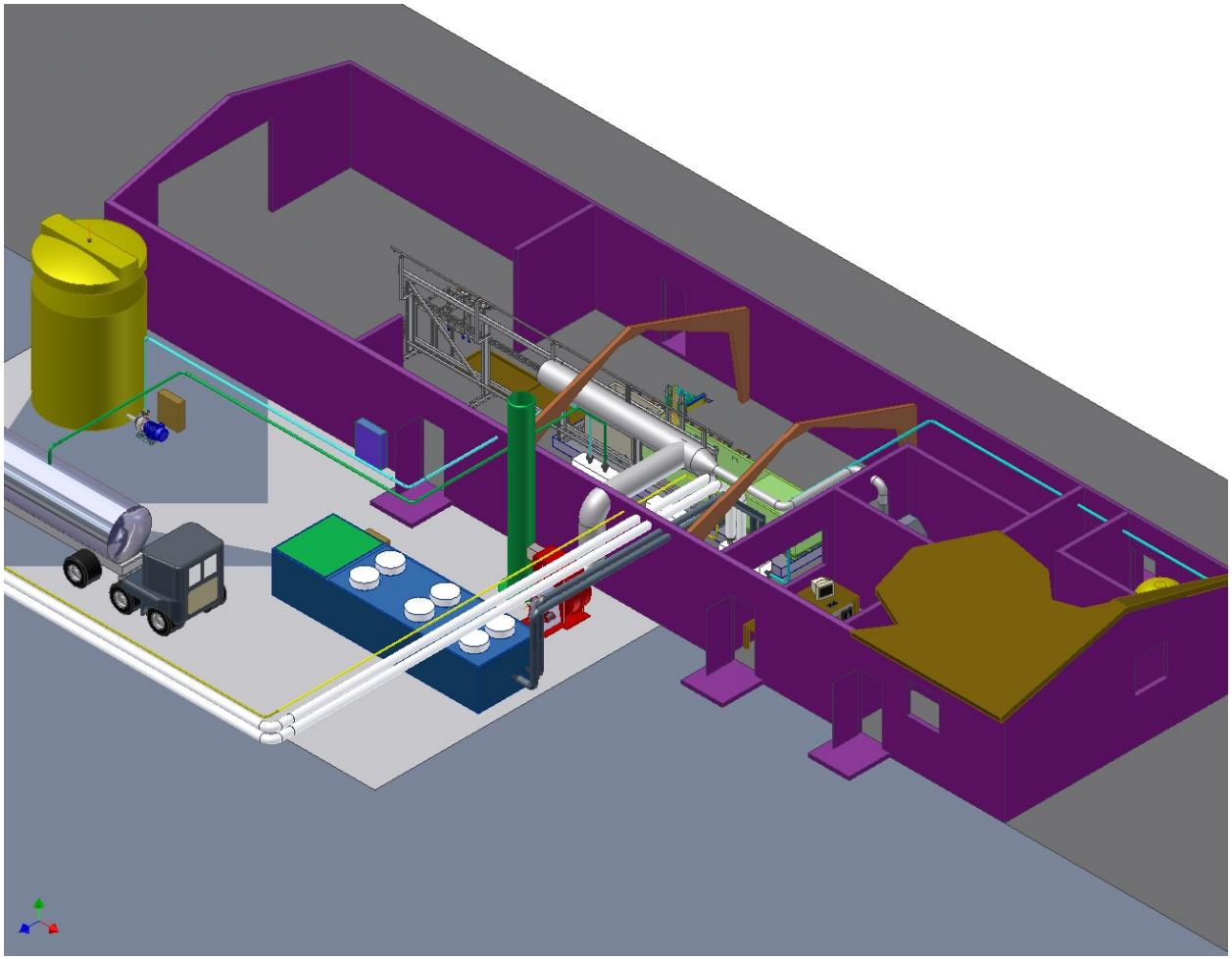
Hydrolysis Production Prototype Plant (HPPP)

Located at Tooele Army Depot

HYDROLYSIS PROCESS FLOW



CAD HPPP FACILITY



Hydrolysis Production Prototype Plant

Objectives & Status:

- **Designed for demil of aluminum bodied CADs**
- **Design processing rate = ~2 tons/day**
- **Design & construction complete**
- **Checkout & systemization complete**
- **Optimization testing in progress**
- **Permitting in progress**
- **Adding a PAS**

Over 360,000 CADs = 80 tons Demil'd

CURRENT TECHNOLOGY TRANSITION PROJECTS

- **Tooele Army Depot (TEAD)**
  - Base Hydrolysis
  - 3 GPM iSCWO
- **Blue Grass Army Depot (BGAD)**
  - 10 GPM iSCWO
- **Alaska iSCWO**
  - 3 GPM iSCWO

Jim Elliott

General Atomics

STATUS OF TECHNOLOGY TRANSITION PROJECTS (TTPs)

- **TEAD**
  - CADs Hydrolysis HPPP
  - iSCWO (3 GPM)
- **BGAD**
  - iSCWO (10 GPM)
- **Alaska**
  - iSCWO (3 GPM)

TEAD TECHNOLOGY TRANSITION PROJECT

- **CADs Hydrolysis HPPP**
- **iSCWO (3 GPM)**

TEAD HYDROLYSIS TTP STATUS

- 2006 – Systemization tests & “trial runs”
- Dec 2006 – Received 3 NOVs from UTDEQ
- Jan 2007 – Submitted CAP
- Apr – Jun 2007 – System mods & tests
- May 2007 - UTDEQ approval of CAP
- Jun 2007 – Update Risk Analysis
- Jul/Aug 2007 – Rerunning “trial burns” for UTDEQ
- Oct 2007 – Complete all required UTDEQ actions
- Mar 2008 - Install PAS
- Early 2008 – Permit issuance

Production Demil Operations Early 2008

TEAD iSCWO TTP STATUS

- 3 GPM iSCWO design complete
- iSCWO skid construction partially complete
- Building complete
- Awaiting further funding

BGAD TECHNOLOGY TRANSITION PROJECT

- **10 GPM iSCWO**
- **Grind/Slurry feed prep system**
- **Heavy metals removal system**

BGAD TECHNOLOGY TRANSITION PROJECT

- **Permitting: RCRA Part B permit application submittal schedule for Jun07**
- **Testing**
  - Completed scale-up tests
  - Performed reactor fabrication tests
- **10 gpm iSCWO**
  - Completed equipment design
  - Completed building design
  - Cleared site for building construction
- **Completed conceptual designs for:**
  - Grind/Slurry system conceptual
  - Heavy metals removal system

ALASKA iSCWO TECHNOLOGY TRANSITION PROJECT

- 3 GPM iSCWO design complete
- iSCWO skid construction partially complete
- iSCWO reactor fabrication nearing completion
- Site purchased – 1 mile from Elmendorf AFB
- Building design work in progress
- RCRA Part B permit application started

FY07 & FY08 Plans

- **TEAD**
  - Complete CADs HPPP operating permit
  - Support CADs demil operations
  - Build & install iSCWO unit
- **BGAD**
  - Obtain RCRA Part B permit
  - Construct the building
  - Start iSCWO construction
- **Alaska**
  - Submit RCRA Part B permit application
  - Complete iSCWO construction
  - Complete building construction
- **R&D**
  - iSCWO energy recovery
  - Acid hydrolysis
  - Analysis & testing of other munitions for hydrolysis

CONCLUSIONS

- **Current Technology Transition Projects (TTPs) are all going well**
  - TEAD CADs Hydrolysis Facility
  - TEAD 2 GPM iSCWO facility
  - BGAD 10 GPM iSCWO
  - Alaska 3 GPM iSCWO