



# International Isotopes Inc

We make **CLEAN** power **CLEANER**

## Presentation on Depleted Uranium Hexafluoride Processing & Fluorine Extraction Process

- COMPANY BACKGROUND
- OPPORTUNITY
- STRATEGY
- PLANT DETAILS AND PROJECT PLAN
- ENVIRONMENTAL CONSIDERATIONS
- EXECUTION CAPABILITIES
- SUMMARY

# I<sup>3</sup> Company Background

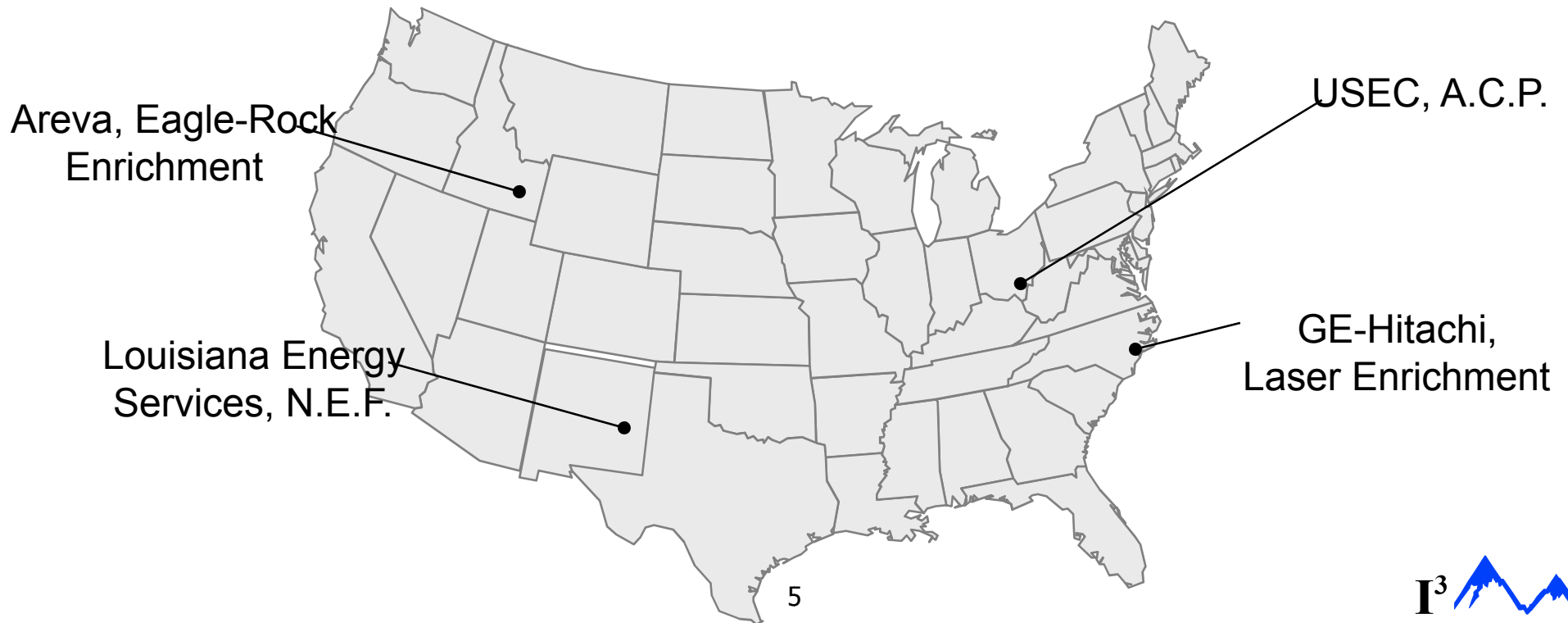
- Founded in 1995 – Public Co. 1996
- Expertise in processing, packaging, and transporting radioactive materials
- NRC Region IV licensed facilities in Idaho since 2001
- NRC HQ License since 2005
- Demonstration-scale FEP Facility operating since 2006

- THE OPPORTUNITY



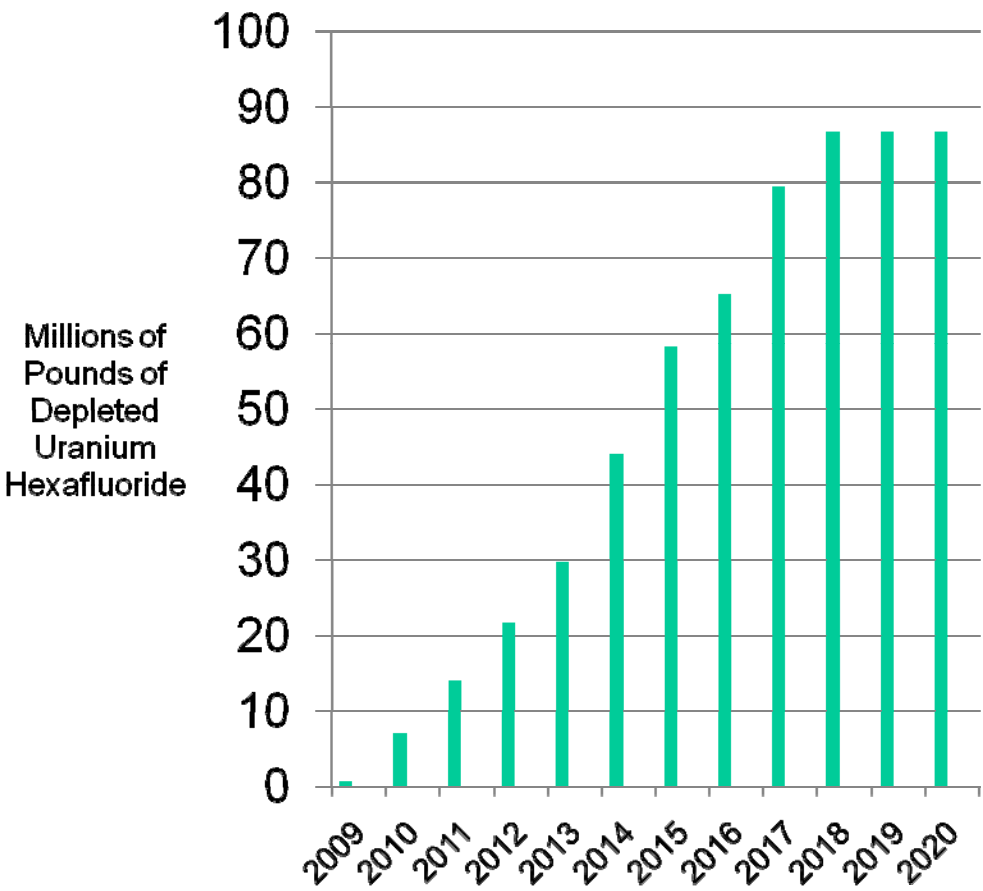
## Four companies are investing heavily in domestic enrichment

2006 – USEC starts construction of American Centrifuge Project	5,000 MTU
2007 – LES starts construction of the National Enrichment Facility	5,000 MTU
2008 – AREVA announces plans to construct Eagle Rock Facility	5,000 MTU
2008 – GE Announces plans to construct enrichment using Silex Laser Technology	10,500 MTU
2009 – LES announces doubling plant capacity	10,000 MTU
2009 – AREVA announces plans to license for double capacity	10,000 MTU

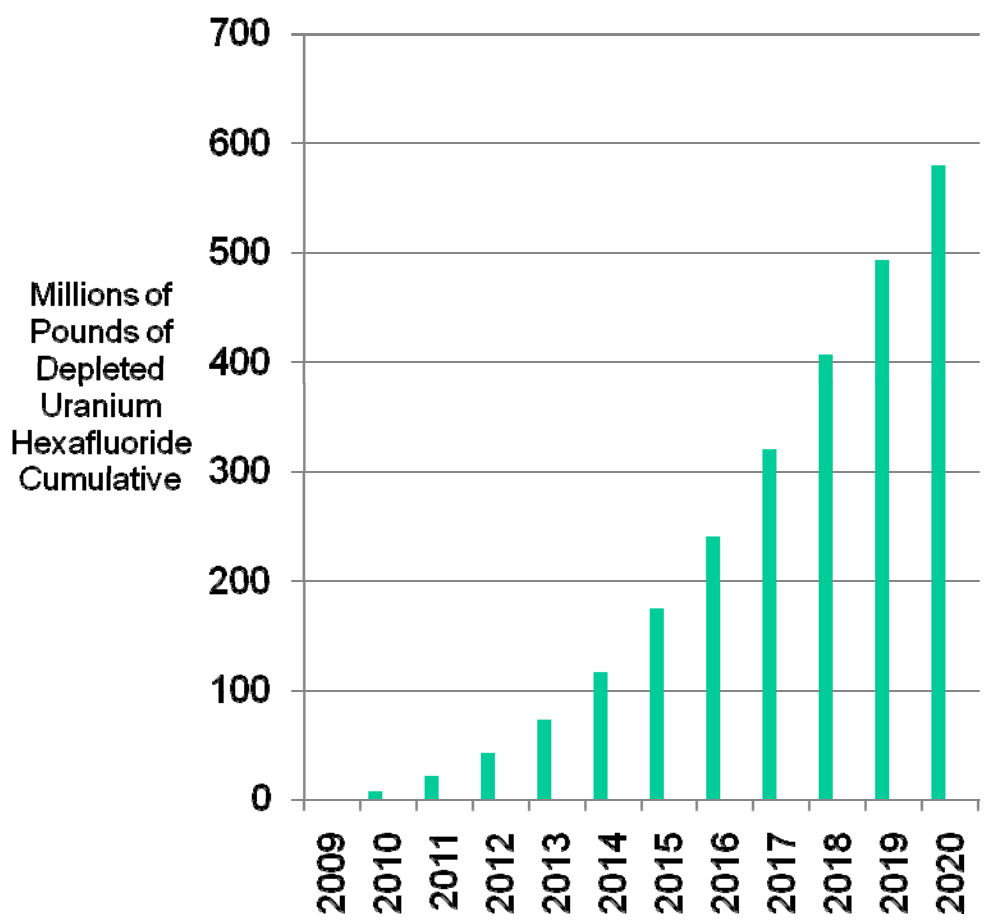


## Estimated Depleted Uranium Hexafluoride Production in the U.S.

### Annual Production in the U.S.



### Cumulative Production in the U.S.



- OUR STRATEGY

Construct the first commercial depleted uranium de-conversion facility in the US.

- Multi-Purpose Purpose Facility
  - DUF<sub>6</sub> off-take agreements for de-conversion
  - Fluorine Extraction Process – exclusive technology to INIS
  - Anhydrous HF Production – Patented Process

- Plant Details and Project Plan

# De-Conversion

- INIS acquired assets of the only complete de-conversion plant in the U.S. in 2008
  - Most key components can be re-used
  - Will relocate equipment

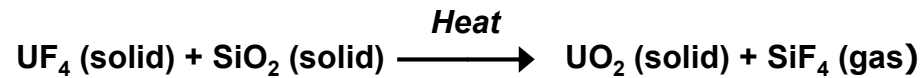


# I<sup>3</sup> Fluorine Extraction Process

- The Fluorine Extraction Process (FEP) is a simple, one step reaction process between two granular solid materials
  - Depleted uranium tetrafluoride (DUF<sub>4</sub>) and a metal oxide are heated in a reaction chamber to the appropriate temperature
  - Fluoride gas separates from uranium and combines with gaseous metal oxide
- Various ultra-pure, uranium-free, fluoride gases are produced while uranium remains in solid-state
- Exclusive U.S. Patent Technology held by INIS enhances commercial viability of de-conversion



Example Reaction - SiF<sub>4</sub> Production







# I<sup>3</sup>

## Defense –in – Depth Approach to Safety

Integrated Safety Analysis, Accident Analyses, and Environmental Assessment

Develop engineered design and controls

Minimize inventories (e.g. reduce “source terms”) of hazardous materials

Employ “double contingency principles”

Multi-layered and redundant safety system controls

Administrative controls - configuration management, Quality Assurance

Training Operators

Isolation

# Project Timeline

INIS Acquires FEP Patents	2004
INIS Focuses on Design of FEP Pilot Plant	2004-2007
GeF <sub>4</sub> Pilot Plant Begins Operation	2007
Acquisition of SFC DUF <sub>6</sub> – DUF <sub>4</sub> De-Conversion Equipment	Q2 2008
Contract with Licensing and Design Team (APTS)	Q3 2008
Site Selection	Q1 2009
Conceptual Design Report	April 2009
Financing to Fund Plant Final Design and Construction	Summer 2009
NRC License Application Submittal	November 2009
Begin Construction	Q1 2011
Begin Operation	Q2 2012

# Environmental Considerations



- **Site Selection Criteria**

- Extensive review process
- Broad regulatory, political, environmental considerations

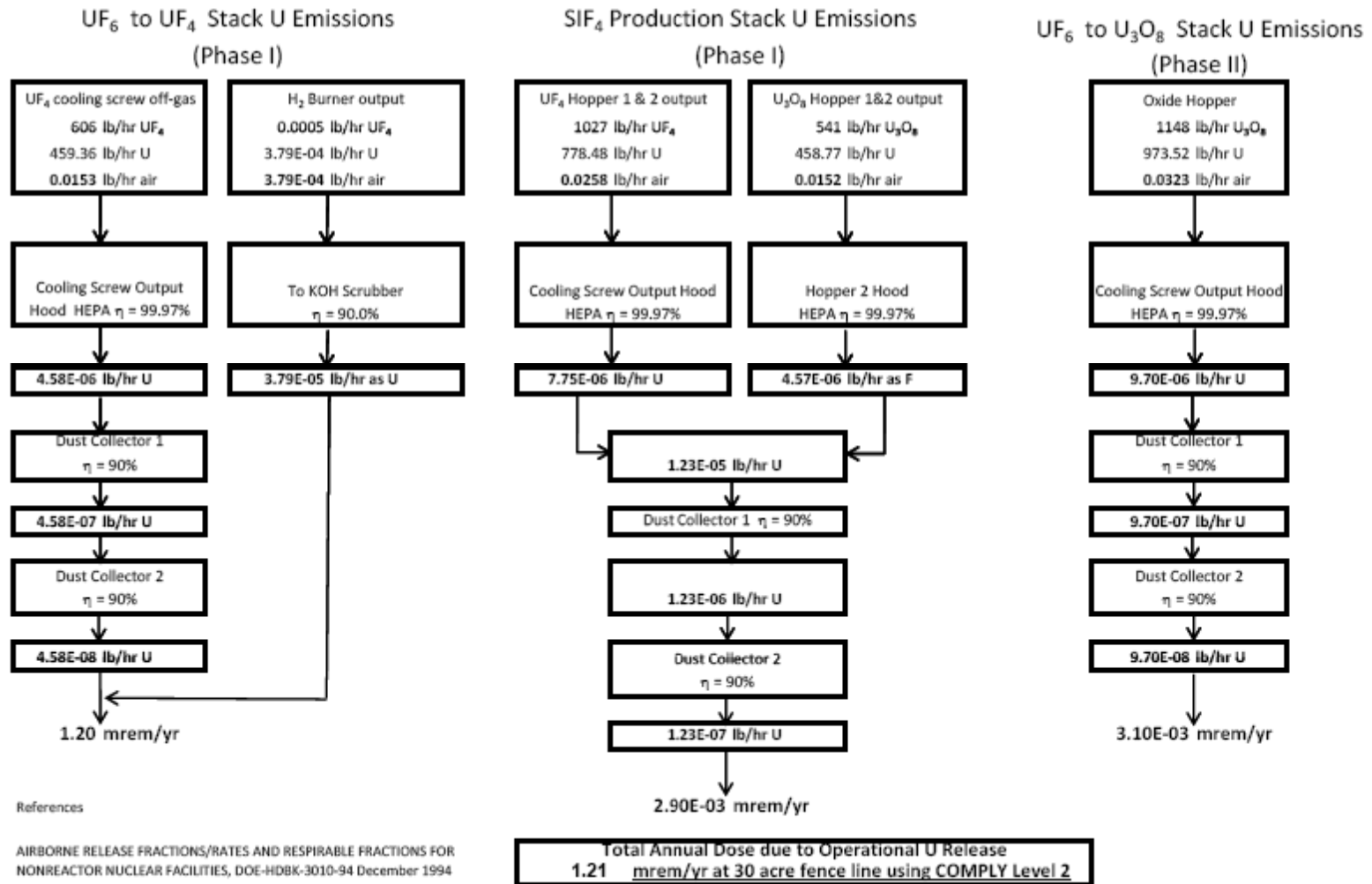
- **Public Acceptance**

- Over 40 meetings held
- No negative reaction, no intervention
- Support in all levels of New Mexico
- Positive meetings with NMED

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- Air Emissions
  - Uranium – Conservative estimate of 1.21 mrem per year at 30 acre fence line.
  - Fluorine – Conservative estimate of 0.0074 lb/hr. NMED Table C emission rate with stack correction – 6.85 lb/hr.

Calculated Annual Dose From operational Uranium Release at 30 acre Fence Line

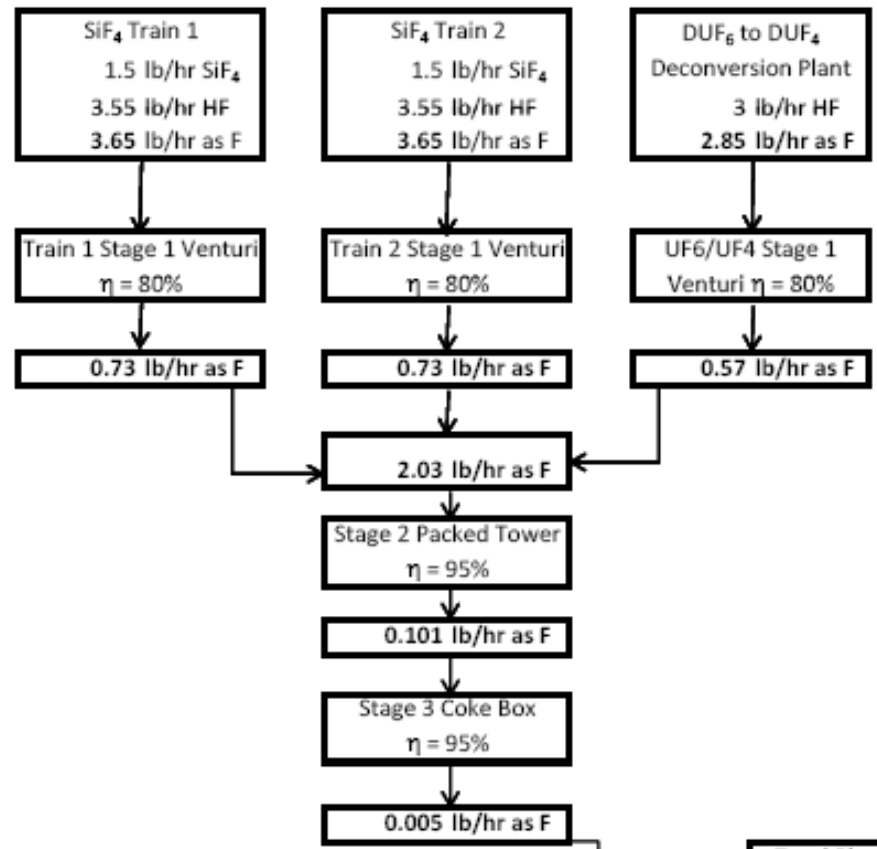


# Fluorine Release Evaluation

## Total Controlled Emissions

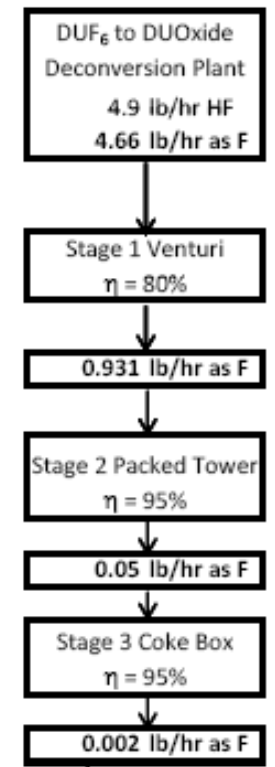
### DUF<sub>6</sub> to DUF<sub>4</sub> and SiF<sub>4</sub> Production Stack Emissions

#### (Phase I)



### DUF<sub>6</sub> to DU Oxides Stack Emissions

#### (Phase II)



24/7 Operations  
64.8 lb/yr as F  
Major Source for TAP  
- 10 ton/year

Table A: Emission Rate Fluorides as F: 0.167 lb/hr  
 Table C Correction Factor, Stack Height of 34.5 m: 41  
 Table C: Emission Rate x CF = **6.847 lb/hr**

- Water Usage

- Minimized thru process water recycling – estimate less than 10,000 gallon per day.

- Ground Water Protection

- Permit Issued though NMED.
- Storm water basins designed for 100 year rain fall
- Segregated yard for DUF6 cylinder storage.
- Zero discharge of process waters



- Depleted uranium oxides are stable and inert
- Uranium waste is shipped to licensed disposal sites

Utah – Energy Solutions

Texas - WCS

- The by-products of chemical scrubbing are neutralized (RCRA waste same sites as above)

- OUR EXECUTION CAPABILITIES

- ***Steve Laflin***- CEO & President, International Isotopes, Inc.
  - 32 Years Experience in the Nuclear Industry
  - INIS CEO Management Since 2001
  - U.S. Nuclear Navy and BS Physics
  
- ***Jim Thomas***- Owner/President of Advanced Process Technology Systems, LLC
  - Over 35 years experience in nuclear fuel cycle; former plant manager of UF6 plant
  - 11 years UF6 and fluorine products technical and production experience
  - 24 years uranium enrichment operations and management experience
  - Developed Silex laser technology, currently used by GE
  - BS, MS, Chemistry and Engineering-Technology; MBA and post-graduate of UT -- Executive Development Program
  
- ***Tom Thompson***- APTS Engineering Director (Project engineering lead)
  - 30 years of project, design and construction experience, including UF6 conversion
  - 20 Years Owner of GT Engineering for commercial and DOD engineering/construction
  - BS, Mechanical Engineering and MS, Engineering-Technology; Licensed P.E. in several States

# Management Team Qualifications and Experience

***Marshall Shepherd- APTS Technical/Licenses Director (Project EA license lead)***

30 years technical and management experience in UF<sub>6</sub>, fluorine, fluorine products

7 of those years was ESH & regulatory manager for Honeywell uranium/fluoride specialty chemicals

BS, MS in Chemistry and MBA

***Gary Holland-Senior Principle Engineer (Project management/mech. engineering lead)***

Over 30 years in engineering & management of chemical plants & uranium enrichment

6 years as design authority for USEC, Inc. Advanced Technology Engineering group

BS Mechanical Engineering; Licensed P.E

***John Miller- INIS Radiation Safety Officer (Project team licensing & RP interface with INIS)***

Over 20 Years Nuclear physics, safety and licensing experience

More than 18 NRC license amendments and actions

SHARP Award for INIS

BS, MS Physics, Certified Health Physicist

***Ron Green-Safety Analysis Engineer (ISA and SA project licensing lead)***

Over 19 years of nuclear and facility safety analysis, ISA and licensing experience

BS, Nuclear Engineering-

***Other Staff-***

The team has over 200 years combined experience in the nuclear fuel, uranium and fluorine products industry.

# I<sup>3</sup> INIS Qualifications for Success

- INIS nuclear business experience
  - All major business segments involve radioactive products
- Experience with NRC licensing and regulators
  - Eighteen license amendments related to business expansion
  - Currently licensed for uranium processing
- INIS FEP production experience
  - Previous pilot scale operation (SiF<sub>4</sub>)
  - Current operational demonstrations for GeF<sub>4</sub>
  - Materials and plant process knowledge
- Proven de-conversion operating assets (UF<sub>6</sub> – UF<sub>4</sub>)
  - Components with proven functionality will be used in construction of new facility
  - Engineering design basis and know-how

- Fills a “Void” in the Nuclear Fuel Cycle
- FEP Technology to Produce Ultra Pure Fluoride Gases Successfully Demonstrated
- Acquired Proven De-Conversion Technology and Assets
- No Commercial Competition Globally and High Barriers to Entry
- Management Team with over 200 years of Experience in Uranium Processing and Fluorine Products Production
- Robust Financial Model with Exponential Growth Going Forward