US ARMY RDECOM

U.S. Army Research, Development and Engineering Command

Field Deployable Hydrolysis System Operational Landscape, Construction on the Cape Ray and the Global Effort

4 June 2015

EDGEWOOD CHEMICAL BIOLOGICAL CENTER
A U.S. Army RDECOM Laboratory

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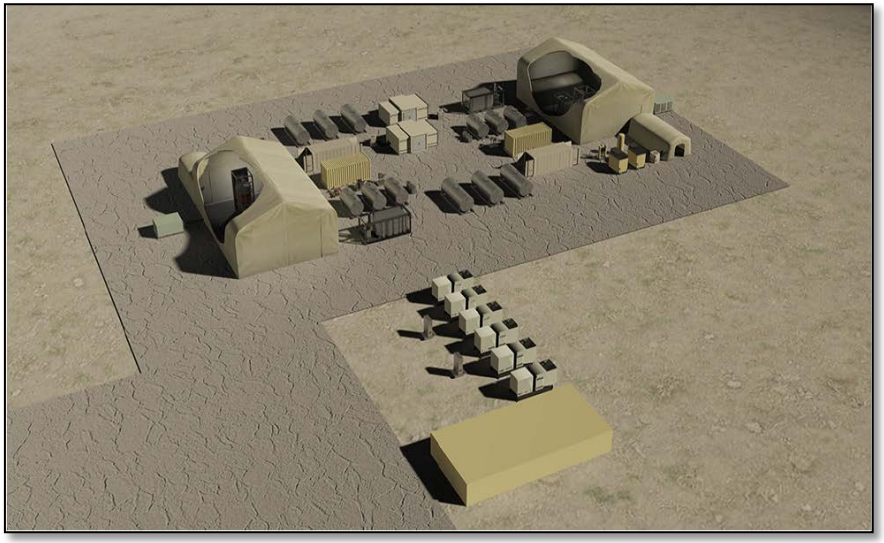
Rob Malone, Project Manager
Edgewood Chemical Biological Center
Directorate for Program Integration
Robert.j.malone50.civ@mail.mil 410-436-1556

Agenda

- **The Changing Operational Landscape**
- **FDHS Installation on Cape Ray**
- **U.S. Interagency Effort and Coordination**
- **Global Community Effort**

Changing Operational Landscape

Original scope was for land-based destruction scenario



Shifted to ship-based after land options denied by multiple countries

Cape Ray Decision

- **Possibility of ship-based destruction raised by JPEO/ECBC/DTRA, with two FDHS platforms on board**
  - **Provides ample water supply**
  - **Provides security**
- **Design team visited ships in September 2013 in Baltimore and Portsmouth**
- **No countries volunteered to accept Syrian CW for destruction**
- **Cape Ray, part of the Maritime Administration's Ready Reserve Fleet, selected for mission in November 2013**

FDHS Installation Team

- FDHS design and production team
- Installed equipment on Cape Ray
- Analyzed sea state effects on system integrity

MARAD

- DOT organization that runs the Ready Reserve Fleet
- Coordinated all modifications to Cape Ray

DTRA

- Organization that runs the Cooperative Threat Reduction (CTR) program
- Provided funding and planning support

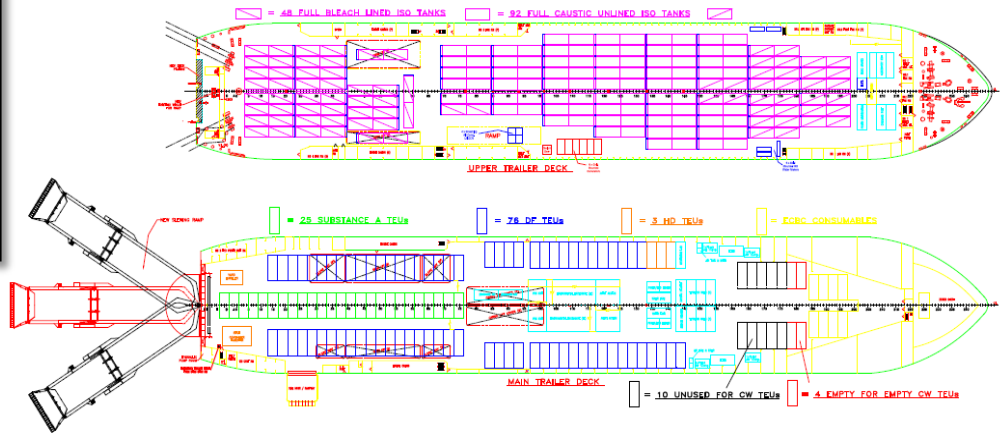
Keystone

- Contractor that operates the Cape Ray
- Assisted in installation
- Integrated all on-board installations

- DoD approval authorities
- Guided installation process and issued approvals for operation

Maritime Ops Challenges

- **Problem: Loading and storing all equipment and material on Cape Ray**
  - **269 total ISO containers (6,000 gal each) on board**
  - **78 shipping containers full of Syrian CW**
  - **Very limited capability for transfer of equipment within and to/from Cape Ray**
  - **Distribution of loads changing daily during operations**



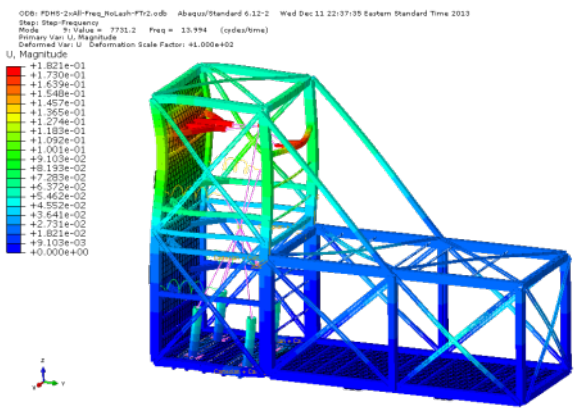
- **Approach**
  - **Collaboration on initial and predicted load planning with Keystone**
  - **Real-time adjustments to load plan throughout operations**
  - **pH adjustment system designed to allow safe long-term storage**

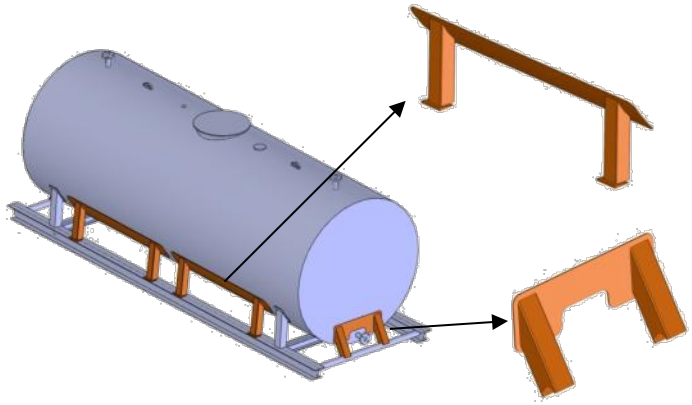
Maritime Ops Challenges

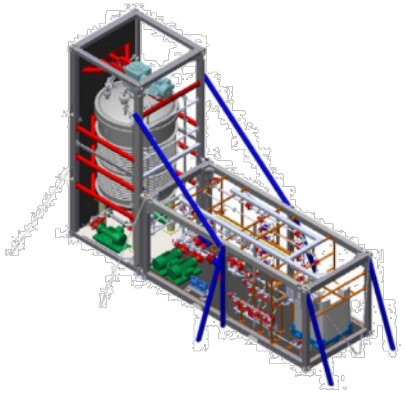
- **Problem: Requirement to prevent agent liquid or vapor release to the environment**
- **Approach:**
  - **FDHS equipment and all Syrian CW stored on Main Trailer Deck**
  - **Only reagent and effluent pass between decks – no agent**
  - **Existing ventilation system retrofitted with carbon filtration**
  - **Multiple levels of environmental controls:**
    - **Reaction occurs in closed system of FDHS**
    - **FDHS located within ventilated environmental enclosure (EE)**
    - **EE located within Main Trailer Deck with ventilation/filtration system**

Maritime Ops Challenges

- **Problem: Ship environment imposes unusual forces on equipment**
  - **Vibration effects of ship's propeller**
  - **Forces in multiple directions caused by ship movement, "sloshing" of liquid**
- **Approach:**
  - **ADM, AMSAA, and Navy personnel performed analysis**
  - **Additional bracing installed for primary FDHS skids and holding tanks**
  - **Ship roll/pitch limits implemented to halt operations in worst conditions**

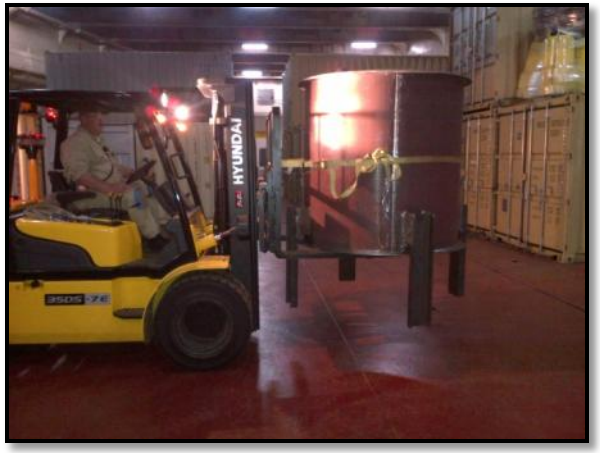






Maritime Ops Challenges

- **Problem: Movement of Syrian DF tanks**
  - **Weight of tanks over 8,000 lbs each**
  - **Aisle space between containers and FDHS equipment ~ 8 feet (severely limits forklift movement)**
- **Approach:**
  - **Container movement system developed by CBARR and ADM engineers/operators**
  - **Allowed for movement of containers without personnel inside shipping container or in path of movement**
  - **Positive control maintained on front and rear side of tank, mitigating effects of ship movement**
  - **Minimized risk of spill or injury**



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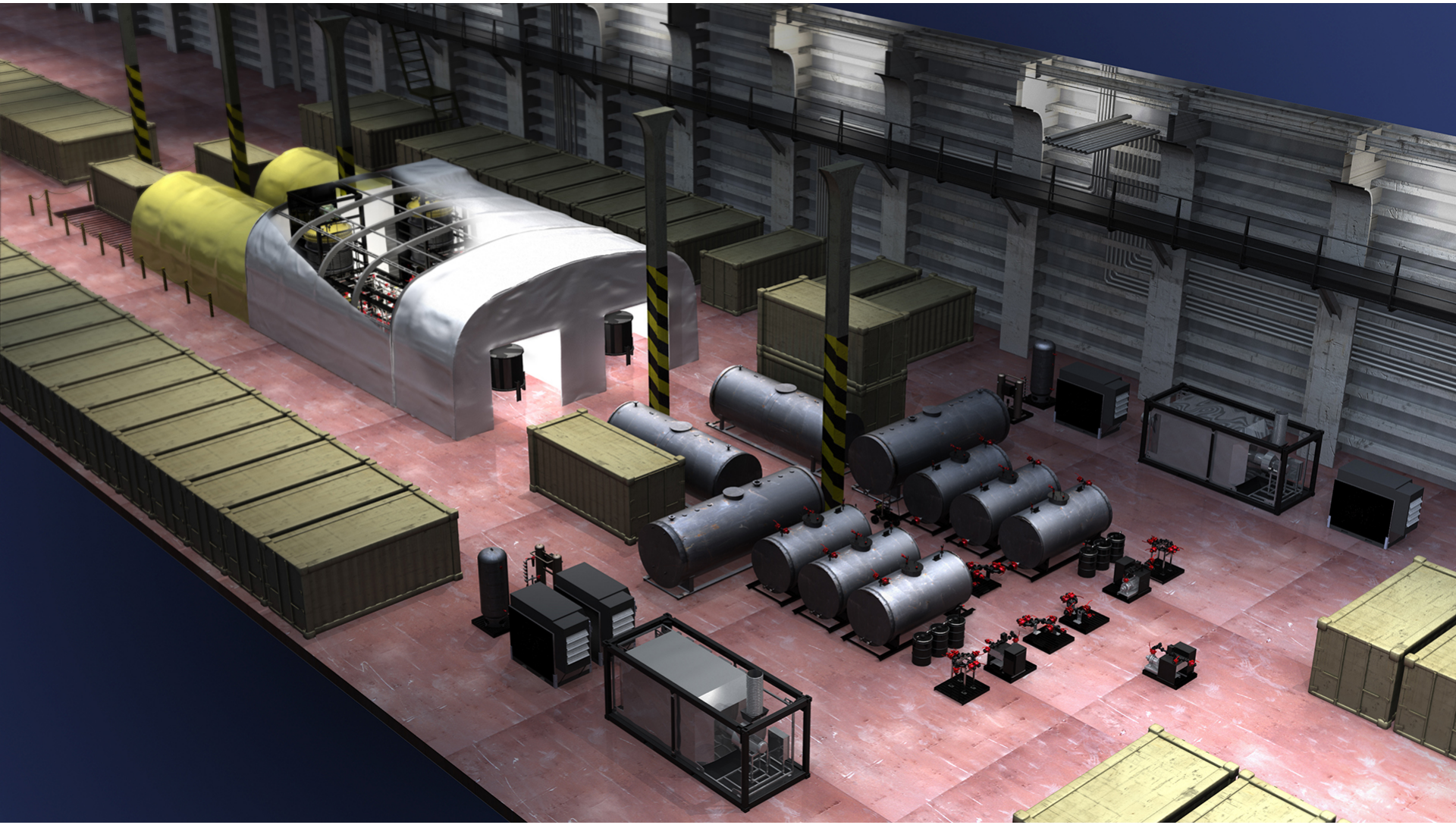
Cape Ray System Layout



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Whole of Government Effort

UN/OPCW Joint Mission

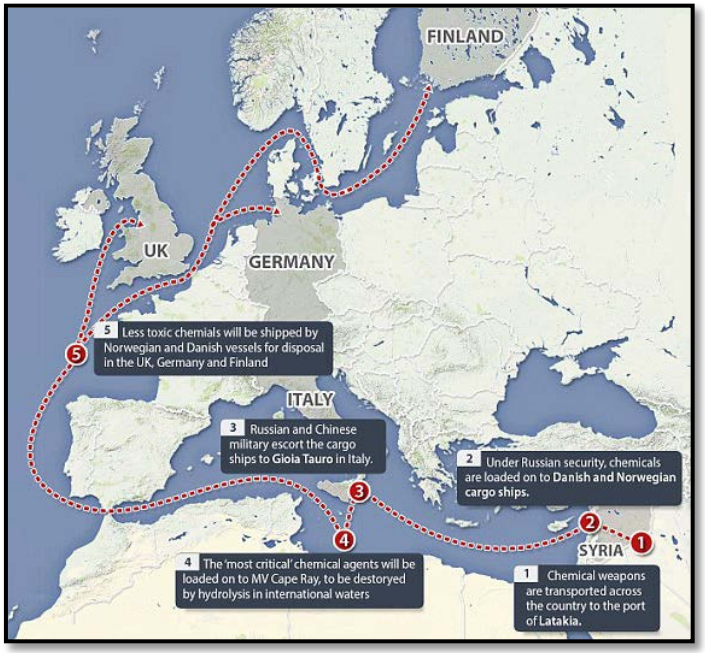
Operate FDHS and Cape Ray

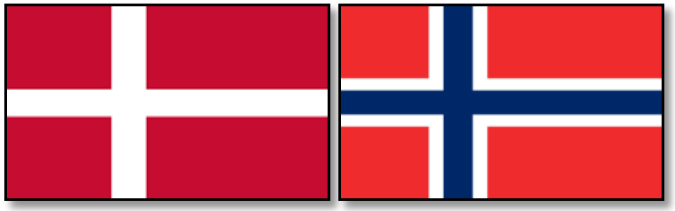
Provide Port for Transload

Destroy V-series Precursors

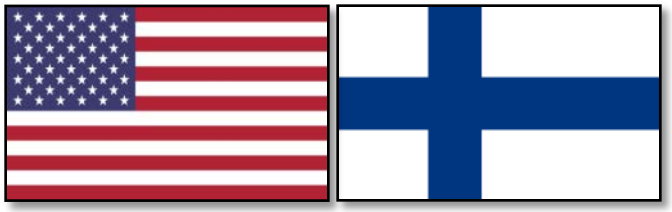
HD Waste Disposal

Mission Leadership





Accept CWM at Latakia



Facilities Contracted for Industrial Chemical and DF Waste Disposal

Security Support

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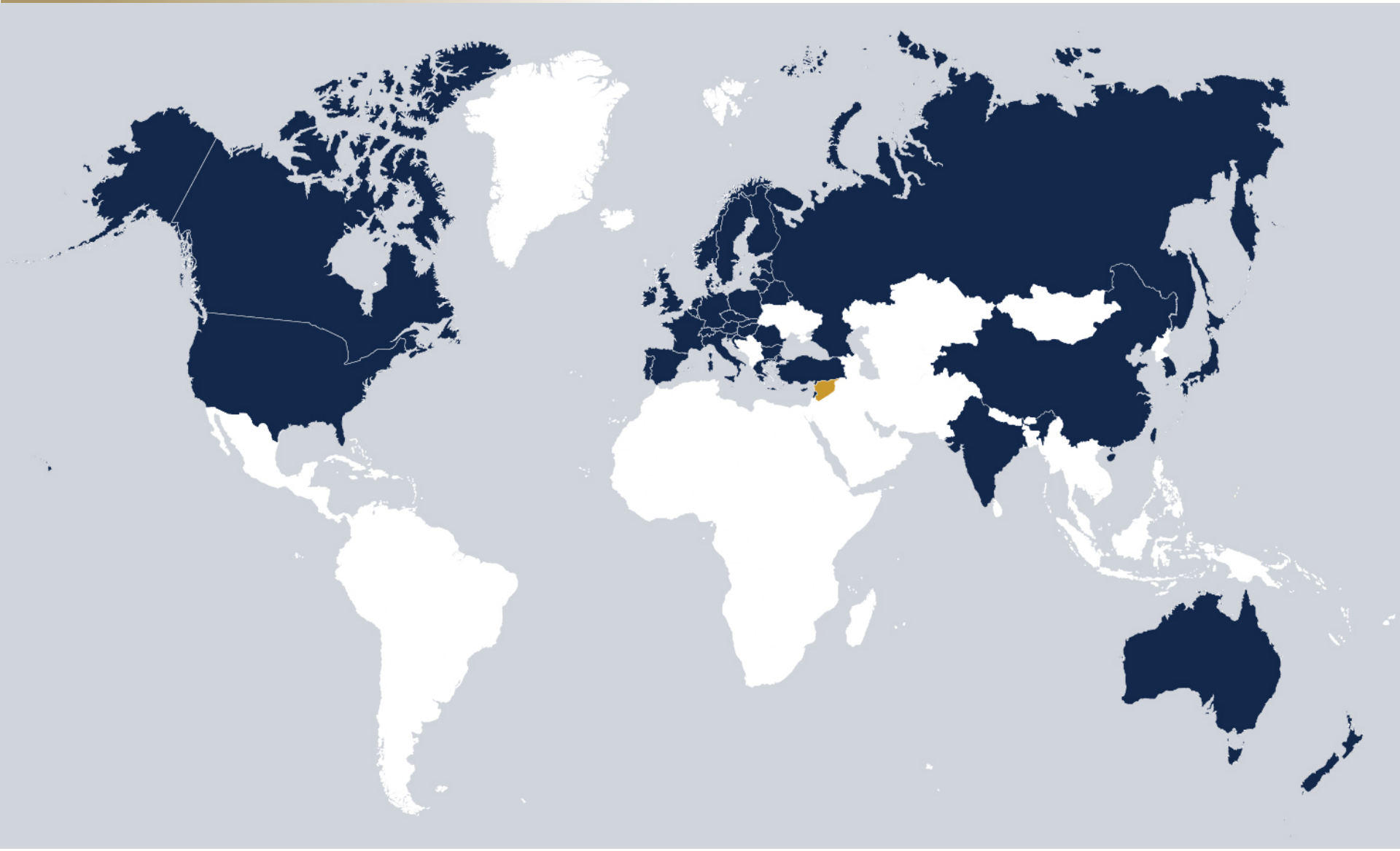
Global Response and Support



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