# INDUSTRIAL SUPERCRITICAL WATER OXIDATION

- Safe, proven, and environmentally sound
- High throughput, low cost, and commercially available
- Excellent, effective destruction efficiency of energetics, organic compounds, chemical waste, pesticides, petrochemical waste, and fungicides
- Emissions much lower than incineration systems that require pollution abatement systems
- Transportable, skid-based system
- Low-cost confirmation tests for process and environmental regulatory permits

GENERAL ATOMICS
ELECTROMAGNETICS

# iSCWO HAS SUCCESSFULLY TREATED A WIDE RANGE OF CHEMICALS

| Complex Feeds | | |
|---|---|---|
| Activated carbon (spent) | Diesel fuel | Paint, paint sludges |
| Adhesives | E. coli | Paper |
| Aqueous Cleaning Solution | Endotoxin (pyrogen) | Paraffin oil |
| (hydrolyzed RDX, TNT, Tetryl, NG, NC) | Explosives/energetics/propellants | Pesticide manufacturing wastewater |
| AFFF | Photographic developer paste | Pharmaceutical waste |
| Antifreeze | Fermentation byproducts | Photographic developer solutions |
| Aroclor 1242 | Flourinated organics | Polychlorotrifluoroethylene (PCTFE) |
| Aroclor 1254 | Food Waste | PFAS/PFOA |
| Aroclor 1260 | Fuel oil | Pig manure |
| Bacillus stearothermophilus | GB chemical agent (neat, hydrolyzed) | Propellants (hydrolyzed) |
| (heat resistant spores) | Gold mining waste with organics | Protein |
| Brake fluid | Gray water | Pulp/paper mill sludge |
| Bran cereal | Greases (mixed) | Sawdust |
| Bromated organics | Human waste | Sewage sludge (black water) |
| Caprolactam wastewater | Hydraulic fluid | Soil contaminated with organics |
| Casein | Industrial biosludge | Soybean plants |
| Cesium Chlorate | Ion exchange resins (styrenedivinyl benzene) | Sulfolobus acidocaldarius |
| Chlorinated plastics (shredded) | Kerosene | Timber/wood waste |
| Class 1.1 solid propellant | Lube oil (molybdenum disulfide oil) | Transformer oil |
| Class 1.3 AP-depleted solid propellant | Malaria antigen | Trimsol cutting oil |
| Coal | Motor oil | VX chemical agent (neat, hydrolyzed) |
| Coal waste | Mustard chemical agent (neat, hydrolyzed) | Waste oils (chlorinated and non-chlorinated) |
| Corn flakes | Navy shore-based wastes | Wheat straw |
| Corn oil | Olive oil | Wood fibers |
| Corn starch | Organic compounds with nuclear isotopes | Yeast |
| CS (Tear Gas) | Organic salts (complex mixtures) | |

| Inorganic Substances | | |
|---|---|---|
| Aluminum hydroxide | Fluorides | Potassium hydroxide |
| Aluminum metal | Hydrochloric acid | Potassium sulfate |
| Aluminum oxide sodium | Hydrofluoric acid | Silica |
| Ammonia | Iron chloride | Sodium bicarbonate |
| Ammonium chloride | Iron oxide | Sodium carbonate |
| Ammonium nitrate (ANSOL) | Lead chloride | Sodium chloride |
| Ammonium nitrite | Lead sulfate | Sodium fluoride |
| Ammonium perchlorate | Lithium hydroxide | Sodium hydroxide |
| Ammonium sulfate | Lithium sulfate | Sodium nitrate |
| Ammonium sulfite | Magnesium nitrate | Sodium nitrite |
| Boric acid | Magnesium oxide | Sodium phosphate |
| Bromides | Magnesium phosphate | Sodium sulfate |
| Calcium carbonate | Magnesium sulfate | Sodium sulfite |
| Calcium chloride | Mercuric chloride | Sulfur, elemental |
| Calcium oxide | Molybdenum disulfide lube oil | Sulfuric acid |
| Calcium phosphate | Nitric acid | Titanium dioxide |
| Calcium sulfate | Phosphoric acid | Zinc chloride |
| Cerium chloride | Potassium bicarbonate | Zinc sulfate |
| Cesium chlorate | Potassium cartonate | |
| Copper chloride | Potassium chloride | |

| Organic Chemicals | | |
|---|---|---|
| Acetate acid | 4,4-Dichlorobiphenyl | Nitrobenzene |
| Acetone | Dichloroethylene | 2-nitrophenol |
| Acetylsalicylic acid (aspirin) | Dichlorophenol | 4-nitrophenol |
| Adumbran | Diethanolamine | Nitrotoluene |
| 4[(2-Amino-3, 5-dibromophenyl)-methylamino] cyclohexanol | Dimethylformamide | Octachlorostyrene |
| Ammonium acetate | Dimethyl methyl phosphonate (DMMP) | Octadecanoic acid magnesium salt |
| Ammonium formate | Dimethyl sulfoxide | Paracetamol |
| Ammonium oxalate | 4,6-denitro-o-cresol | Pentachlorobenzene |
| Benzene | 2,4-Dinitrophenol | Pentachlorobenzonitrile |
| Biphenyl | Dinitrotoluene | Pentachlorophenol |
| Butanol | Dioxane | Pentachloropyridine |
| Calcium acetate | 1,4 Dioxane | Phenol |
| Carbon tetrachloride | Dioxin | Polychlorinated biphenyls (PCB) |
| Carboxylic acids | Dipyridamole | Polychlorotrifluoroethylene |
| Carboxymethyl cellulose | Diisopropyl ethanolamine | Sodium acetate |
| Cellulose | Diisopropyl ethylamine | Sodium formate |
| Cerium acetate | Ethanol | Sodium hexanoate |
| Chlorinated dibenzo-p-dioxins | Ethyl acetate | Sodium isethionate |
| 6-chloro-2,3,4,5-tetrahydro-3-methyl-1H-3-benzazepine hydrochloride | Ethylene chlorohydrin | Sodium propionate |
| 2-chlorobenzalmalononitrile (CS) | Ethylenediamine tetraacetic acid | Sucrose |
| Chlorobenzene | Ethylene glycol | Surfactant |
| Chloroform | Fluorescein | Tetrachlorobenzene |
| 2-Chlorophenol | Freon 22 | Tetrachloroethylene |
| o-Chlorotoluene | Glycerol | Tegrapropylene H |
| Cobalt acetate | Hexachlorobenzene | Thiodiglycol |
| Corrosive solvent waste | Hexachlorocyclohexane | Toluene |
| m-Cresol | Hexachlorocyclopentadiene | Tributyl phosphate |
| Cresolate | Iron acetate | Trichlorobenzene |
| Cyanide | Isooctane | 1,1,1-Trichloroethane |
| Cyclohexane | Isopropanol | 1,1,2-Trichloroethane |
| DDT | Lead acetate | Trichloroethylene |
| Decachlorobiphenyl | Mercaptans | Trichlorophenol |
| Dextrose | Mercaptoethanol | Trifluoroacetic acid |
| Dibenzofurans | Methanol* | 1,3,7-Trimethylxanthine |
| 3,5-dibromo-N0cyclohexyl-N-methyltoluene-, | Methyl acetate | Unsymmetrical dimethyl hydrazine |
| 2-diamine | Methyl cellosolve | Urea |
| Dibutyl phosphate | Methylene chloride | o-Xylene |
| Dichloracetic acid | Methyl ethyl ketone | Zinc acetate |
| Dichloroanisole | Methylphosphonic acid (MPA) | |
| Dichlorobenzene | Monoethanolamine | |

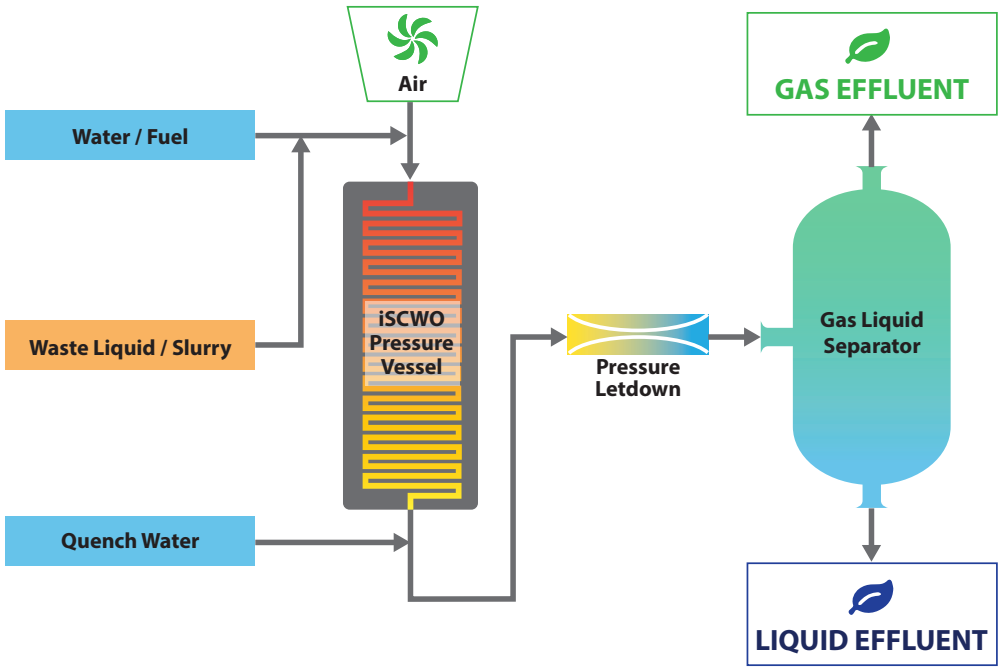
# WASTE DESTRUCTION TECHNOLOGY

General Atomics Electromagnetic Systems' (GA-EMS) commercially available Industrial Supercritical Water Oxidation (iSCWO) technology has been successfully used to treat a broad range of hazardous and non-hazardous waste, with at least a 99.99% destruction removal efficiency. iSCWO provides a safe, environmentally sound solution to replace alternative technologies that have high emission rates, post treatment requirements, and substantial installation and operation costs.

In addition to offering a fixed site solution, GA-EMS offers the only flexible, transportable iSCWO system available today to facilitate "generate and destroy" on-site capabilities. The system consists of a compact equipment skid housed inside a shipping container to create a convenient, cost effective, mobile platform for waste destruction when and where it's needed.

Two Transportable iSCWO Systems

GA-EMS' iSCWO system uses compressed air rather than more expensive pure oxygen ($O_2$) in the treatment process for safe, easy, and low cost in-field maintenance. The iSCWO process makes most organic materials, oxidation reactants, and oxidation products miscible in water, allowing complete oxidation reactions to take place at a high rate. The result is the creation of $CO_2$, water and salts, all of which can be released into the environment or reused for other industrial purposes without any post treatment. $NO_x$, $SO_x$, and particulate concentrations created are also at or below detection limits.

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Rev B 0422