

CCS Web-Based Systems

NONMUNITION

1. • GC-DDS (“green” chemical)
2. • GP-CAS (“green” product)
3. • G-PACS (“green” process)
4. • G-WACS (“green” waste)
5. C2D (data/CAS #)
6. Regulatory Queries
7. Chem-NET (regulatory list QC)
8. MISS (MSDS Creation)
9. • MRS-PHI (MSDS-product)
10. • MRS-CHI (MSDS-chemical)
11. • MRS-CEPPA (MSDS-“green”)
12. MIE-CPRS (export-import)
13. • COC (chemicals of concern)
14. • C-CAS (chemical tracking)
15. • CHEMS (hazard & equivalent material)

16. • G-PEAS (“green” process engineering) [*pending*]
17. C-HoSS (homeland security) [*concept*]
18. BBP-CAS (biobased) [*concept*]

• Utilizes our 44 ecological, health & safety “green” endpoint criteria

MUNITION

1. MACS-1 (demil)
2. MACS-2 (ranges)
3. MACS-3 (theoretical compliance)
4. • G-MACS (“green”)
5. • GM-PACS (“green” process)
6. • GM-WACS (“green” waste)
7. INC-FRCS (incinerator)
8. RISK (emission dispersion)
9. TRACS (hazardous waste)
10. • MACS-COC (constituents of concern)
11. MACS-PRA (permit repository)
12. MACS-ERA (emissions risk assessment)
13. MACS-HRA (health risk assessment)
14. MACS-EnRA (environmental risk assessment)
15. MACS-OBODM (plume height)
16. MACS-AERMOD (air dispersion & deposition)
17. MACS-MODFLOW (groundwater dispersion)
18. MACS-GIS (site pollutant impact)

19. • GM-PEAS (DfD “green” process engineering) [*pending*]

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CCS Nonmunition Web-Based Systems ^a

All CCS nonmunition Web-based systems utilize information from our centralized Relational Chemical and Product Database (R-CPD). R-CPD is the largest and most accurate hazardous material repository in the world. R-CPD is estimated to include over 75 million data elements for more than 275,000 chemicals, over 1 million chemical and munition products, and 700 regulatory lists (local, state, federal, international, and nongovernmental organization [NGO-i.e., ACGIH]). CCS started compiling and purifying this data in 1985 and currently draws data from over 1,000 public sources and incorporates numerous data elements of our own invention/calculation. R-CPD is currently composed of more than 250 fields for each chemical, as data is available, and new fields are added each month, to fulfill customer requests.

◆ Modules currently available on the World Wide Web

● Modules currently with submitted proposals

✂ Modules in the defined concept stage

1. ◆ GC-DDS: "Green" Chemical Data Delivery System GC-DDS is a Web-based system that utilizes 45 ecological, health and safety endpoint criteria to quantitatively and objectively evaluate the "greenness" of individual chemicals and/or alternatives for the intended chemical application (i.e., solvent, acid, base, oxidizer, etc.). GC-DDS provides the supportive data for the "green" ratings and for evaluating alternative chemicals.

2. ◆ GP-CAS: "Green" Products Compliance Analytical System GP-CAS is a Web-based system that utilizes 45 ecological, health and safety endpoint criteria to quantitatively and objectively evaluate the "greenness" of products during their design and transportation/usage/storage, the first and third stages of the product life cycle. GP-CAS, in combination with G-PACS (see #3), and G-WACS (see #4), evaluates the "greenness" of all four stages of the product life cycle. GP-CAS also utilizes 112 state, federal and international lists to assess the regulatory impact of each product constituent, and identifies alternative constituents for those that are the least "green," or have the worst regulatory impact.

3. ◆ G-PACS: "Green" Process Analytical Compliance System G-PACS is a Web-based system that utilizes 45 ecological, health and safety endpoint criteria to quantitatively and objectively evaluate the "greenness" of processes during the manufacture of a product, the second stage of the product life cycle. G-PACS, in combination with GP-CAS (see #2), and G-WACS (see #4), evaluates the "greenness" of all four stages of the product life cycle. G-PACS also utilizes 112 state, federal and international lists to assess the regulatory impact of each process, and identifies alternative constituents for those that are the least "green," or have the worst regulatory impact.

4. ◆ G-WACS: "Green" Waste Analytical Compliance System G-WACS is a Web-based system that utilizes 50 ecological, health and safety endpoint criteria to quantitatively and objectively evaluate the "greenness" of chemical wastestreams from product manufacture and/or disposal, the fourth stage of the product life cycle. G-WACS, in combination with GP-CAS and G-PACS (see #2 & #3), evaluates the "greenness" of all four stages of the product life cycle. G-WACS also utilizes 112 state, federal and international lists to assess the regulatory impact of each wastestream.

5. ◆ C2D: Chemical Classification Data C2D is a Web-based system that provides a broad spectrum of reference data for a specific chemical. Data elements that can be selected include: synonyms and ecological, health, safety, or physical/chemical values. C2D also provides regulatory impacts for 112 state, federal and international lists and DOT Safety Sheets.

6. ◆ Regulatory Queries This Web-based system enables a user to enter a chemical name or CAS number and determine whether the chemical is impacted by any of the 700 local, state, federal, international, or nongovernmental organization regulatory lists.

7. ◆ Chem-NET: Chemical Nomenclature Evaluation Tool Chem-NET is a Web-based system that provides access to our Chemical Cross Reference Dictionary composed of more than 550,000 synonyms and numeric chemical identifiers for over 275,000 chemical and munition products. Chem-NET allows regulatory agencies and Material Safety Data Sheet developers to accurately identify their constituent chemicals.

8. ◆ MISS: MSDS Information Synthesis System MISS is a Web-based system that facilitates the creation of a new product MSDS. The user enters raw material MSDS and other data that is then merged with MISS chemical reference, regulatory and R/S-statement databases to create an MSDS. MSDSs in the system can easily be updated, electronically transferred to any of our three MSDS retrieval systems (see #9, #10 and #11) or printed as a hardcopy at any location with customer-specific MISS approved access codes/passwords.

continued

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^a Except where otherwise noted

9. ♦ **MRS–PHI: MSDS Retrieval System for Product Hazard Information**

MRS–PHI is a Web-based capability that either makes imaged manufacturer MSDSs electronically available to their customers, or employers' MSDSs available to their employees. MRS–PHI can receive electronic MSDSs from MISS (see #8) or from manufacturer files.

10. ♦ **MRS–CHI: MSDS Retrieval System for Chemical Hazard Information**

MRS–CHI is a Web-based capability that not only provides product MSDS images (as in MRS–PHI) but also provides an MSDS for each product constituent chemical, four chemical reference files (i.e., synonyms, physical/chemical properties, formulas, and DOT Guides), and an expanded index and search engine.

11. ♦ **MRS–CEPPA: MSDS Retrieval System for Chemical and Environmentally Preferable Product Analyses**

MRS–CEPPA is a Web-based system that includes the capabilities of MRS–PHI and MRS–CHI, but also includes 112 of the most critical state/federal/international regulatory lists (from #1-4), "green" ratings based upon 45 ecological/health/safety endpoint criteria, a compendium of chemical replacement alternatives for solvents (i.e., alcohols, VOCs, and SVOCs), acids (i.e., organic and inorganic), bases, oxidizers, chelators, surfactants, metals and their compounds, alloys (i.e., steel, brass, aluminum, etc.), and a comprehensive analytical capability.

12. ♦ **MIE–CPRS: Manufacture Import Export Chemical Product Regulatory System**

MIE–CPRS is a Web-based capability that enables an organization to identify import and/or export requirements for a chemical product. MIE–CPRS also identifies regulatory constraints for the product or manufacturing process, provides required notification forms, and chemical/chemical constituent hazard data. MIE–CPRS has also integrated the "green" analytical capabilities (see #1-4).

13. ♦ COC: Chemicals of Concern The Web-based COC module integrates five standardized, objective and quantitative criteria, including the ecological/health/safety criteria (from #1-4), to rank/prioritize pure or product constituent COCs. This automated, Web-based module ranks COCs on the basis of quantities processed, regulatory, ecological, health and safety impacts, overall "concerns," and identifies the Level of Concern (LOC) for each COC. This module is equivalent to the MACS–COC module (see CCS Web-Based Systems -Munition) that has been utilized to assess COCs on ranges and at demil sites.

14. ♦ C–CAS: Chemical Compliance Analytical System This state-of-the-art Web-based chemical/product container tracking system is based upon individual container bar codes that can be captured manually with a scanner, or utilizing automated scales and scanners. C–CAS captures over 20 potential data elements for each container, adds a dozen product data elements, and maintains this real time data in the C–CAS Master Product Inventory File. In addition, C–CAS identifies each product constituent chemical and maintains a real time Master Chemical Reference file, derived from our separate

Relational Chemical and Product Database (R–CPD), that includes customer-specific regulatory impact List of Lists, ecological, health, safety, physical/chemical, hazard classification, handling, and generic dictionary data elements. C–CAS can generate container bar code labels and literally hundreds of analytical compliance reports. C–CAS container bar codes can flow directly into a waste module. Finally, C–CAS was the software template for our MACS–1 module (see #1, under CCS Web-based Systems–Munition) and can also serve as the software template for over a dozen identified, customer-specific modules (e.g., Industrial Hygiene, Air Toxics, Storage Tanks, Solid Waste, etc.).

15. ♦ **CHEMS: Chemical Hazard and Equivalent Material System**

CHEMS is a Web-based capability that functions either as a standalone analytical system, or as an enhancement within GP–CAS (see #2), G–PACS (see #3) or MRS–CEPPA (see #11). CHEMS identifies alternative chemicals within generic classes (i.e., solvents [alcohols, VOCs, SVOCs], acids [organic and inorganic], bases, oxidizers, chelators, surfactants, metals and their compounds, and alloys [steel, brass, aluminum]), etc., and provides appropriate ranking/assessment data (e.g., redox potential for oxidizers, pKa values for acids, etc.), and "green" scores for all chemicals within the selected class.

16. ● **G–PEAS: "Green" Process Engineering Compliance Analytical System**

G–PEAS quantitates and normalizes the five green engineering factors stipulated in the ANSI/GCI 355 Greener Chemicals and Processes Information standard on the same 0-100% scale as our other green modules. This enables G–PEAS to quantitatively integrate process chemical utilization efficiency, water usage, energy consumption, biobased carbon content, and process safety, with ecological, health and chemical safety across the entire life cycle of a chemical product.

17. ✕ C–HoSS: Chemical Homeland Security System C–HoSS utilizes existing chemical/product inventory data and unique, quantitative chemical hazard ranking and grading criteria to rank resident chemical hazards, security risks, and mortality risks to identify three different types of inventory concerns. Addition of high risk container accessibility constraints enables C–HoSS to rank container vulnerabilities and identify container accessibility constraints that eliminate any/all vulnerabilities. Thus, C–HoSS assures that vulnerabilities to terrorist utilization of chemical inventories to create weapons of mass destruction are effectively controlled and eliminated.

18. ✕ **BBP–CAS: Biobased Products Compliance Analytical System**

BBP–CAS is a Web-based system that integrates the 45 endpoint "green" criteria (see #1-4) with similarly normalized biomass, regulatory impact and economic performance scores. Thus, BBP–CAS similarly provides a quantitative and objective evaluation of the biobased value of a product that can be quantitatively and objectively compared to a similarly functioning product. BBP–CAS can also be combined with G–PACS (see #3) and G–WACS (see #4) to provide a life cycle assessment.

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CCS Munition Web-Based Systems ^a

CCS has worked with the U.S. Army Defense Ammunition Center from 1999 to the present to enhance and maintain their Munition Items Disposition Action System (MIDAS) munition characterization database and integrate it with our Relational Chemical and Product Database (R-CPD). These integrated databases provide the basis for all of our munition modules. Since these systems each include Government proprietary data (i.e., MIDAS) and CCS-owned data (i.e., R-CPD), these systems are co-owned by CCS and the Government; however, CCS has a Licensing Agreement with DAC that allows CCS to charge licensing fees to both governmental and industrial users for each of their selected modules. Each of these modules can be easily customized to accommodate user-specific requirements or preferences. Completed and available, or defined concept, modules include the following:

◆ Modules currently available on the World Wide Web

● Modules currently with submitted proposals

✦ Modules in the defined concept stage

- 1. ◆ MACS-1: Munitions Analytical Compliance System (for demil)** MACS-1 is a Web-based greatly simplified version of C-CAS that was customized for munitions demilitarization processes. This system was implemented in 1999 at 13 demil sites throughout the U.S. utilizing a single, centralized database. MACS-1 is a Web-based capability that serves as a remote data entry and report request tool, and utilizes the analytical and report generation software and the proprietary munition, chemical, and regulatory reference databases which reside in the Web server. MACS-1 can provide over 112 local, state, or federal compliance reports and analyses and identify emission products.
- 2. ◆ MACS-2: Munitions Analytical Compliance System (for ranges)** MACS-2 is a Web-based close facsimile of MACS-1 that is customized to include range recovery, dud location, range assessment data repository and range media contamination databases, as well as a UXO GIS database not required in the demil module. MACS-2 can also include a range loading/discharge control algorithm that calculates releases against thresholds, and an altered subsystem. MACS-2 has the same broad based environmental, safety and health analytical capabilities as MACS-1, and is an effective tool for assuring range sustainment.
- 3. ◆ MACS-3: Munitions Analytical Compliance System (for theoretical compliance analyses)** MACS-3 is a Web-based specialty module that combines the analytical compliance capabilities of MACS-1 with theoretical demil projects, including the demil workload and costing forecast capabilities of the Optimizer[®] system. MACS-3 is utilized to assure that the demilitarization of single, or batch munitions will not exceed site permit constraints, or other regulatory thresholds.

- 4. ◆ G-MACS: "Green" Munitions Analytical Compliance System** G-MACS is the munition equivalent of our "Green" Product Compliance Analytical System (GP-CAS) and is a Web-based capability that quantitatively and objectively evaluates the "greenness" of either new munitions under development, munition components/parts as resources for utilization in new munitions, or existing munitions in production, utilizing 45 ecological, health and safety endpoint criteria. G-MACS also utilizes 112 state, federal and international lists to evaluate the regulatory impact of each munition constituent. G-MACS is the only available tool for quantitatively documenting the relative "greenness" of a munition. This system will simultaneously evaluate the "greenness" during design and during transportation/use/storage, the first and third stages of the munition life cycle, while also protecting trade secrets for munition developers. G-MACS, in combination with our "Green" Process Analytical Compliance System (G-PACS), evaluates the "greenness" of all four stages of the munition life cycle.

- 5. ◆ "Green" Munitions Process Analytical Compliance System (GM-PACS)** GM-PACS is a Web-based system that utilizes 45 ecological, health and safety endpoint criteria to quantitatively and objectively evaluate the "greenness" of processes during the manufacture of a munition, the second stage of the munition life cycle. GM-PACS, in combination with GM-WACS and G-MACS, evaluates the "greenness" of all four stages of the munition life cycle. GM-PACS also utilizes 112 state, federal and international lists to assess the regulatory impact of each process, and identifies alternative constituents for those that are the least "green," or have the worst regulatory impact.

- 6. ◆ "Green" Munitions Waste Analytical Compliance System (GM-WACS)** GM-WACS is a Web-based system that utilizes 45 ecological, health and safety endpoint criteria to quantitatively and objectively evaluate the "greenness" of chemical wastestreams from munition manufacture and/or disposal, the fourth stage of the munition life cycle. GM-WACS, in combination with G-MACS and GM-PACS, evaluates the "greenness" of all four stages of the munition life cycle. GM-WACS also utilizes 112 state, federal and international lists to assess the regulatory impact of each wastestream.

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7. ♦ INC–FRCS: *Incinerator Feedrate Control System* INC–FRCS is Web-based, was also derived from MACS–1, and calculates the maximum rate a munition can be fed into the APE-1236 incinerator and not exceed regulatory, equipment safety, or permit thresholds. INC–FRCS utilizes the worst case combination of munition alternative parts to calculate feedrate limits.

8. ♦ RISK: *Dispersion Risk* RISK is Web-based and was also derived from MACS–1. RISK utilizes the Gaussian Plume dispersion model to calculate emission concentrations at selected distances under selected meteorological conditions. These concentrations can then be utilized in standard EPA Health Risk Assessment analyses.

9. ♦ TRACS: *Transportation Records Analytical Compliance System* TRACS is a Web-based records tracking and document generation system initially utilized for electronic Hazardous Waste Manifest documents that must accompany shipments of waste munitions from storage to disposal sites, including overseas locations. TRACS assures that all EPA, state-specific, and international requirements are met, and lost documents can easily be replaced. TRACS capabilities are also applicable to munition shipments from manufacturing to storage utilization locations with minimal, or no change. Value added data tables provide emergency responders with hazard and spill cleanup information.

10. ♦ MACS–COC: *Munitions Analytical Compliance System for Chemicals of Concern* The Web-based munition COC module integrates five standardized, objective and quantitative criteria from other MACS modules to rank/prioritize munition constituent COCs. This automated, Web-based module ranks COCs on the basis of quantities processed, regulatory, ecological, health and safety impact, overall “concerns,” and identifies the Level of Concern (LOC) for each COC. This module has been utilized to assess COCs on ranges and at demil sites.

11. ♦ MACS–PRA: *Munitions Analytical Compliance System for Permit Repository & Assets* MACS–PRA is a Web-based repository for required permit application data elements including: forms (9), imaged documents (14), reference data (20), and contingency plans (8).

12. ♦ MACS–ERA: *Munitions Analytical Compliance System for Emissions Risk Assessment* MACS–ERA is a Web-based specialty module that utilizes historic OB/OD demil data, munition emission release data, and PBT and HAPs regulatory lists to calculate event, daily, and annual munition emission releases. This data is utilized in the MACS–HRA module.

13. ♦ MACS–HRA: *Munitions Analytical Compliance System for Health Risk Assessments* MACS–HRA is a Web-based specialty module that utilizes data from the MACS–ERA to calculate human health risk assessments, including the toxicity, exposure and risk assessments for Tiers I, II, and III. These calculations evaluate cancer, non-cancer chronic, and acute risks based upon EPA guidance.

14. ♦ MACS–EnRA: *Munitions Analytical Compliance System for Environmental Risk Assessment* MACS–EnRA is a Web-based tool that evaluates the likelihood of adverse ecological effects occurring, or that may occur, as a result of exposure to stressors. This system follows the 3-phased process consisting of problem formulation, analysis, and risk characterization defined in EPA guidelines.

15. ♦ MACS–OBODM: *Munitions Analytical Compliance System for plume height* MACS–OBODM is a Web-based version of an EPA-approved model that calculates the OB or OD plume height based upon the heat capacities of munition constituent chemicals. This plume height value is then fed into MACS–AERMOD (see #16).

16. ♦ MACS–AERMOD: *Munitions Analytical Compliance System for air dispersion & deposition* MACS–AERMOD is a Web-based version of the EPA-approved model for calculating the air dispersion and surface deposition of air pollutants. Airborne munition emission product (EP) concentrations are fed into both MACS–HRA and MACS–EnRA. EP deposition to soil is fed into MACS–MODFLOW (see #17).

17. ♦ MACS–MODFLOW: *Munitions Analytical Compliance System for groundwater dispersion* MACS–MODFLOW is a Web-based version of the USGS model for calculating the flow of the soil deposited pollutants into aquifers. The resultant groundwater concentrations are then fed into MACS–HRA and MACS–EnRA.

18. ♦ MACS–GIS: *Munitions Analytical Compliance System for Geographical Information* MACS–GIS is a Web-based specialty module that visually displays pollution dispersion pathways from a source (e.g., detonation pit). By displaying defined facility receptors on a site map, MACS–GIS illustrates whether or not receptors will be exposed to pollutants.

19. ● GM–PEAS: *“Green” Munitions Process Engineering Analytical System (for DfD process engineering)* GM–PEAS quantitates and normalizes the five green engineering factors for munitions stipulated in the ANSI/GSI 355 Greener Chemicals and Processes Information standard on the same 0-100% scale as our other green modules. This enables GM–PEAS to quantitatively integrate process chemical utilization efficiency, water usage, energy consumption, biobased carbon content, and process safety, with ecological, health and chemical safety across the entire life cycle of a munition.