



June 25, 2007

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

RE: RFQ Number 667C0029
Calcium Magnesium Acetate

Cryotech Deicing Technology is pleased to respond herein to the subject invitation to bid. The products bid shall be Cryotech CMA® solid commercial deicer and Cryotech CF7® clear liquid deicer. Product documentation follows. CMA is 96% calcium magnesium acetate and CF7 is 50% potassium acetate with less than 1% corrosion inhibitors (active material). Both products are produced at Cryotech's Fort Madison, Iowa production facility.

Cryotech will supply the same product as supplied in prior seasons per attached product specifications.

Please see attached for our response to your requirements. Thank you for this opportunity to work with the West Virginia Division of Highways.

Respectfully Submitted,

Cryotech Deicing Technology

A handwritten signature in black ink, appearing to read "Roxanna Huffman", is written over the printed name.

ROXANNA HUFFMAN
Manager, Operations

PRODUCT

SPECIFICATIONS - CRYOTECH CMA[®]

COMPOSITION	Calcium Magnesium Acetate (CMA)	
	3:7 Ca to Mg molar ratio	
	Hydrated CMA + other acetates	96% minimum
	Inert Material	4% maximum

PARTICLE SIZE	<u>Sieve</u>	<u>% Passing</u>
	4	90
	14	10

SHAPE Hard spherical pellet

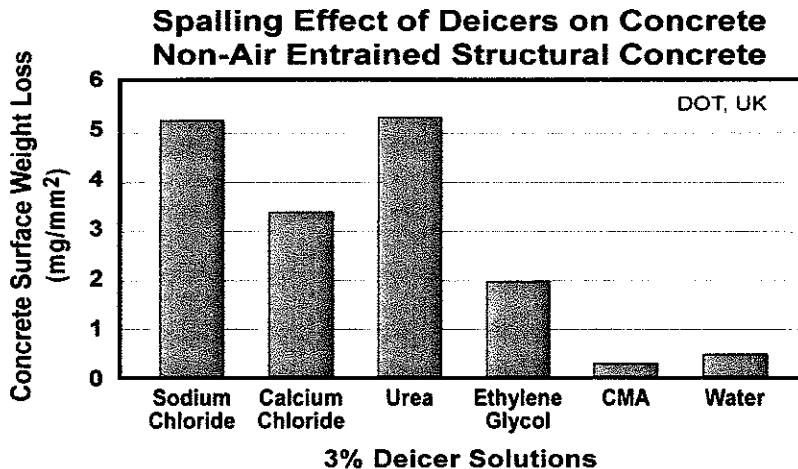
BULK DENSITY 40 lbs/ft³ to 44 lbs/ft³
(0.65 g/cm³ to 0.79 g/cm³)

TYPICAL pH 8 to 10 in a 10% solution

RESIDUAL BASE Maximum 0.4 meg base/gm

PACKAGING 25 kg (55 lbs) poly bags - (40 bags minimum)
1000 kg (2205 lbs) Super Sacks - (1 SS minimum)
Bulk - (20 metric ton minimum)

Spalling Effect of Deicers on Concrete



Revised - 11/06

FOR ORDERING INFORMATION CONTACT:

Ph: 319.372.6012 or 800.346.7237 Fax: 319.372.2662 E-mail: deicers@cryotech.com



June 25, 2007

CRYOTECH DEICING TECHNOLOGY

RFQ Number 667C0029

Calcium Magnesium Acetate

General (Cryotech Deicing Technology)

- Cryotech's core business is deicers. All personnel are dedicated to meeting customer needs.
- Cryotech is ISO9001:2000 and ISO14001:2004 certified. This assures its customers that Cryotech deicers always meet a rigorous, internationally recognized quality standard, and is committed to protecting our environment.
- Cryotech's web site (www.cryotech.com) provides easy access to all company, product, safety, and ISO information.
- Cryotech welcomes customer site visits and audits.
- Cryotech personnel at its Fort Madison, IA plant are available around-the-clock, seven days a week including holidays.
- All Cryotech carriers are required to ensure that drivers have completed appropriate safety-training programs, including spill handling. This is part of Cryotech's ISO 9001:2000 quality certification and vendor monitoring program.
- Cryotech and its partners have 24-hour customer service utilizing answering services, cellular phones and pagers to ensure that someone is always available to respond.

Calcium Magnesium Acetate (Cryotech CMA®) & Potassium Acetate (CF7®)

- Cryotech has CMA storage capacity at its Iowa plant for 2,500 metric tons and will deliver directly to West Virginia's Oak Hill storage site within 3-5 days ARO.
- CMA has been produced at this Iowa plant since 1986. From 1986 to 1991 it was produced by Chevron Chemical Company, and since 1992 it has been produced by Cryotech Deicing Technology.
- Cryotech has CF7 storage capacity at its Fort Madison, IA plant and could deliver directly to West Virginia's Oak Hill storage site within 3-5 days ARO.



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFO NUMBER
667C0029

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF
**JOHN JOHNSTON
 304-558-2402**

VENDOR

*609112626 800-346-7237
**CRYOTECH DEICING TECHNOLOGY
 6103 ORTHOWAY
 FORT MADISON IA 52627**

SHIP TO

**DIVISION OF HIGHWAYS
 VARIOUS LOCALES AS INDICATED
 BY ORDER**

REC'D JUN 11 2007

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
06/04/2007				

BID OPENING DATE: **06/27/2007** **BID OPENING TIME 01:30PM**

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	LS		325-12	\$1,314.49/US Ton	\$1,314.49/US Ton
<p>CALCIUM MAGNESIUM ACETATE</p> <p>OPEN END CONTRACT</p> <p>TO FURNISH ALL LABOR, MATERIALS AND EQUIPMENT TO SUPPLY CALCIUM MAGNESIUM ACETATE AND A NON-CORROSIVE PRE-WETTING AGENT TO THE WEST VIRGINIA DIVISION OF HIGHWAYS AT THE LOCATIONS AND IN THE ESTIMATED QUANTITIES SET OUT IN THE ATTACHED BID SCHEDULE.</p> <p>EXHIBIT 3</p> <p>LIFE OF CONTRACT: THIS CONTRACT BECOMES EFFECTIVE ON AND EXTENDS FOR A PERIOD OF ONE (1) YEAR OR UNTIL SUCH "REASONABLE TIME" THEREAFTER AS IS NECESSARY TO OBTAIN A NEW CONTRACT OR RENEW THE ORIGINAL CONTRACT. THE "REASONABLE TIME" PERIOD SHALL NOT EXCEED TWELVE (12) MONTHS. DURING THIS "REASONABLE TIME" THE VENDOR MAY TERMINATE THIS CONTRACT FOR ANY REASON UPON GIVING THE DIRECTOR OF PURCHASING 30 DAYS WRITTEN NOTICE.</p> <p>UNLESS SPECIFIC PROVISIONS ARE STIPULATED ELSEWHERE IN THIS CONTRACT DOCUMENT, THE TERMS, CONDITIONS AND PRICING SET HEREIN ARE FIRM FOR THE LIFE OF THE CONTRACT.</p> <p>RENEWAL: THIS CONTRACT MAY BE RENEWED UPON THE MUTUAL WRITTEN CONSENT OF THE SPENDING UNIT AND VENDOR, SUBMITTED TO THE DIRECTOR OF PURCHASING THIRTY (30) DAYS PRIOR TO THE EXPIRATION DATE. SUCH RENEWAL SHALL BE IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Koranna Henderson</i>	TELEPHONE 800-346-7237 or 319-372-6012	DATE June 25, 2007
TITLE Manager, Operations	FEIN 33-0270225	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

**GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)**

1. Awards will be made in the best interest of the State of West Virginia.
2. The State may accept or reject in part, or in whole, any bid.
3. All quotations are governed by the *West Virginia Code* and the *Legislative Rules* of the Purchasing Division.
4. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125.00 registration fee.
5. All services performed or goods delivered under State Purchase Orders/Contracts are to be continued for the term of the Purchase Order/Contract, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.
6. Payment may only be made after the delivery and acceptance of goods or services.
7. Interest may be paid for late payment in accordance with the *West Virginia Code*.
8. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
9. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
10. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
11. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern all rights and duties under the Contract, including without limitation the validity of this Purchase Order/Contract.
12. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
13. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, this contract is automatically null and void, and is terminated without further order.
14. **HIPAA Business Associate Addendum** - The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, and available online at the Purchasing Division's web site (<http://www.state.wv.us/admin/purchase/vrc/hipaa.htm>) is hereby made part of the agreement. Provided that, the Agency meets the definition of a Covered Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division.
2. **SPECIFICATIONS:** Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Complete all sections of the quotation form.
4. Unit prices shall prevail in cases of discrepancy.
5. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
6. **BID SUBMISSION:** All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications.

SIGNED BID TO:

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFC NUMBER
 667C0029

PAGE
 2

ADDRESS CORRESPONDENCE TO ATTENTION OF:
 JOHN JOHNSTON
 304-558-2402

VENDOR

*609112626 800-346-7237
 CRYOTECH DEICING TECHNOLOGY
 6103 ORTHOWAY
 FORT MADISON IA 52627

SHIP TO

DIVISION OF HIGHWAYS
 VARIOUS LOCALES AS INDICATED
 BY ORDER

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
06/04/2007				

BID OPENING DATE: **06/27/2007** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>ORIGINAL CONTRACT AND SHALL BE LIMITED TO TWO (2) ONE (1) YEAR PERIODS.</p> <p>CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE COMMODITIES AND/OR SERVICE SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM TO THE SPECIFICATIONS OF THE BID AND CONTRACT HEREIN.</p> <p>OPEN MARKET CLAUSE: THE DIRECTOR OF PURCHASING MAY AUTHORIZE A SPENDING UNIT TO PURCHASE ON THE OPEN MARKET, WITHOUT THE FILING OF A REQUISITION OR COST ESTIMATE, ITEMS SPECIFIED ON THIS CONTRACT FOR IMMEDIATE DELIVERY IN EMERGENCIES DUE TO UNFORESEEN CAUSES (INCLUDING BUT NOT LIMITED TO DELAYS IN TRANSPORTATION OR AN UNANTICIPATED INCREASE IN THE VOLUME OF WORK.)</p> <p>QUANTITIES: QUANTITIES LISTED IN THE REQUISITION ARE APPROXIMATIONS ONLY, BASED ON ESTIMATES SUPPLIED BY THE STATE SPENDING UNIT. IT IS UNDERSTOOD AND AGREED THAT THE CONTRACT SHALL COVER THE QUANTITIES ACTUALLY ORDERED FOR DELIVERY DURING THE TERM OF THE CONTRACT, WHETHER MORE OR LESS THAN THE QUANTITIES SHOWN.</p> <p>ORDERING PROCEDURE: SPENDING UNIT(S) SHALL ISSUE A WRITTEN STATE CONTRACT ORDER (FORM NUMBER WV-39) TO THE VENDOR FOR COMMODITIES COVERED BY THIS CONTRACT. THE ORIGINAL COPY OF THE WV-39 SHALL BE MAILED TO THE VENDOR AS AUTHORIZATION FOR SHIPMENT, A SECOND COPY MAILED TO THE PURCHASING DIVISION, AND A THIRD COPY RETAINED BY THE SPENDING UNIT.</p> <p>BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THIS CONTRACT IS AUTOMATICALLY NULL AND VOID, AND IS TERMINATED WITHOUT FURTHER ORDER.</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Raymond G. Luginer</i>	TELEPHONE 800-346-7237 or 319-372-6012	DATE June 25, 2007
TITLE Manager, Operations	FEIN 33-0270225	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
667C0029

PAGE
3

ADDRESS CORRESPONDENCE TO ATTENTION OF:
JOHN JOHNSTON
304-558-2402

VENDOR

*609112626 800-346-7237
 CRYOTECH DEICING TECHNOLOGY
 6103 ORTHOWAY

 FORT MADISON IA 52627

SHIP TO

DIVISION OF HIGHWAYS
 VARIOUS LOCALES AS INDICATED
 BY ORDER

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
06/04/2007				

BID OPENING DATE: **06/27/2007** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>THE TERMS AND CONDITIONS CONTAINED IN THIS CONTRACT SHALL SUPERSEDE ANY AND ALL SUBSEQUENT TERMS AND CONDITIONS WHICH MAY APPEAR ON ANY ATTACHED PRINTED DOCUMENTS SUCH AS PRICE LISTS, ORDER FORMS, SALES AGREEMENTS OR MAINTENANCE AGREEMENTS, INCLUDING ANY ELECTRONIC MEDIUM SUCH AS CD-ROM.</p> <p>REV. 04/11/2001</p> <p>PURCHASING CARD ACCEPTANCE: THE STATE OF WEST VIRGINIA CURRENTLY UTILIZES A VISA PURCHASING CARD PROGRAM WHICH IS ISSUED THROUGH A BANK. THE SUCCESSFUL VENDOR MUST ACCEPT THE STATE OF WEST VIRGINIA VISA PURCHASING CARD FOR PAYMENT OF ALL ORDERS PLACED BY ANY STATE AGENCY FOR ORDERS THAT ARE LESS THAN \$2,500 AS A CONDITION OF AWARD.</p> <p style="text-align: center;">VENDOR PREFERENCE CERTIFICATE</p> <p>CERTIFICATION AND APPLICATION* IS HEREBY MADE FOR PREFERENCE IN ACCORDANCE WITH WEST VIRGINIA CODE, 5A-3-37 (DOES NOT APPLY TO CONSTRUCTION CONTRACTS).</p> <p>A. APPLICATION IS MADE FOR 2.5% PREFERENCE FOR THE REASON CHECKED:</p> <p>() BIDDER IS AN INDIVIDUAL RESIDENT VENDOR AND HAS RESIDED CONTINUOUSLY IN WEST VIRGINIA FOR FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION; OR</p> <p>() BIDDER IS A PARTNERSHIP, ASSOCIATION OR CORPORATION RESIDENT VENDOR AND HAS MAINTAINED ITS HEAD-QUARTERS OR PRINCIPAL PLACE OF BUSINESS CONTINUOUSLY I</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Raymond Hupman</i>	TELEPHONE 800-346-7237 or 319-372-6012	DATE June 25, 2007
TITLE Manager, Operations	FEIN 33-0270225	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
667C0029

PAGE
4

ADDRESS CORRESPONDENCE TO ATTENTION OF:
JOHN JOHNSTON
304-558-2402

VENDOR

*609112626 800-346-7237
 CRYOTECH DEICING TECHNOLOGY
 6103 ORTHOWAY
 FORT MADISON IA 52627

SHIP TO

DIVISION OF HIGHWAYS
 VARIOUS LOCALES AS INDICATED
 BY ORDER

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
06/04/2007				

BID OPENING DATE: **06/27/2007** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>WEST VIRGINIA FOR FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION; OR 80% OF THE OWNERSHIP INTEREST OF BIDDER IS HELD BY ANOTHER INDIVIDUAL, PARTNERSHIP, ASSOCIATION OR CORPORATION RESIDENT VENDOR WHO HAS MAINTAINED ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS CONTINUOUSLY IN WEST VIRGINIA FOR FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION; OR</p> <p>() BIDDER IS A CORPORATION NONRESIDENT VENDOR WHICH HAS AN AFFILIATE OR SUBSIDIARY WHICH EMPLOYS A MINIMUM OF ONE HUNDRED STATE RESIDENTS AND WHICH HAS MAINTAINED ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS WITHIN WEST VIRGINIA CONTINUOUSLY FOR THE FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION.</p> <p>B. APPLICATION IS MADE FOR 2.5% PREFERENCE FOR THE REASON CHECKED:</p> <p>() BIDDER IS A RESIDENT VENDOR WHO CERTIFIES THAT, DURING THE LIFE OF THE CONTRACT, ON AVERAGE AT LEAST 75% OF THE EMPLOYEES WORKING ON THE PROJECT BEING BID ARE RESIDENTS OF WEST VIRGINIA WHO HAVE RESIDED IN THE STATE CONTINUOUSLY FOR THE TWO YEARS IMMEDIATELY PRECEDING SUBMISSION OF THIS BID;</p> <p>OR</p> <p>() BIDDER IS A NONRESIDENT VENDOR EMPLOYING A MINIMUM OF ONE HUNDRED STATE RESIDENTS OR IS A NONRESIDENT VENDOR WITH AN AFFILIATE OR SUBSIDIARY WHICH MAINTAINS ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS WITHIN WEST VIRGINIA EMPLOYING A MINIMUM OF ONE HUNDRED STATE RESIDENTS WHO CERTIFIES THAT, DURING THE LIFE OF THE CONTRACT, ON AVERAGE AT LEAST 75% OF THE EMPLOYEES OR BIDDERS' AFFILIATE'S OR SUBSIDIARY'S EMPLOYEES ARE RESIDENTS OF WEST VIRGINIA</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Roxanna Sufferin</i>	TELEPHONE 800-346-7237 or 319-372-6012	DATE June 25, 2007
TITLE Manager, Operations	FEIN 33-0270225	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER:
667C0029

PAGE:
5

ADDRESS CORRESPONDENCE TO ATTENTION OF:
**JOHN JOHNSTON
 304-558-2402**

VENDOR

*609112626 800-346-7237
 CRYOTECH DEICING TECHNOLOGY
 6103 ORTHOWAY

 FORT MADISON IA 52627

SHIP TO

DIVISION OF HIGHWAYS
 VARIOUS LOCALES AS INDICATED
 BY ORDER

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
06/04/2007				

BID OPENING DATE: **06/27/2007** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>WHO HAVE RESIDED IN THE STATE CONTINUOUSLY FOR THE TWO YEARS IMMEDIATELY PRECEDING SUBMISSION OF THIS BID.</p> <p>BIDDER UNDERSTANDS IF THE SECRETARY OF TAX & REVENUE DETERMINES THAT A BIDDER RECEIVING PREFERENCE HAS FAILED TO CONTINUE TO MEET THE REQUIREMENTS FOR SUCH PREFERENCE, THE SECRETARY MAY ORDER THE DIRECTOR OF PURCHASING TO: (A) RESCIND THE CONTRACT OR PURCHASE ORDER ISSUED; OR (B) ASSESS A PENALTY AGAINST SUCH BIDDER IN AN AMOUNT NOT TO EXCEED 5% OF THE BID AMOUNT AND THAT SUCH PENALTY WILL BE PAID TO THE CONTRACTING AGENCY OR DEDUCTED FROM ANY UNPAID BALANCE ON THE CONTRACT OR PURCHASE ORDER.</p> <p>BY SUBMISSION OF THIS CERTIFICATE, BIDDER AGREES TO DISCLOSE ANY REASONABLY REQUESTED INFORMATION TO THE PURCHASING DIVISION AND AUTHORIZES THE DEPARTMENT OF TAX AND REVENUE TO DISCLOSE TO THE DIRECTOR OF PURCHASING APPROPRIATE INFORMATION VERIFYING THAT BIDDER HAS PAID THE REQUIRED BUSINESS TAXES, PROVIDED THAT SUCH INFORMATION DOES NOT CONTAIN THE AMOUNTS OF TAXES PAID NOR ANY OTHER INFORMATION DEEMED BY THE TAX COMMISSIONER TO BE CONFIDENTIAL.</p> <p>UNDER PENALTY OF LAW FOR FALSE SWEARING (WEST VIRGINIA CODE 61-5-3), BIDDER HEREBY CERTIFIES THAT THIS CERTIFICATE IS TRUE AND ACCURATE IN ALL RESPECTS; AND THAT IF A CONTRACT IS ISSUED TO BIDDER AND IF ANYTHING CONTAINED WITHIN THIS CERTIFICATE CHANGES DURING THE TERM OF THE CONTRACT, BIDDER WILL NOTIFY THE PURCHASING DIVISION IN WRITING IMMEDIATELY.</p> <p style="text-align: right;">BIDDER: -----</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Johnna Geyman</i>	TELEPHONE 800-346-7237 or 319-372-6012	DATE June 25, 2007
TITLE Manager, Operations	BEIN 33-0270225	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
667C0029

PAGE
6

ADDRESS CORRESPONDENCE TO ATTENTION OF:
JOHN JOHNSTON 304-558-2402

VENDOR

*609112626 800-346-7237
 CRYOTECH DEICING TECHNOLOGY
 6103 ORTHOWAY

 FORT MADISON IA 52627

SHIP TO

DIVISION OF HIGHWAYS
 VARIOUS LOCALES AS INDICATED
 BY ORDER

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
06/04/2007				

BID OPENING DATE: **06/27/2007** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
			DATE:	-----		
			SIGNED:	-----		
			TITLE:	-----		
	* CHECK ANY COMBINATION OF PREFERENCE CONSIDERATION(S) IN EITHER "A" OR "B", OR BOTH "A" AND "B" WHICH YOU ARE ENTITLED TO RECEIVE. YOU MAY REQUEST UP TO THE MAXIMUM 5% PREFERENCE FOR BOTH "A" AND "B". (REV. 12/00)					
	NOTICE					
	A SIGNED BID MUST BE SUBMITTED TO:					
	DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION BUILDING 15 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25305-0130					
	THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:					
	SEALED BID					
	BUYER:			33		
	RFQ. NO.:			667C0029		

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Royman Guyman</i>	TELEPHONE 800-346-7237 or 319-372-6012	DATE June 25, 2007
TITLE Manager, Operations	FEIN 33-0270225	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
667C0029

PAGE
7

ADDRESS CORRESPONDENCE TO ATTENTION OF
**JOHN JOHNSTON
 304-558-2402**

VENDOR

***609112626 800-346-7237**
CRYOTECH DEICING TECHNOLOGY
6103 ORTHOWAY

FORT MADISON IA 52627

SHIP TO

DIVISION OF HIGHWAYS
VARIOUS LOCALES AS INDICATED
BY ORDER

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
06/04/2007				

BID OPENING DATE: **06/27/2007** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>BID OPENING DATE AND TIME</p> <p>PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID:</p> <p style="padding-left: 150px;">319-372-2662</p> <p>-----</p> <p>CONTACT PERSON (PLEASE PRINT CLEARLY):</p> <p style="padding-left: 50px;">Laura Mason or Roxanna Huffman</p> <p>-----</p> <p>***** THIS IS THE END OF RFQ 667C0029 ***** TOTAL: \$1,314.49/US Ton</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Roxanna Huffman</i>	TELEPHONE 800-346-7237 or 319-372-2662	DATE June 25, 2007
TITLE Manager, Operations	FEIN 33-0270225	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

1. SPECIFICATIONS

The following sections of the West Virginia Department of Transportation, Division of Highways Standard Specifications Roads and Bridges, adopted 2000, as modified by the current Supplemental Specifications shall apply to the Administration of this Contract: Sections 101, 102.4, 102.5, 105.1, 105.3, 105.4, 105.10, 105.11, 105.12, 105.13, 106.3, 106.4, 106.5, 106.6, 106.7, 106.9, 107.1, 107.2, 107.3, 107.14, 107.19, 107.20, 108.8, 109.1, 109.2 and 109.20.

The requirements of the West Virginia Department of Transportation, Division of Highways, Standard Specifications Section 109.20, PRICE ADJUSTMENT FOR LOAD LIMIT VIOLATIONS, shall apply to all material supplied under this contract. This will include material loaded by the vendor into Division of Highways owner and/or rented trucks.

The terms "Contractor" and "Vendor" used in the above specifications of this contract are interchangeable. Contractor shall mean Vendor and Vendor shall mean Contractor.

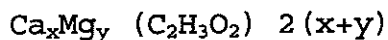
West Virginia Department of Transportation, Division of Highways' Standard Specifications Roads and Bridges, adopted 2000 and may be obtained from:

West Virginia Division of Highways
Contract Administration Division
1900 Kanawha Blvd., East, Bldg. 5, Rm A729
Charleston, West Virginia 25305

2. Calcium Magnesium Acetate shall conform to the following product specifications and shall be delivered in bulk.

PRODUCT SPECIFICATION

Composition: A nominal 3/7 Calcium Magnesium Acetate (CMA) of this analysis:




x = 3 to 4

y = 7 to 6

CMA	91% Min.
Water (Free & Hydration)	5% Max.
Water-Insoluble Material	4% Max.

<u>Particle Size:</u>	Sieve	% Passing
	4	90 Min.
	14	10 Max.

Particle Shape: Hard, ~~Angular~~, ~~Asymmetrical~~ Granules
Specific Gravity: Minimum 1.2
Bulk Density: 40 lb/ft³ to 44 lb/ft³
Residual Base: Maximum 0.4 meg base/gm sample
Product pH: pH 8 to 10 in a 10% solution

see attached product spec 

2a. Low corrosive Pre-wetting agent/ no clorides

Density: At 68 degrees F. 10.7 lbs/gallon
Viscosity: At 68 degrees F. 10 cp maximum
 At 32 degrees F. 20 cp maximum
Freezing Point: -76 degrees F.
Typical ph: 11.0+/- 0.5
Specific Gravity: At 68 degrees F. 1.25 - 1.30
Container Size: 265 gallon tote

3. BIDDING INSTRUCTIONS

The purpose of this contract is to provide for the delivery of Calcium Magnesium Acetate and a liquid pre-wetting agent to the location listed in the bidding schedule. Actual quantity to be delivered to the location will be specified in a State Contract Purchase Order (SCO), which will be issued by the Division of Highways at the time delivery is required. Any qualification of bids or any modification of the specifications or conditions governing the bids may be cause for their rejection.

4. CONTRACT AWARD

All qualified Vendors who submit a valid bid for "FOB Vendor's Storage Site" will be awarded a contract for this item (see Subsection 9.1).

All qualified Vendors who submit a valid bid for "FOB Division's Storage Site" will be awarded a contract for each location for which their bid is low (see Subsection 9.2). In the event a Vendor fails to conform to the requirements set out in this contract document, the State Contract Purchase Order or the governing specifications, the Purchase Order Contract may be canceled and re-awarded to the next low bidder.

5. DELIVERY

A State Contract Purchase Order (SCO) for delivery to individual Division of Highways Storage Sites will be issued to the Vendor awarded a contract for that specific location (see Subsection 9.2).

In the event the Vendor to which the SCO is issued is unable to comply with the specified delivery schedule the Division may, at its option, cancel all or part of the SCO and obtain the required quantity of Calcium Magnesium Acetate from the most economical available source.

6. SAMPLING AND TESTING

Upon award of contract, the Vendor shall provide the Division with the proposed source of supply. Acceptance shall be based on suppliers' certification of quality and gradation. This information shall be directed to:

West Virginia Division of Highways
Materials Section
190 Dry Branch Road
Charleston, West Virginia 25306

The Division may conduct sampling and testing to verify material quality or gradation.

7. WEIGHING MATERIALS DELIVERED BY TRUCK

The material shall be weighed on any scales meeting the following requirements. The Vendor is not authorized to ship, nor is the Division authorized to receive, materials prior to the issuance of an "SCO".

All truck scales shall be mounted on solid foundations, which will ensure their remaining plumb and level. All truck scales shall be inspected and sealed by the West Virginia Department of Labor, Bureau of Weights and Measures, or other appropriate agencies of the State or its political subdivision. The Division may, at its option, accept inspection and sealing by out-of-state agencies when the scales are located outside West Virginia.

The Division prefers materials be weighed on digital scales for better accuracy and dependability and thus the increased confidence in record keeping. Therefore, the Division supports and encourages the installation of digital recorders on all truck scales.

These digital recorders shall produce a printed record of the gross, tare and net weights, and the time, date, truck identification and "SCO" numbers. Provisions shall be made for constant zero compensation and further provision shall be made so that the scales may not be manually manipulated during the printing process. The system shall be interlocked so as to allow printing only when the scale has come to rest. In case of a breakdown of the automatic equipment, the Division of Highways will permit manual operation for forty-eight (48) hours, while equipment is being repaired, before the stated deductions for failure to have digital scales are assessed.

Each truck shall be weighed empty prior to each load.

8. SUPPLYING OTHER ORGANIZATIONAL ENTITIES

In accordance with Chapter 5A, Article 3, Section 9 of the Code of West Virginia the commodities or services contracted for herein shall be available to all local governmental bodies in accordance with the same prices, terms and conditions afforded to the State of West Virginia.

In the event any Vendor does not wish to extend the above prices, terms and conditions of his/her bid and subsequent contract to all political sub-divisions of the State, he must so indicate in a clear and unambiguous manner in his bid.

This indication does not prejudice the award of the contract. If a Vendor does not indicate his refusal to extend the prices, terms and conditions of his bid to other entities of the State he is bound to extend them upon issuance of a purchase order by these entities.

Other organizational entities using this provision of the contract shall do so without any involvement of the Division of Highways. That is, the entity shall make its own purchase arrangements with the Vendor and shall make its own arrangements for payment.

9. VENDOR'S INVOICES

Vendor's invoices must be submitted in original and one copy and contain the following:

- a) Division of Highways State Contract Purchase Order (SCO) Number, and this Contract Number.
- b) Total quantity and unit price with the total cost of material furnished.

Note: Under no circumstance will the West Virginia Division of Highways accept, or pay for, quantities of materials in excess of the quantity stated on the State Contract Purchase Order.

10. BIDDING FOB VENDOR'S STORAGE SITE

10.1 Bidding F.O.B. Vendor's Storage Site

<u>Location of Storage Site</u>	<u>Bid Price (\$/Ton) FOB Vendor's Storage Site (Note 1)</u>
<u>Ft. Madison, IA</u>	\$1,223.58/US Ton

Haul By Vendor

@ _____ For First Ton-Mile

@ _____ For Each Additional Ton-Mile

NOTE 1: Bid price shall include cost of vendor loading Division trucks.

BID SCHEDULE (Continued)

10.2 Bidding F.O.B. Division's Storage Site

CALCIUM MAGNESIUM ACETATE

(DOH CLASSIFICATION 011-010-000004)

DISTRICT 9

PLEASE QUOTE ENGLISH MEASURE ONLY

COUNTY	DELIVERY SITE	ESTIMATED NEEDS (TONS)	BID PRICE (PER TON)
Fayette	Oak Hill	100	<u>\$1,314.49/US Ton</u>

10.3 Bidding F.O.B. Division Storage Site

LIQUID PRE-WETTING AGENT NON-CLORIDES
(DOH CLASSIFICATION 011-010-000020)

COUNTY	DELIVERY SITE	ESTIMATED NEEDS GALLONS	PER GALLON
Fayette	Oak Hill	800	<u>\$7.03/gallon shipped</u> in 265 gallon totes

Note 1: Price per gallon and per ton shall include delivery cost.

STATE OF WEST VIRGINIA
Purchasing Division**PURCHASING AFFIDAVIT**

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owned is an amount greater than one thousand dollars in the aggregate

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

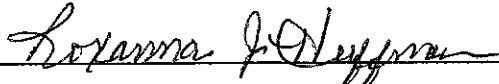
EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

LICENSING: Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agencies or political subdivision. Furthermore, the vendor must provide all necessary releases to obtain information to enable the Director or spending unit to verify that the vendor is licensed and in good standing with the above entities.

CONFIDENTIALITY: The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures and rules. Vendors should visit www.state.wv.us/admin/purchase/privacy for the Notice of Agency Confidentiality Policies.

Under penalty of law for false swearing (West Virginia Code, §61-5-3), it is hereby certified that the vendor acknowledges the information in this said affidavit and are in compliance with the requirements as stated.

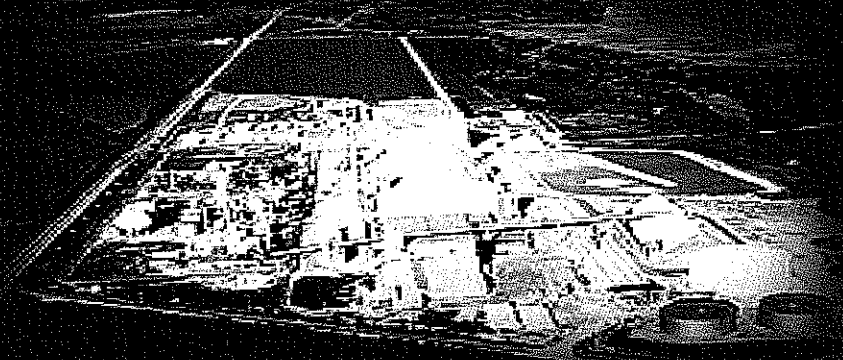
Vendor's Name: Cryotech Deicing Technology (a division of General Atomics Int'l Services Corp.)

Authorized Signature:  Date: June 25, 2007



CRYOTECH DEICING TECHNOLOGY IS A DIVISION OF GENERAL ATOMICS INTERNATIONAL SERVICES CORPORATION, A SAN DIEGO-BASED COMPANY SPECIALIZING IN ENERGY-RELATED RESEARCH AND PRODUCT DEVELOPMENT. IN 1992, GENERAL

ATOMICS PURCHASED THE DEICING BUSINESS OF CHEVRON CHEMICAL COMPANY. INCLUDED IN THE ACQUISITION WAS THE PRODUCTION FACILITY AT FORT MADISON, IOWA, PLUS ALL PATENTS, PROCESSES, AND RIGHTS DEVELOPED BY CHEVRON. THE BUSINESS WAS RENAMED CRYOTECH DEICING TECHNOLOGY, THE ROOT WORD "CRYO" MEANING COLD.



A WORLD LEADER IN ACETATE TECHNOLOGY, CRYOTECH MANUFACTURES AND MARKETS ENVIRONMENTALLY COMPATIBLE ACETATE-BASED HIGHWAY, COMMERCIAL, AND AIRPORT RUNWAY DEICERS. ACETATES ARE CONSIDERED SAFE FOR THE ENVIRONMENT BECAUSE THEY READILY BIODEGRADE AND EXHIBIT LOW TOXICITY TO VEGETATION AND AQUATIC LIFE. ACETATES HAVE LOW CORROSION RATES, AND ARE IDEAL FOR APPLICATION ON REINFORCED CONCRETE STRUCTURES SUCH AS BRIDGES AND PARKING GARAGES. ACETATES ALSO HAVE A RESIDUAL EFFECT, WORKING LONGER THAN COMMON DEICERS.

IN 1998, CRYOTECH'S FORT MADISON, IOWA PLANT RECEIVED ISO 9002 CERTIFICATION FOR ITS QUALITY PROCESS SYSTEMS. ISO IS AN INTERNATIONALLY RECOGNIZED QUALITY MODEL. IT PROVIDES ASSURANCE TO CUSTOMERS THAT THE PRODUCTS THEY RECEIVE ARE PRODUCED AND SHIPPED UNDER RIGOROUS INTERNATIONAL QUALITY STANDARDS. IN MARCH 2002, CRYOTECH'S FT. MADISON, IOWA, PLANT ACHIEVED CONVERSION TO ISO 9001:2000 CERTIFICATION. CRYOTECH ALSO BECAME ISO 14001:2004 CERTIFIED IN 2005. TO ACHIEVE ISO 14001:2004 CERTIFICATION, A COMPANY MUST ESTABLISH AND MAINTAIN A DETAILED ENVIRONMENTAL MANAGEMENT SYSTEM WHICH ALLOWS IT TO IDENTIFY AND TAKE REQUIRED ACTIONS THAT REDUCE ENVIRONMENTAL AND HEALTH RISKS, WHILE CONSISTENTLY IMPROVING ITS ENVIRONMENTAL PERFORMANCE. CRYOTECH IS THE FIRST MANUFACTURER IN ITS INDUSTRY TO RECEIVE CERTIFICATION TO BOTH ISO STANDARDS, REAFFIRMING ITS POSITION AS INDUSTRY LEADER IN ACETATE-BASED DEICERS.

IN 1999 CRYOTECH FORMED AN AGREEMENT WITH KILFROST LTD. IN EUROPE TO MANUFACTURE AND DISTRIBUTE KILFROST TYPE I AND TYPE IV AIRCRAFT DEICERS THROUGHOUT NORTH AMERICA. THE FLUIDS ARE PROPYLENE GLYCOL-BASED, OFFERING SUPERIOR ENVIRONMENTAL AND HOLDOVER PERFORMANCE.



PRODUCTS

CRYOTECH NAAC®

- NAAC is 97% solid anhydrous sodium acetate
- For commercial and airport use - certified to current FAA-approved specifications
- Exothermic: gives off heat, melting ice faster than common deicers
- Requires less material than common deicers
- Is effective to low temperatures: 5°F (-15°C)
- Safer for the environment: low BOD, low toxicity

CRYOTECH CMA®

- CMA is solid calcium magnesium acetate
- For commercial use as a solid
- May be dissolved and applied as anti-icing liquid
- The safest deicer for concrete, even concrete cured less than one year
- Breaks/inhibits bond between snow/ice and pavement, improving traction
- Works best above 20°F (-7°C)

CRYOTECH CMA40®

- CMA40 is 40% calcium magnesium acetate and 60% sodium chloride
- For commercial use
- The blend retains many of the benefits of CMA, inhibiting the chloride
- Apply early in the storm to prevent snow/ice bonding
- Works best above 20°F (-7°C)

CRYOTECH CF7®

- CF7 is liquid potassium acetate
- For commercial use
- Liquid formulation works on contact
- Is not slippery and does not track like common deicers
- Low freezing point of -76°F (-60°C)

CRYOTECH E36®

- E36 is liquid potassium acetate
- For airport use - certified to current FAA approved specifications
- Excellent anti-icing characteristics
- Less slippery than glycol-based products
- Active at low temperatures
- Safer for the environment: low BOD, low toxicity

KILFROST ABC-S®

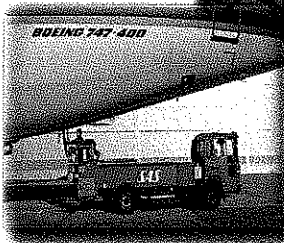
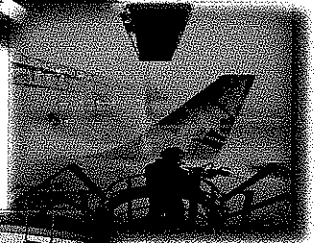
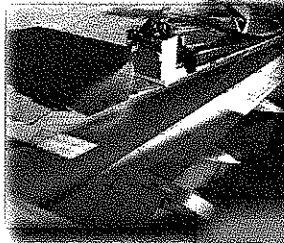
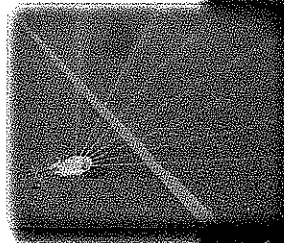
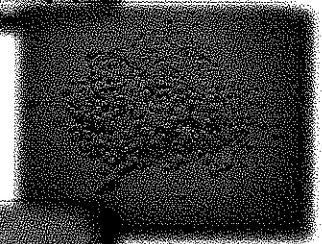
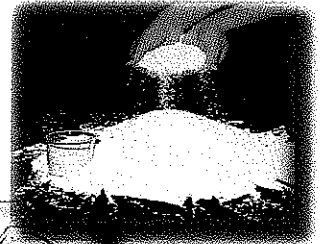
- Type IV propylene glycol fluid
- For aircraft use - certified to current FAA approved specifications
- Long holdover performance in all snow conditions
- Superior sprayability - lack of foam during application
- Long-term fluid stability

KILFROST DF Plus®

- Type I propylene glycol fluid
- For aircraft use - certified to current FAA approved specifications
- Supplied as concentrate
- Dilute to required temperature for economical savings
- Fully certified triazole-free fluid

CRYOTECH E36 Lavatory Antifreeze

- Cryotech E36 Lavatory Antifreeze is liquid potassium acetate
- Has low freeze point of -76°F (-60°C)
- May be diluted to desired freeze point
- BOD less than one-third that of propylene glycol



FOR ORDERING INFORMATION CONTACT:
Ph: 319.372.6012 or 800.346.7237 Fax: 319.372.2662 E-mail: deicers@cryotech.com

Cryotech Deicing Technology
a division of General Atomics International Services Corporation
(a wholly owned subsidiary of General Atomic Technologies Corporation)
www.cryotech.com www.ga.com

Incorporated: Delaware
 December 4, 1987
 Registration #2145419

Parent: General Atomic Technologies Corporation (inc. in WY 2/26/86)
 3550 General Atomics Court
 San Diego, CA 92121-1194
 Fed-ID #83-0278510

Federal ID #: 33-0270225 (GAISC)
Sales Tax Exempt #: 1-56-011655 (Cryotech)
Dun & Bradstreet #: 85-918-1984 (GATC)
 80-807-9529 (GAISC)
 94-676-7308 (GAISC - Cryotech)
NAICS Code: 325998 Cage Code: 0S095
SIC Code: 2899

Remit to address: Cryotech Deicing Technology
(for customers) P.O. Box 513120
 Los Angeles, CA 90051-1120

SHIP TO/BILL TO:
Cryotech Deicing Technology
6103 Orthoway
Fort Madison, IA 52627-9412

Wiring Instructions: Bank of the West
 1280 Fourth Avenue
 San Diego, CA 92101-4206
 Cryotech Deicing Technology
 Checking Account #7490-03182
 ABA routing #121100782

For foreign wires Swift Code = BWSTUS66

Cryotech Deicing Technology
a division of General Atomics International Services Corporation
(a wholly owned subsidiary of General Atomic Technologies Corporation)

Trade References

Altorfer, Inc.
2600 6th Street, SW
Cedar Rapids, IA 52404
(319) 365-0551 phone
(319) 365-5639 fax
Contact: Ted Lawler

Crescent Electric Supply Co.
1001 N. Roosevelt
Burlington, IA 52601
(319) 752-3631 phone
(319) 752-4726 fax

Erco Worldwide
101 State Hwy. 73 South
Nekoosa, WI 54457
(715) 887-4575 phone
(416) 234-7435 fax
Contact: Jim Hensley
Email: jhensley@ercoworldwide.com

Jumbo Sack/Cratex Corp.
2677 Metro Boulevard
Maryland Heights, MO 63043
(314) 291-7777 phone
(314) 291-0045 fax
Contact: Michael Reynoso

Potterfield Trucking
R.R. 1, Box 225A
Monroe City, MO 63456
(573) 735-4528 phone
(573) 735-4399 fax
Contact: Phillip Potterfield

BP Chemicals
150 W. Warrenville Road
Naperville, IL 60563-8460
(877) 701-2726 phone
(630) 961-7800 fax
Contact: Lou Williams

Bank Reference

Union Bank of California
530 B Street #400
San Diego, CA 92186
(619) 230-3380 phone
(619) 230-3766 fax
Contact: Larry Hart

007 007 2007 10:10 0.00 REPORT 7 00701008 10-043 0002

MARSH

777 So. Figueroa Street, Los Angeles, CA 90017
Telephone (213) 624-5555 Fax (213) 346-5989
California License 0437153

CERTIFICATE OF INSURANCE

This certifies to: **To Whom It May Concern**

*that the following policy(ies) of insurance has been issued to **Cryotech Deicing Technology, General Atomics Corporation**, with office at **3550 General Atomics Court, San Diego, CA 92121-1194** by the insurer(s) named below:*

Insurer: One or More Member Companies of United States Aviation Insurance Group (USAIG)

Policy No: SIHL1-625H

Policy Term: April 1, 2007 to April 1, 2008

Coverage: Aviation Products Liability, including Grounding Liability, Airport Premises Liability and Aircraft Liability.

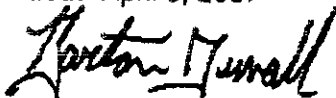
Limits of Liability: \$100,000,000 each occurrence Combined Single Limit Bodily Injury and Property Damage and in the aggregate.

Special Provisions:

EVIDENCE OF INSURANCE ONLY

If prior Certificates have been Issued pertaining to the subject matter above, this Certificate cancels and supercedes all such prior certificates.

Date Issued: April 3, 2007



Marsh Risk & Insurance Services

(1) This Certificate of Insurance is not an insurance policy and does not amend or alter the coverage afforded by the policies listed on this certificate, and (2) notwithstanding any requirement term or condition of any contract or other document with respect to which this certificate may be concerned or may pertain, the insurance afforded by the policy(ies) listed on this certificate is subject to all the terms, exclusions and conditions of such policy(ies) (California Insurance Code, Section 384)

Certificate: No. 019

MARSH

CERTIFICATE OF INSURANCE

CERTIFICATE NUMBER
LOS-000415613-24

PRODUCER

Marsh Risk & Insurance Services
4445 Eastgate Mall, Suite 300
San Diego, CA 92121-1979
858-552-4200

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER OTHER THAN THOSE PROVIDED IN THE POLICY. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES DESCRIBED HEREIN.

COMPANIES AFFORDING COVERAGE

COMPANY

A Lexington Insurance Company

COMPANY

B Everest National Insurance Company

COMPANY

C American International Specialty Lines Insurance Co.

COMPANY

D American Home Assurance Company

034348-10206--

INSURED

Cryotech Deicing Technology
A Division of General Atomics International Services Corp.
General Atomic Technologies Corporation
P. O. Box 85608
San Diego, CA 92186-5608

COVERAGES

This certificate supersedes and replaces any previously issued certificate for the policy period noted below.

4

THIS IS TO CERTIFY THAT POLICIES OF INSURANCE DESCRIBED HEREIN HAVE BEEN ISSUED TO THE INSURED NAMED HEREIN FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THE CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, CONDITIONS AND EXCLUSIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
A	GENERAL LIABILITY	0990032	02/28/07	02/28/08	GENERAL AGGREGATE	\$ 1,500,000
	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY				PRODUCTS - COMP/OP AGG	\$ 1,500,000
	<input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR				PERSONAL & ADV INJURY	\$ 1,500,000
	OWNER'S & CONTRACTOR'S PROT				EACH OCCURRENCE	\$ 1,500,000
	<input checked="" type="checkbox"/> \$500,000 SIR				FIRE DAMAGE (Any one fire)	\$ 100,000
					MED EXP (Any one person)	\$ Excluded
B	AUTOMOBILE LIABILITY	CA10000087071	02/28/07	02/28/08	COMBINED SINGLE LIMIT	\$ 1,000,000
	<input checked="" type="checkbox"/> ANY AUTO	CA10000094071 (TX)	02/28/07	02/28/08	BODILY INJURY (Per person)	\$
	<input type="checkbox"/> ALL OWNED AUTOS				BODILY INJURY (Per accident)	\$
	<input type="checkbox"/> SCHEDULED AUTOS				PROPERTY DAMAGE	\$
	<input type="checkbox"/> HIRED AUTOS				AUTO ONLY - EA ACCIDENT	\$
	<input checked="" type="checkbox"/> \$100,000 Deductible				OTHER THAN AUTO ONLY:	
	GARAGE LIABILITY				EACH ACCIDENT	\$
	<input type="checkbox"/> ANY AUTO				AGGREGATE	\$
C	EXCESS LIABILITY	9834233	02/28/07	02/28/08	EACH OCCURRENCE	\$ 4,500,000
	<input checked="" type="checkbox"/> UMBRELLA FORM				AGGREGATE	\$ 4,500,000
	OTHER THAN UMBRELLA FORM				SIR \$10,000	\$
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	WC 9722166 (AOS)	12/31/06	12/31/07	<input checked="" type="checkbox"/> WC STATUTORY LIMITS	
		Z066604603 (CA)	12/01/06	12/01/07	OTHER	
					EL EACH ACCIDENT	\$ 1,000,000
E	THE PROPRIETOR/PARTNERS/EXECUTIVE OFFICERS ARE:	<input checked="" type="checkbox"/> INCL			EL DISEASE-POLICY LIMIT	\$ 1,000,000
		<input type="checkbox"/> EXCL			EL DISEASE-EACH EMPLOYEE	\$ 1,000,000
F	OTHER Property Special Form Replacement Cost	ERP3086919-06	02/28/07	02/28/08	Total Property Limit	65,000,000
					Business Pers Prop Included	
					Deductible	100,000

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

EVIDENCE OF INSURANCE

CERTIFICATE HOLDER

CRYOTECH/GENERAL ATOMICS

CANCELLATION

SHOULD ANY OF THE POLICIES DESCRIBED HEREIN BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE INSURER AFFORDING COVERAGE WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED HEREIN, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER AFFORDING COVERAGE, ITS AGENTS OR REPRESENTATIVES, OR THE ISSUER OF THIS CERTIFICATE.

MARSH USA INC.

BY: Alejandrina M. Smith

Alejandrina M. Smith

MM1(3/02)

VALID AS OF: 03/12/07

ADDITIONAL INFORMATION

LOS-000415613-24 DATE (MM/DD/YY)
03/12/07

PRODUCER

Marsh Risk & Insurance Services
4445 Eastgate Mall, Suite 300
San Diego, CA 92121-1979
858-552-4200

034348-10206--

INSURED

Cryotech Deicing Technology
A Division of General Atomics International Services Corp.
General Atomic Technologies Corporation
P. O. Box 85608
San Diego, CA 92186-5608

COMPANIES AFFORDING COVERAGE

COMPANY

E Zenith Insurance Company

COMPANY

F American Guarantee & Liability Insurance Company

COMPANY

G

COMPANY

H

TEXT

CERTIFICATE HOLDER

CRYOTECH/GENERAL ATOMICS

MARSH USA INC. BY

Alejandrina M. Smith *Alejandrina M. Smith*

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2000

This is to certify that:

Cryotech Deicing Technology
6103 Orthoway
Fort Madison
Iowa
52627
USA

Holds Certificate No: **FM 39092**

and operates a Quality Management System which complies with the requirements of ISO 9001:2000 for the following scope:

The development, production and sales of environmentally benign deicing materials.

For and on behalf of BSI:



President, BSI Management Systems (Americas)

Originally registered: **03/12/1998**

Latest Issue: **07/24/2006**

Expiry Date: **07/23/2009**



Page: 1 of 2

This certificate remains the property of BSI, Inc. and shall be returned immediately upon the request.
An electronic certificate can be authenticated online. Printed copies can be validated at www.bsi-global.com/ClientDirectory.
To be read in conjunction with the scope above or the attached appendix.
Americas Headquarters: 12110 Sunset Hills Road, Suite 200, Reston, VA 20190, USA.
Group Headquarters: 389 Chiswick High Road, London, W4 4AL, UK.

BSI
**Management
Systems**

Certificate No: **FM 39092**

Location

Registered Activities

Cryotech Deicing Technology
6103 Orthoway
Fort Madison
Iowa
52627
USA

The development, production and sales of environmentally benign deicing materials.

Originally registered: **03/12/1998**

Latest Issue: **07/24/2006**

Expiry Date: **07/23/2009**

Page: 2 of 2

This certificate remains the property of BSI, Inc. and shall be returned immediately upon the request.
An electronic certificate can be authenticated online. Printed copies can be validated at www.bsi-global.com/ClientDirectory
To be read in conjunction with the scope above or the attached appendix.
Americas Headquarters: 12110 Sunset Hills Road, Suite 200, Reston, VA 20190, USA.

Group Headquarters: 389 Chiswick High Road, London, W4 4AL, UK.



CERTIFICATE OF REGISTRATION

Environmental Management System

This is to certify that:

Cryotech Deicing Technology
6103 Orthoway
Fort Madison
Iowa
USA
52627

Hold Certificate No: **EMS 89384**

and operate an Environmental Management System, which complies with the requirements of BS EN ISO 14001:2004 for the following scope:

The development, production and sales of environmentally benign deicing materials.

For and on behalf of BSI, Inc.:

President

Issue Date: 12 Jul 2005

Latest issue: 12 Jul 2005

Expiry Date: 11 Jul 2008

Page: 1 of 1



This certificate remains the property of BSI, Inc. It is contingent on meeting agreed contractual requirements. Validity is maintained through a process of continual assessments and reassessments. To check validity call 703 437 9000 or visit www.bsiamerica.com. To be read in conjunction with the scope of registration shown above or on the attached appendix. Group Headquarters: 389 Chiswick High Road, London W4 4AL, UK. Americas Headquarters: BSI, Inc. 12110 Sunset Hills Road, Suite 200, Reston, VA 20190, USA.

BSI
BSI
Management
Systems



Cryotech Deicing Technology is certified to ISO 9001:2000 and 14001:2004 standards. Customers often ask why these certifications are important enough to be made part of bid specifications. This document attempts to answer that question.

What is ISO?

The abbreviation "ISO" stands for International Organization for Standardization. ISO is a series of international standards introduced in 1987 that define and structure a company's management systems. These standards apply equally to all industries and require companies seeking certification to define how their systems meet the standards' rigorous requirements. Meeting the standards assures customers that all vendor company activities – design, manufacturing, production, purchasing, quality control, packaging, handling, storage, shipping, and customer service – are appropriately managed and controlled.

What is the difference between ISO 9000 and 14000?

ISO 9000 is concerned with "quality management." This means what the organization does to enhance customer satisfaction by meeting customer and applicable regulatory requirements and continually improving its performance in this regard.

ISO 14000 is primarily concerned with "environmental management." This means what the organization does to minimize harmful effects on the environment caused by its activities and continually improving its environmental performance.

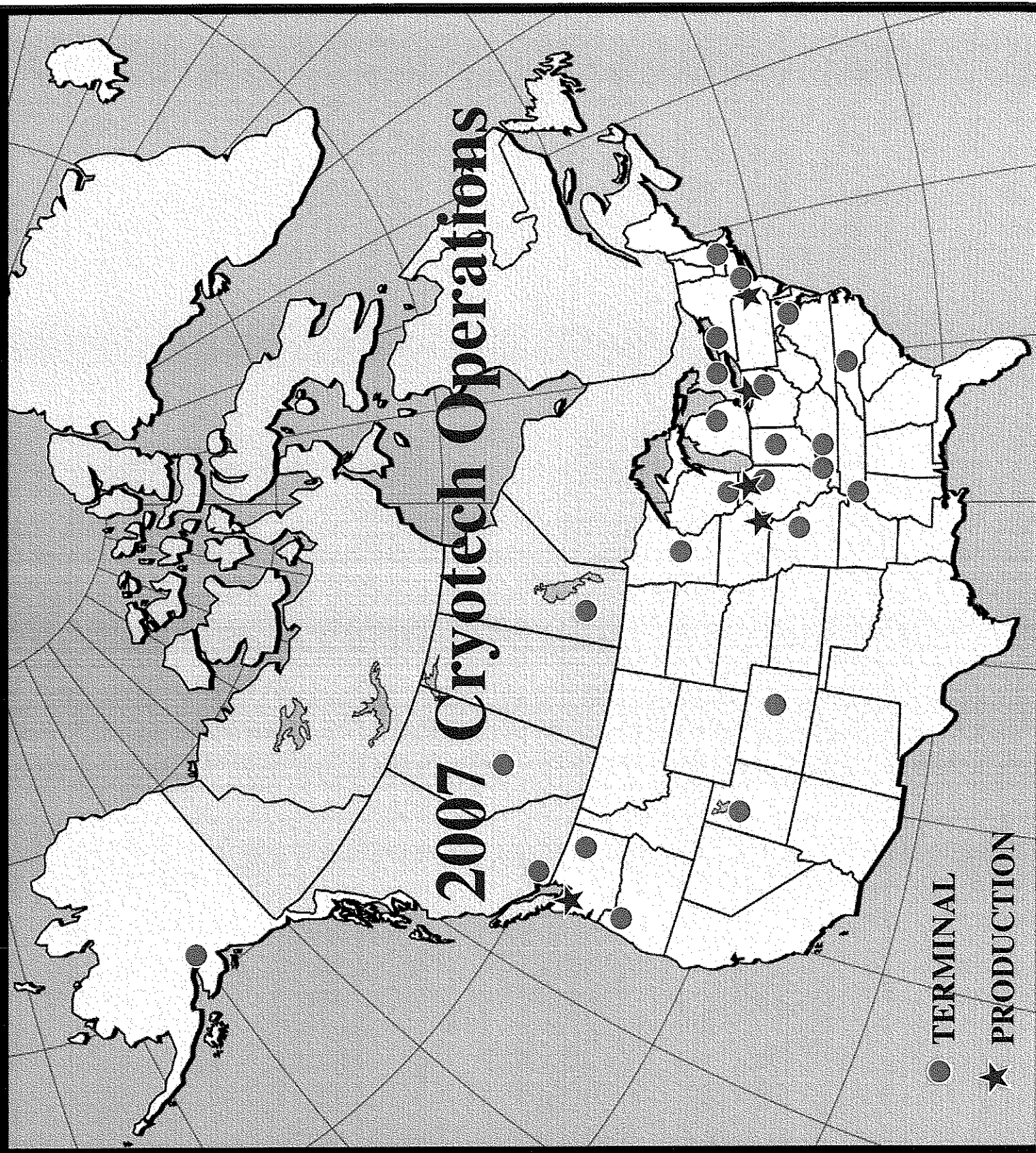
Can any vendor be ISO-certified?

Yes. There are approximately 250,000 companies worldwide registered to ISO standards. Any company willing to make the effort can be certified.

Why should I require vendors to be ISO-certified?

- ISO is direct evidence of a company's financial and ethical commitment to provide high quality, safe products.
- ISO certified companies maintain comprehensive internal audit programs that demonstrate to customers the effectiveness of their quality and environmental efforts.
- ISO certified companies utilize systems that have been accepted for use by over 80 countries as effective means to achieve product quality and environmental stewardship.
- ISO certified companies document, review, and approve product designs that meet applicable safety, regulatory, and customer requirements.
- ISO certified companies prove their systems through audits by independent registrars. Registrars are governed by strict international codes that dictate operating practices, audit methods, and staff qualifications. Failure to maintain quality program requirements will lead to de-certification by the registrar.
- ISO certified company products reduce the need for the buyers to perform audits and reviews to determine if quality systems are in place and being maintained.
- A certificate of analysis from an ISO certified company will be supported by documented procedures and records that demonstrate its validity. This is particularly important should a customer ever have a reason to question product quality.

2007. Cryotech Operations



Title: RELATIONSHIPS WITH SUPPLIERS AND CUSTOMERS

POLICY

- 1. GA shall sell its products and services on the basis of price, quality, and other lawful and reasonable business criteria. GA shall purchase goods and services on the basis of price, quality and other lawful and reasonable criteria. Contacts with supplier representatives and all contractual discussion with suppliers are to be made by, or with the knowledge of, Purchasing. *
- 2. Without consultation with, and approval of the Law Department, no employee, particularly those performing a selling or purchasing function, shall expressly or implicitly condition purchases of non-GA supplied goods and services upon the sales of GA's products since such a reciprocal buying practice may be anticompetitive and/or may be a violation of applicable antitrust laws. *
- 3. To the extent practicable, all qualified suppliers will be given an opportunity to bid on GA requirements. Any changes in technical or contractual requirements after the original solicitation is issued will be conveyed to prospective suppliers, who in the reasonable judgment of Purchasing, can meet the bid requirements. No advance information is to be given a bidder regarding the status of its proposal as compared to others. *
- 4. It is the policy of GA to encourage the participation of small business, small businesses owned and controlled by socially and economically disadvantaged individuals, historically under utilized business zone small businesses, women owned small businesses, veteran owned small businesses, American Indian owned businesses and historically black colleges and universities, in its procurements to the maximum extent practicable, consistent with effective performance, the needs of GA's business, and compliance with applicable laws. *
- 5. In order to avoid the appearance of GA's sponsoring or favoring any supplier, exhibits or products displayed through the use of booths, trailers, etc., will not be permitted on GA property. An exception may be made by the Director, Contracts & Purchasing, where it can be shown that the exhibit of a number of needed suppliers' products is in the best interest of GA. *

PROCEDURE

The Law Department should be consulted with respect to any questions involving the applicability or effect of this policy.

REFERENCES

- Guide to Antitrust Compliance
- Company Policy Manual:
 - CP-201 - Conflict of Interest
 - CP-600 - Procurement
 - CP-602 - Consultants

* = Revised

GENERAL ATOMICS

Memorandum of Agreement Regarding the

MASTER SUBCONTRACTING PLAN

FOR

DEPARTMENT OF DEFENSE CONTRACTS AND SUBCONTRACTS

Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB)

October 1, 2005 through September 30, 2008

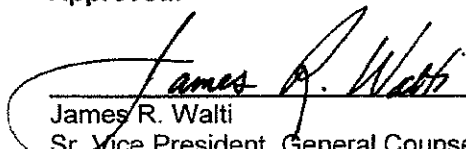
Prepared by:

 12/9/05

Andres A. Lara, Manager, Purchasing
Small Business Liaison Officer

Date


Approved:

 12/9/05

James R. Walti
Sr. Vice President, General Counsel & Secretary

Date

Approved by:

 12/1/05

Title
KAREN LAUSHAUL
Contracting Officer

Date

SECTION 1.0

1.1 Program Responsibility

The responsibility for the development and maintenance of the Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB), in accordance with Public Laws 95-507, 99-661, 103-355, 105-135, 106-50, 106-554, and FAR 52.219-8, 52.219-9(j)(2), 19.704, and DFAR 252.219-7003, and for assuring the successful performance and achievement of program objectives has been assigned to Andres A. Lara, Manager, Purchasing.

1.2 Program Coordination

General Atomics' (GA) Small Business Liaison Officer, Andres A. Lara, has been assigned program implementation and coordination responsibility. These responsibilities include:

- Establishing and maintaining internal source lists
- Acquisition of externally published source lists
- Distribution of information company-wide
- Assisting with identification of potential Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) sources
- Preparing and submitting Standard Forms 294 and 295
- Representing the purchasing organization at Small Business Administration (SBA) and Defense Contract Management Agency (DCMA) reviews
- Providing staff training
- Seeking out Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) sources and arranging Purchasing/QA/Technical surveys
- Developing and reviewing subcontracting plans

SECTION 2.0

2.1 GA Policy and Procedure

GA views the Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) program, as a continuation of past and present commitment to assist those concerns and provide them with the maximum practical opportunity to participate in subcontracts. It is the policy, as stated in Company Policy No. CP-215, and intention of GA to fully honor and implement the requirements of laws governing subcontracts and purchase orders into which GA enters. GA Purchasing Standard Operating Procedure 25 sets forth the internal procedure for complying with this program.

2.2 Implementation Methods

GA will assure that Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) will have an equitable opportunity to compete for subcontracts. In order to assure identification of potential sources for solicitation purposes, GA will:

- Comply with all government regulations including those concerning Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB).
- Maintain programs to effectively implement its Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) program. Purchasing personnel will be kept informed and current through department reviews and training programs, which are ongoing.
- Maintain existing company source lists of Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB)
- Utilize the Procurement Marketing and Access Network Central Contracting Registration (CCR) of the Small Business Administration (SBA), the list of certified small disadvantaged business, and HUBZone certified concerns of the SBA and, to the extent

- appropriate, the National Minority Purchasing Council Vendor Information Service, the Research and Information Division of the Minority Business Development Agency in the Department of Commerce, or other small business, HUBZone small business, small disadvantaged business, veteran-owned and service-disabled veteran-owned small business, and women-owned small business trade association publications.
- Provide outreach assistance and counseling, including publicizing of subcontracting opportunities, from its Purchasing, quality assurance, technical, and financial staff to assist Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB). Special payment terms will be arranged for Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB), when required.

SECTION 3.0
SUBCONTRACT FLOW-DOWN REQUIREMENTS

3.1 FAR 52.219-8 "Utilization of Small Business Concerns"

The clause "Utilization of Small Business Concerns" shall be included in all subcontracts over the simplified acquisition threshold except those for personal services and those which will be performed entirely outside any state, territory, or possession of the United States, the District of Columbia, or the Commonwealth of Puerto Rico.

3.2 FAR 52.219-9 "Small Business Subcontracting Plan"

GA will include the clause entitled, "Small Business Subcontracting Plan," in all subcontracts to other than small business concerns which offer further subcontracting opportunities and will require all sub-tier subcontractors (except small business concerns) who receive subcontracts in excess of five hundred thousand dollars (\$500,000), or in the case of a contract for the construction of any public facility, one million dollars (\$1,000,000), to negotiate a detailed subcontracting plan in accordance with FAR 52.219-9. GA will review, approve, and monitor the subcontracting plan for compliance.

3.3 FAR 52.219-16 "Liquidated Damages-Subcontracting Plan"

GA will include the clause entitled "Liquidated Damages-Subcontracting Plan", in all subcontracts containing FAR 52.219-9 "Small Business Subcontracting Plan."

SECTION 4.0 REPORTS

4.1 GA shall submit the following reports:

- (1) Standard Form 294, Subcontracting Report for Individual Contracts. This report shall be submitted to the Contracting Officer semi-annually and at contract completion. For contracts, which contain the clause FAR 52.219-25 GA shall report on the participation of SDB concerns at contract completion, or as otherwise required. Reporting may be on Optional Form 312, Small Disadvantaged Business Participation Report, or in GA's own format providing the same information. This report is required for each contract containing SDB participation targets. If this contract contains an individual Subcontracting Plan, reports may be submitted with the final Subcontracting Report for Individual Contracts (Standard Form 294) at the completion of the contract. Copies shall be submitted to the Defense Contract Management Agency (DCMA) at the Defense Contract Management Agency - San Diego office.

- (2) Standard Form 295, Summary Subcontract Report. This report encompasses all the contracts with the awarding agency. It must be submitted semi-annually for contracts with the Department of Defense. All reports submitted at the close of each fiscal year for applicable contracts shall include a breakout of subcontract awards, in whole dollars, to small disadvantaged business concerns by North American Industry Classification System (NAICS) Subsectors.

4.2 GA will ensure its subcontractors agree to submit SF 294 and SF 295 reports to the Government as required.

4.3 GA will provide periodic reports and cooperate in any studies or surveys as may be required by the contracting agency or the Small Business Administration in order to determine the extent of compliance with subcontracting plans for Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) requirements in general.

SECTION 5.0 RECORDS

5.1 GA agrees to maintain records that comply with the requirements and goals in this plan, including establishing source lists and efforts to locate Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) and award subcontracts to them. The records shall include the following:

Source lists (e.g., PRO-Net), guides, and other data that identify small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns.

Organizations contacted in an attempt to locate sources that are Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB), including:

San Diego Supplier Development Council
DOD Western Regional Council for Education and Advocacy
San Diego Contracting Opportunities Center
Supplier Diversity Marketplace

Subcontract solicitation resulting in an award of more than \$100,000, indicating-

- (1) Whether small business concerns were solicited and, if not, why not;
- (2) Whether HUBZone small business concerns were solicited and, if not, why not;
- (3) Whether small disadvantaged business concerns were solicited and, if not, why not;
- (4) Whether women-owned small business concerns were solicited and, if not, why not;
- (5) Whether Veteran-owned small business concerns were solicited and, if not, why not;
- (6) Whether Service-Disabled Veteran-owned small business concerns were solicited and, if not, why not; and
- (7) If applicable, the reason award was not made to a small business concern.

Outreach efforts to contact:

- (1) Trade associations;
- (2) Business development organizations; and
- (3) Conferences and trade fairs to locate Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) sources.

Internal guidance and encouragement provided to buyers through--

- (1) Workshops, seminars, training, etc.; and
- (2) Monitoring performance to evaluate compliance with the program's requirements.

5.2 GA also agrees to maintain, on a contract-by-contract basis, records to support award data submitted by the GA to the Government, including the name, address, and business size of each subcontractor.

SECTION 6.0 TRAINING AND MOTIVATION

6.1 Training

GA provides on-going training and awareness programs relative to FAR Part 19. Training is accomplished through staff meetings as well as seminars conducted by appropriate government and trade representatives.

6.2 Incentives

GA periodically provides incentive awards to Buyers for outstanding contributions to this program.

SECTION 7.0

ASSISTANCE TO SMALL BUSINESSES (SB), SMALL DISADVANTAGED BUSINESSES (SDB), WOMEN-OWNED SMALL BUSINESSES (WOSB), HISTORICALLY BLACK COLLEGES AND UNIVERSITIES AND MINORITY INSTITUTIONS (HBCU/MI), CERTAIN SMALL BUSINESS CONCERNS LOCATED IN "HISTORICALLY UNDERUTILIZED BUSINESS ZONES" (HUBZONE), VETERAN-OWNED SMALL BUSINESS (VOSB), AND SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESSES (SDVOSB)

GA agrees to implement this plan to the extent consistent with efficient contract performance and shall perform the following functions:

- (1) Assist Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) by arranging solicitations, time for the preparation of bids, quantities, specifications, and delivery schedules so as to facilitate the participation by such concerns. Where the lists of potential Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) subcontractors are excessively long, reasonable effort shall be made to give all such small business concerns an opportunity to compete over a period of time.
- (2) Provide adequate and timely consideration of the capabilities of Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) in all "make-or-buy" decisions.
- (3) Counsel and discuss subcontracting opportunities with representatives of Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) firms.
- (4) Provide notice to subcontractors concerning penalties and remedies for misrepresentations of business status as Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses

(WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) for the purpose of obtaining a subcontract that is to be included as part or all of a goal contained in the subcontracting plan.

SECTION 8.0 UNDERSTANDING

GA understands that:

- (1) An acceptable plan must, in the determination of the Contracting Officer, provide the maximum practicable opportunity for Small Businesses (SB), Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), certain small business concerns located in "historically underutilized business zones" (HUBZone), Veteran-Owned Small Business (VOSB), and Service-Disabled Veteran-Owned Small Business (SDVOSB) to participate in the performance of the contract.
- (2) The Contracting Officer shall notify GA in writing of any reasons for determining a subcontracting plan to be unacceptable. Such notice shall be given early enough in the negotiation process to allow GA sufficient time to modify the plan within the time limits prescribed.
- (3) Prior compliance of GA with other such subcontracting plans under previous contracts may be considered by the Contracting Officer in determining the responsibility of GA for award of the contract.
- (4) The failure of GA to comply in good faith with FAR 52.219-8 entitled, "Utilization of Small Business Concerns," may be a material breach of such contract or subcontract.
- (5) This Master Subcontracting Plan, which contains all the elements required by FAR 52.219-9 except goals, shall be incorporated by reference as a part of the contract specific subcontracting plan required of GA, provided:
 - (i) the master plan has been approved by the Contractor's cognizant Contract Administration Office;
 - (ii) GA provides copies of the approved master plan and evidence of its approval to the Contracting Officer; and
 - (iii) separate goals for the basic contract and, if necessary, each option and
 - (iv) any deviation from the master plan deemed necessary by the Contracting Officer to satisfy the requirements of its contract are set forth in the contract specific subcontracting plan.

Each contract specific subcontracting plan shall contain a description of the

principal types of supplies and services to be subcontracted, and an identification of the types planned for subcontracting to (i) Small Businesses (SB), (ii) Small Disadvantaged Businesses (SDB), (iii) Women-Owned Small Businesses (WOSB), (iv) Historically Black Colleges and Universities and Minority Institutions (HBCU/MI), (v) certain small business concerns located in "historically underutilized business zones" (HUBZone), (vi) Veteran-Owned Small Business (VOSB), and (vii) Service-Disabled Veteran-Owned Small Business (SDVOSB). Any goals less than the desired minimum will contain a description of the efforts to find sources and an explanation as to why those efforts have been unsuccessful. As provided in DFAR 219.705-4, GA will review and consider plans to utilize competition restricted to HBCU or MI's when a goal of less than 5% to SDB concerns is proposed.

GENERAL ATOMICS

Contract Specific Small Business Subcontracting Plan
For
DEPARTMENT OF DEFENSE

**SMALL BUSINESSES (SB), SMALL DISADVANTAGED BUSINESSES (SDB), WOMEN-OWNED SMALL BUSINESSES (WOSB), HISTORICALLY BLACK COLLEGES AND UNIVERSITIES AND MINORITY INSTITUTIONS (HBCU/MI), CERTAIN SMALL BUSINESS CONCERNS LOCATED IN "HISTORICALLY UNDERUTILIZED BUSINESS ZONES" (HUBZONE), VETERAN-OWNED SMALL BUSINESS (VOSB), AND SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESSES (SDVOSB)
MASTER SUBCONTRACTING PLAN**

October 1, 2005 through September 30, 2008

Contracting Agency: _____

Subcontracting goals for prime
Contract / solicitation no.: _____

Proposal No.: _____

Proposal Title: _____

Prepared by:
Mr. Tin Hla
Small Business Administrator

Approved by:

Andres A. Lara Date
Small Business Liaison Officer
Manager, Purchasing

I. Subcontracting Goals

A. Plan Administrator

Name: Mr. Tin Hla
Title: Small Business Administrator
Address: General Atomics
P. O. Box 85608
San Diego, CA 92186-5608
Telephone: (858) 455-2519

B. Subcontracting Goal Summary:

	<u>Amount</u>	<u>Percentage</u>
Total to be Subcontracted	\$	100.0%
To Large Business:	\$	%
To Small Business:	\$	%
To Small Disadvantaged Business (including HBCU's and MI's):	\$	%
To Woman-Owned Small Business:	\$	%
To HUBZone Small Business:	\$	%
To Veteran-Owned Small Business:	\$	%
To Service-Disabled Veteran-Owned Small Business:	\$	%

II. METHOD USED TO DEVELOP GOALS

Proposed subcontracting goals as identified in Item I were developed by a joint review of the solicitation statement of work and performance requirements. The joint review involved program, technical and purchasing personnel, including the Small Business Administrator. Criteria considered in the review process included:

- Review of the solicitation statement of work
- Identification of the requirement for goods and services
- Identification of the potential to subcontract for goods and services
- Identification of potential suppliers

III. INDIRECT AND OVERHEAD CHARGES

Indirect and overhead charges are not included in this subcontracting plan.

**SUBCONTRACTING GOAL SUMMARY:
OPTION YEAR MATRIX:**

		Total Value	Base Year	Option Year 1	Option Year 2	Option Year 3	Option Year 4
SMALL BUSINESS CONCERNS	SB	\$0					
LARGE BUSINESS CONCERNS	LB	\$0					
TOTAL AMOUNT TO BE SUBCONTRACTED	TOTAL	\$0					
SMALL DISADVANTAGED BUSINESS CONCERNS	SDB	\$0					
WOMEN-OWNED SMALL BUSINESS CONCERNS	WOSB	\$0					
HISTORICALLY BLACK COLLEGES AND UNIVERSITIES AND MINORITY INSTITUTIONS (if applicable)	HBCU/MI	\$0					
HUBZONE SMALL BUSINESS CONCERNS	HUBZone	\$0					
VETERAN-OWNED SMALL BUSINESS	VOSE	\$0					
SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS	SDVOSE	\$0					

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE SMALL BUSINESS PROGRAM	NUMBER 25	ISSUE J	DATE 2/20/01	PAGE 1 of 10
---------------------------------	--------------	------------	-----------------	-----------------

1. INTRODUCTION

1.1. Purpose

This instruction establishes the procedure for implementing compliance with Federal Acquisition Regulation (FAR) Part 19, Small Business Programs.

1.2. Policy

It is the policy of GA to encourage the participation of small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) concerns in its procurements to the maximum extent practicable, consistent with efficient performance and compliance with applicable laws and prime contract requirements.

*
*
*
*
*

1.3. Definitions

1.3.1. Small Business Concern

"Small business concern" means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on government contracts, and qualified as a small business under the criteria and size standards in FAR 19.102 size standards. Such a concern is "not dominant in its field of operation" when it does not exercise a controlling or major influence on a national basis in a kind of business activity in which a number of business concerns are primarily engaged. In determining whether dominance exists, consideration shall be given to all appropriate factors, including volume of business, number of employees, financial resources, competitive status or position, ownership or control of materials, processes, patents, license agreements, facilities, sales territory, and nature of business activity.

1.3.2. Veteran-Owned Small Business Concern

Veteran-owned small business concern means a small business

*
*
*

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE	NUMBER	ISSUE	DATE	PAGE
SMALL BUSINESS PROGRAM	25	J	2/20/01	2 of 2

* concern-

*

(1) Not less than 51 percent of which is owned by one or more
* veterans (as defined at 38 U.S.C. 101(2)) or, in the case
* of any publicly owned business, not less than 51 percent of
* the stock of which is owned by one or more veterans; and

*

(2) The management and daily business operations of which are
* controlled by one or more veterans.

*

* 1.3.3. Service-disabled Veteran Owned Small Business

*

* Service-disabled veteran-owned small business concern-

*

(1) Means a small business concern-

*

(i) * Not less than 51 percent of which is owned by one or
* more service-disabled veterans or, in the case of any
* publicly owned business, not less than 51 percent of
* the stock of which is owned by one or more service-
* disabled veterans; and

*

(ii) * The management and daily business operations of which
* are controlled by one or more service-disabled veter-
* ans or, in the case of a veteran with permanent and
* severe disability, the spouse or permanent caregiver
* of such veteran.

*

(1) Service-disabled veteran means a veteran, as defined in
* 38 U.S.C. 101(2), with a disability that is service-
* connected, as defined in 38 U.S.C. 101(16).

*

* 1.3.4. Historically Underutilized Small Business Concern
(HUBZone)

*

(1) A firm is a qualified HUBZone concern if:

*

(i) it is small

*

(ii) it is located in a HUBZone

*

(iii) it is owned and controlled by one or more U.S.
Citizens, and

*

*

(iv) at least 35% of its employees reside in a HUBZone

*

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE	NUMBER	ISSUE	DATE	PAGE
SMALL BUSINESS PROGRAM	25	J	2/20/01	3 of 10

(2) A HUBZone is an area that is located in one or more of the following:

- (i) a qualified census tract (as defined in section 42(d)(5)(C)(i)(I) of the Internal Revenue Code of 1986);
- (ii) a qualified "non-metropolitan county" (as defined in section 143(k)(2)(B) of the Internal Revenue Code of 1986) with a median household income of less than 80 percent of the State median household income or with an unemployment rate of not less than 140 percent of the statewide average, based on US Department of Labor recent data; or
- (iii) lands within the boundaries of federally recognized Indian reservations.

(2) If the SBA determines that a concern is a qualified HUBZone small business concern, it will issue a certification to that effect and will add the concern to the List of Qualified HUBZone Small Business Concerns on its Internet website at <http://www.sba.gov.hubzone> (PRONET). The concern must appear on the list to be a HUBZone small business concern.

1.3.5 Small Disadvantaged Business Concern

(1) A small disadvantaged business concern is one which is at least 51% unconditionally owned by one or more socially and economically disadvantaged individuals. This can include a publicly owned business that has at least 51 percent of its stock unconditionally owned by one or more socially and economically disadvantaged individuals and whose management and daily business is controlled by one or more such individuals.

(2) To be considered a small disadvantaged business, an offeror must represent as part of its offer that it is a small business under the size standard applicable to the acquisition and either:

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE SMALL BUSINESS PROGRAM	NUMBER 25	ISSUE J	DATE 2/20/01	PAGE 4 of 7
---------------------------------	--------------	------------	-----------------	----------------

(i) It has received SBA certification as a small disadvantaged business concern consistent with 13 CFR part 124, subpart B and is listed on PRONET as a certified SDB; and

(A) No material change in disadvantaged ownership and control has occurred since its certification;

(B) Where the concern is owned by one or more disadvantaged individuals, the net worth of each individual upon whom the certification is based does not exceed \$750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

* (C) It is identified, on the date of its
* representation, as a certified small disadvan-
* tagged business in the database maintained by
* the Small Business Administration (PRO-Net);
* or

(ii) It has submitted a completed application to the Small Business Administration or a private certifier to be certified as a small disadvantaged business concern in accordance with 13 CFR part 124, subpart B, and a decision on that application is pending, and that no material change in disadvantaged ownership and control has occurred since its application was submitted. In this case, a contractor must receive certification as an SDB by the SBA prior to contract award.

* 1.3.6 Historically Black College or
* University/Minority Institution

* "Historically Black College or University"
* (HBCU) means an institution determined by the Secretary
* of Education to meet the requirements of 34 CFR 608.2.
* For DoD, NASA, and the Coast Guard, the term also in-
* cludes any nonprofit research institution that was an
* integral part of such a college or university before
* November 14, 1986.
*

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE	NUMBER	ISSUE	DATE	PAGE
SMALL BUSINESS PROGRAM	25	J	2/20/01	5 of 10

"Minority Institution" means an institution of higher education meeting the requirements of Section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1135d-5(3)) which, for the purpose of this subpart, includes a Hispanic-serving institution of higher education as defined in Section 316(b)(1) of the Act (20 U.S.C. 1059c(b)(1)). [FAC 90-46, 62 FR 12690, 3/17/97, effective 5/16/97]

1.3.7. Woman Owned Small Business Concerns

"Women-owned small business concern" means a small business concern:

(i) Which is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(ii) Whose management and daily business operations are controlled by one or more women.

2. REQUIREMENTS

2.1. A small business liaison officer (SBLO) for the small business subcontracting programs shall be designated for Purchasing. His or her duties shall include the following:

2.1.1. Prepare and administer subcontract plans for Government prime and subcontracts exceeding \$500,000.

2.1.2. Maintain records on awards exceeding \$100,000 indicating whether or not they were solicited and why they were, or were not, selected (See Exhibit 1).

2.1.3. Establish goals for small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) concerns on a contract-by-contract basis, and

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE	NUMBER	ISSUE	DATE	PAGE
SMALL BUSINESS PROGRAM	25	J	2/20/01	6 of 7
<p>submit reports as required, to the cognizant Government agencies showing progress toward established goals.</p> <p>2.1.4. Maintain records of actual dollars spent on a contract-by-contract basis for small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), * Historically Black Colleges and Universities/Minority * Institutions (HBCU/MI), veteran owned small business * (VOB), and service disabled veteran owned small business * (SDVOB) concerns.</p> <p>2.1.5. Cooperate in any studies, surveys, or audits as may be required by Government agencies, including the Small Business Administration (SBA), in order to determine the extent of compliance with the subcontract plans.</p> <p>2.1.6. Maintain liaison with Government representatives * on matters affecting subcontracting to small businesses.</p> <p>2.1.7. Ensure known small business concerns will have an equitable opportunity to compete for subcontracts to the maximum extent practicable consistent with applicable laws and prime contract requirements and with the efficient performance of its prime contract(s).</p> <p>2.1.8. Review selected procurement requisitions prior * to supplier determination to assist buyers in identify- * ing small business (SB), small disadvantaged business * (SDB), women-owned small business (WOB), HUBZone small * business (HUBZone), Historically Black Colleges and * Universities/Minority Institutions (HBCU/MI), veteran * owned small business (VOB), and service disabled veteran * owned small business (SDVOB) concerns.</p> <p>2.1.9. Organize Buyer workshops, seminars, or training * programs to keep Purchasing personnel current on small * business (SB), small disadvantaged business (SDB), * women-owned small business (WOB), HUBZone small business * (HUBZone), Historically Black Colleges and Universi- * ties/Minority Institutions (HBCU/MI), veteran owned * small business (VOB), and service disabled veteran owned * *</p>				

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE	NUMBER	ISSUE	DATE	PAGE
SMALL BUSINESS PROGRAM	25	J	2/20/01	7 of 10

small business (SDVOB) concerns.

2.1.10. Assist Buyers in providing counseling assistance to maintain documentation of counseling to small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) concerns. *

2.1.11. Assist Buyers in providing technical, financial, or other assistance to small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) concerns. *

2.1.12. Assist Buyers in notifying small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) concerns as to why they may have failed to receive an purchase order award. Maintain records of such notification efforts. *

2.1.13. Maintain and encourage Buyers' use small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) source lists and directories. *

2.1.14. Develop and maintain contacts with small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universi *

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE SMALL BUSINESS PROGRAM	NUMBER 25	ISSUE J	DATE 2/20/01	PAGE 8 of 8
<p>* ties/Minority Institutions (HBCU/MI), veteran owned</p> <p>* small business (VOB), and service disabled veteran owned</p> <p>* small business (SDVOB) trade associations, business development organizations and attend procurement conferences and trade affairs.</p> <p>2.2. The Buyers shall be responsible to:</p> <p>2.2.1. Prepare requests for proposals/quotations under Government prime contracts indicating whether or not the</p> <p>* proposers are/are not small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), or service disabled veteran owned small business (SDVOB) concerns on awards exceeding \$100,000 indicating whether or not they were solicited and why they were, or were not, selected (See Exhibit 1).</p> <p>* 2.2.2. Locate small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) concerns from PRONet, bidders lists and directories and use them to the maximum extent practicable consistent with program requirements.</p> <p>* 2.2.3. Check the appropriate small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), or service disabled veteran owned small business (SDVOB) boxes on the procurement requisition form and ensure that the vendor file is properly coded as to vendor type.</p> <p>2.2.4. Provide technical and/or financial counseling or other assistance to small business (SB), small disadvantaged business (SDB), women-owned small business (WOB),</p> <p>*</p>				

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE SMALL BUSINESS PROGRAM	NUMBER 25	ISSUE J	DATE 2/20/01	PAGE 9 of 10
<p>HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) concerns and inform the SBLO in writing of such counseling. *</p>				
<p>2.2.5. Inform small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) concerns as to why they may have failed to receive an award if they so request. Provide the SBLO with documentation of such actions. *</p>				
<p>2.2.6. Attend small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) workshops, seminars, or training programs as coordinated by the SBLO. *</p>				
<p>2.2.7. On a best efforts basis, arrange solicitations, provide adequate bid preparation time, and adjust quantities, delivery schedules and specifications to small business (SB), small disadvantaged business (SDB), women-owned small business (WOB), HUBZone small business (HUBZone), Historically Black Colleges and Universities/Minority Institutions (HBCU/MI), veteran owned small business (VOB), and service disabled veteran owned small business (SDVOB) to increase participation in bidding. Further, buyers shall contact such small business firms to determine why they may not have responded to a solicitation and offer counseling as appropriate consistent with efficient performance of contract needs and provide the SBLO with documentation of such action, when appropriate. *</p>				

GENERAL ATOMICS PURCHASING STANDARD OPERATING PROCEDURES

TITLE SMALL BUSINESS PROGRAM	NUMBER 25	ISSUE J	DATE 2/20/01	PAGE 10 of 10
---------------------------------	--------------	------------	-----------------	------------------

GA 2817
2/5/01

EXHIBIT 1

SMALL BUSINESS CONCERNS CHECKLIST*

Date Order Placed _____
P.O./SC NO. _____

A. If small business (SB), veteran-owned small business (VO), service disabled veteran owned small business (SDVO), HUBZone small business (HZ), small disadvantaged business (SDB), Historically Black Colleges or Universities (HBCU), or woman-owned small business (WO) concern firms were not solicited, indicate the reason(s) by checking the appropriate space below:

- 1. Large mandatory (also check a, b, and/or c below).
 - a. Only qualified parts or sources admissible.
 - b. Proprietary and patented items required.
 - c. Heavy industrial sources required.
- 2. No known SB sources.
- 3. No known VO sources.
- 4. No known SDVO sources.
- 5. No known HZ sources.
- 6. No known SDB sources.
- 7. No known HBCU sources.
- 8. No known WO sources.
- 9. Known small business sources ruled out for technical, quality, delivery, or other justifiable reasons (explain).

B. If SB, VO, SDVO, HZ, SDB, HBCU or WO concern firms were solicited, indicate the number solicited and the reasons why the order was placed with large business by checking the appropriate space(s) below.

- 1. Number of SB firms solicited. _____
- 2. Number of VO firms solicited. _____
- 3. Number of SDVO firms solicited. _____
- 4. Number of HZ firms solicited. _____
- 5. Number of SDB firms solicited. _____
- 6. Number of HBCU firms solicited. _____
- 7. Number of WO firms solicited. _____
- 8. No SB responses received.
- 9. No VO responses received.
- 10. No SDVO responses received.
- 11. No HZ responses received.
- 12. No SDB responses received.
- 13. No HBCU responses received.
- 14. No WO responses received.
- 15. If SB, VO, SDVO, HZ, SDB, HBCU or WO concern firm was not selected, please explain:

Buyer _____

* Required on all procurement packages of \$100,000 or more.



CRYOTECH ORDER PROCEDURE

Orders for the following Cryotech products should be placed as shown below.

CUSTOMER NAME: **LOCATION(S):**

CRYOTECH PRODUCTS (applicable products checked)

- Kilfrost ABC-S Type IV Aircraft Fluid
- Kilfrost DF Plus (88) Type I Aircraft Fluid, Dilute and/or Concentrate
- E36 Liquid Runway Deicer
- Lavatory Antifreeze
- NAAC Solid Runway Deicer
- Other

ORDER PROCESS

Normal business hours: 7:30 a.m. to 4:00 p.m., Monday through Friday:

Account Representative: Email:

- Call Cryotech at **800-346-7237** or **319-372-6012**. Cryotech will need to know:
 - a. Product that you are ordering
 - b. Delivery location address
 - c. Requested delivery date and receiving hours
 - d. Receiving location contact & phone number for delivery confirmation or questions
 - e. Quantity requested
 - f. Requestor name and P.O. number
 - g. Other special delivery or receiving requirements (fittings, hose, etc.)

After normal business hours or during holidays: (pagers used Nov. 1 thru March 31st)

- Call Cryotech at **800-346-7237** to reach our after hours voice mail system. You will then have the option to "press 1" to reach our answering service who will then page a Cryotech customer service contact. Or, if you do not need to place an order, you may leave a voice mail message that will be picked up on the next business day. (If you call 319-372-6012 after hours, it is picked up by our answering service direct without going into our voice mail system.)
- If after 30 minutes, you have not received a response, call Cryotech's answering service on their line at 866-581-8964. The answering service has additional pager numbers, all employee home phone numbers, and instructions to call until they reach someone.
- Finally, if none of the above options have put you in touch with Cryotech, call Cryotech cellular numbers or select Cryotech employees' home numbers as listed below.

CRYOTECH	CONTACTS	Cellular	Home	Office
After Hours	800-346-7237 or as below			
Cust. Srvc	Various	319-470-4631	N/A	800-346-7237 or as below
	Roxanna Huffman	319-470-4784 or 515-779-2298	319-372-4398	319-372-6012
	Amy Munday	515-770-2737	309-256-6381	319-372-6012
Technical	John Moles	515-779-2248	319-372-8526	319-372-6012

Cryotech can also be reached, on a non-emergency basis, by e-mail to deicers@cryotech.com.

NOTE: Schutz style totes (8 minimum) may be picked up when empty by calling 888-724-8389.

CUSTOMER PROFILE

<u>CUSTOMER:</u>	<u>ACCPAC CODES:</u> Bill to: Ship to	<u>Underline one:</u> Gov't Airport Commercial Distributor	GSA? <input type="checkbox"/> Yes- <input checked="" type="checkbox"/> No
-------------------------	----------------------------------------------------	-------------------------------------------------------------------------------	-------------------------------------------------------------------------------------

SHIPPING RECAP NAME:

STANDING ORDER:

AGREEMENT/CONTRACT :

ORDERS & DELIVERY REQUIREMENTS:

Need pumps &/or hoses _____ On-site storage tanks? _____ Capacity? _____ Tanks cs / ss / poly / other

BILL TO:

SHIP TO:

SHIP FROM:

FM if time allows

Terminal name:

Product:

Contract: within hours

Terminal name:

Product:

Contract: within hours

RECEIVING PH:

FAX:

RECEIVING HRS:

RECEIVING CONTACT(S):

OTHER CONTACTS:

E-mail:

PRICE INCREASE OPTION:

PRODUCTS AND PRICING:

LINE OF CREDIT:

INVOICING NOTES:

CUSTOMER PROFILE

TAX INFORMATION:

Taxable/Tax rate at %
Taxable/Not registered
Not taxable – exemption certificate received –

Type of Exemption:
Cryotech registered in this state yes no

MISCELLANEOUS:

CUSTOMER TRAINING:

Field Training/Tech. Briefing

Last Visit to Customer: By:

MX








ECOBULK MX

The perfect solution for filling goods with high density.



The *ECOBULK MX*, with integrated bottom plate, offers superior stability and best protection to the inner container. Additional distinguishing features of the high-quality IBC system are easy discharge of contents and outstanding service life. *ECOBULK MX* components are made, without exception, for reconditioning and thereby meet the demand for multi-trip capabilities of transport packaging.

SCHÜTZ
INDUSTRIAL PACKAGING

MATERIAL	PALLETS
Inner container <ul style="list-style-type: none"> extrusion blow-moulded HDPE SMP protective barrier on request Outer jacket <ul style="list-style-type: none"> welded tubular steel grid galvanized Bottom plate <ul style="list-style-type: none"> made of steel plate to provide stability and to facilitate easy removal of residuals of the inner container 	4-way entry  steel  plastic  timber  full-plastic 
CERTIFICATIONS	CAPACITIES
UN 31 HA1/Y - FDA <ul style="list-style-type: none"> with wooden pallet max. density 1.9 with plastic pallet max. density 1.9 with steel pallet max. density 1.9 with full-plastic pallet max. density 1.9 	MX 640 640 litre (170 gal) MX 820 820 litre (220 gal) MX 1000 1,000 litre (275 gal) MX 1250 1,250 litre (330 gal)
FILLING OPENING	OUTLET VALVES
<ul style="list-style-type: none"> DN150 with screw cap DN225 with screw cap DN400 with clamp-ring lid 	<ul style="list-style-type: none"> integrated butterfly valve DN50 threaded butterfly valve DN50 or DN80, DN150 also available threaded ball valve DN50
DIMENSIONS	DYNAMIC LOAD
MX 640 1,200x800x1,000 (LxBxH) MX 820 1,200x1,000x1,000 (LxBxH) MX 1000 1,200x1,000x1,160 (LxBxH) MX 1250 1,200x1,000x1,350 (LxBxH)	Filled <i>ECOBULKs</i> according to specific weight of the filling goods  up to 1.5 2-high more than 1.5 1-high
WEIGHT	STATIC LOAD
MX 640 55 kg (TP), 51 kg (PP), 46 kg (SP) MX 820 61 kg (TP), 57 kg (PP), 54 kg (SP) MX 1000 66 kg (TP), 63 kg (PP), 59 kg (SP), 64 kg (FPP) MX 1250 75 kg (TP), 72 kg (PP), 68 kg (SP)	max. 4-high 

MX

ECOBULK MX

SCHÜTZ

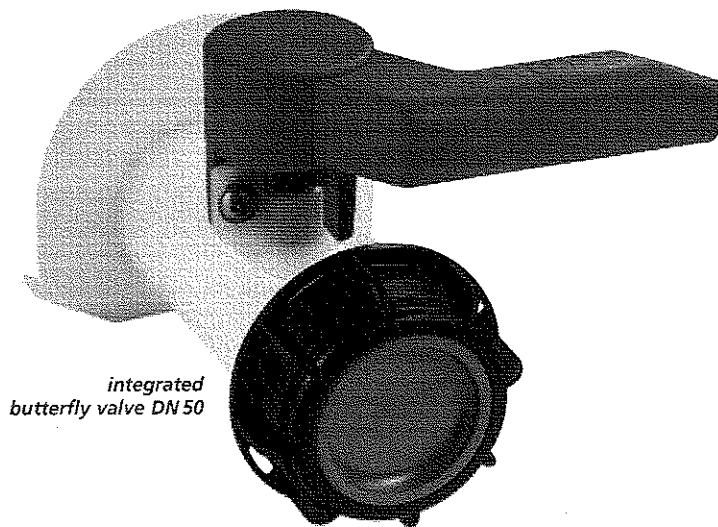
INDUSTRIAL PACKAGING

The ECOBULK MX offers the greatest possible volume in the minimum of space. The IBC system is designed for the safe transport of hazardous goods up to the specific weight of 1.9. Quick to fill, easy to stack, easy to load.

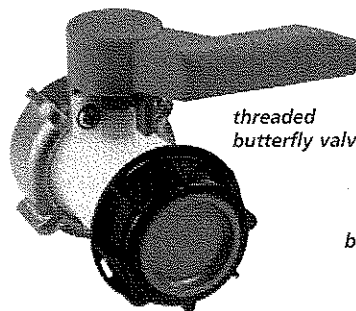
The outlet valves from SCHÜTZ.

User-oriented outlet valves ensure safe and *precise control of discharging filling goods of various viscosities*. A large selection of sealing materials provide resistance to various fittings of most filling mediums.

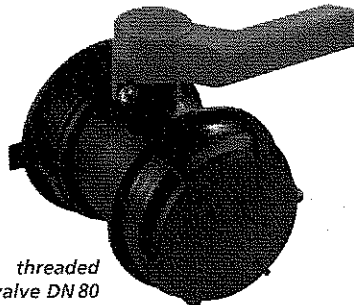
In addition to environment-friendly production of transport containers the *SCHÜTZ TICKET SERVICE* significantly contributes to the conservation of resources and to the protection of natural foundations of life: by means of conserving raw materials our unique collection and reconditioning system relieves the strain on our environment.



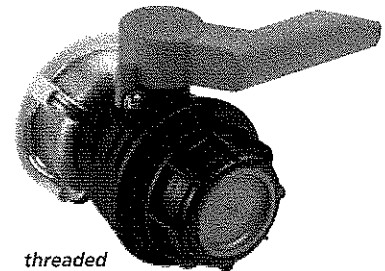
integrated
butterfly valve DN 50



threaded
butterfly valve DN 50



threaded
butterfly valve DN 80



threaded
ball valve DN 50

10.02 / 12500 / KEMPKES / ABRESCH (technical changes reserved)

SCHÜTZ (UK) Ltd.
Elylands Ave, Dukeries Ind Est
GB-Workop, Notts S81 7BE
Phone: (+44) 1909-478863
Fax: (+44) 1909-478864

SCHÜTZ France S.A.R.L.
Chemin du Buisson Gayet
F-91460 Marcoussis
Phone: (+33) 1-69805000
Fax: (+33) 1-64993044

SCHÜTZ Iberica S.L.
Polígono 37, Finca 10
E-43460 Vilassac (Tarragona)

INDUSTRIAL PACKAGING
Phone: (+34) 977-391023
Fax: (+34) 977-391063

ENERGY SYSTEMS
Phone: (+34) 977-394190
Fax: (+34) 977-391299

SCHÜTZ (Italia) S.r.l.
Via del Boscone
I-25014 Castenedolo (BS)
Phone: (+39) 030-2134711
Fax: (+39) 030-2134720

SCHÜTZ Polska
ul. Instalatorów 5
PL-02-237 Warszawa
Phone: (+48) 22-8463405
Fax: (+48) 22-8680440

SCHÜTZ Nordic AS
Norvæst Strands vei 162
N-2206 Kongsvinger
Phone: (+47) 62-822750
Fax: (+47) 62-822751

SCHÜTZ (Ireland) Ltd.
Townmore, Killakee
IRL-Co. Mayo
Phone: (+353) 9633044
Fax: (+353) 9633045

Headquarters USA
SCHÜTZ Container Systems
200 Aspen Hill Road
US-North Branch,
NJ 08876-5950
Phone: (+1) 908-5266161
Fax: (+1) 908-5260550

SCHÜTZ Mexico
Envases y Laminados
S.A. de C.V., Av. 1 No. 12A
Parque Industrial Cartagena
54900 Tultitlan
Edo. de Mexico
Phone: (+1) 877-315-7061
Fax: (+1) 877-290-8648

ITA-Industrias Termoplásticas
Argentinas S.A.
Ruta 5 Km. 75
6707-Lauregui-Buenos Aires
Argentina
Phone: (+54) 2323-497-596
Fax: (+54) 2323-497-844

SCHÜTZ do Brasil
Rua João Batista
Nogueira 550 - parte
07231-410 - Guarulhos
São Paulo
Phone: (+55) 116412-5177
Fax: (+55) 116412-3331

Furukawa Altex Co., Ltd.
Furukawa Electric Kanda Bld.
2-16-8 Uchikanda Chiyoda-Ku
Tokyo 101-0047, Japan
Phone: (+81) 3-5295-4050
Fax: (+81) 3-5295-4503

DSL Pty Ltd.
152 Cockburn Road
South Fremantle WA 6162
Australia
Phone: (+61) 893362608
Fax: (+61) 893366052

SCHÜTZ GmbH & Co. KGaA
Schützstraße 12
D-56242 Sellers
Phone: +49 (0) 2626 727-0
Fax: +49 (0) 2626 727-365
E-Mail: info@schuetz.net
www.schuetz.net

FROM: N. Blue 

DATE: March 18, 2005

TO: All Employees and Applicants

SUBJECT: EQUAL EMPLOYMENT OPPORTUNITY POLICY

General Atomics continues to stress the importance of the Company's Equal Employment Opportunity Policy. This policy makes good economic sense for the Company since it seeks to develop a broadened base for the talents and energies required to conduct our business. Furthermore, we have an obligation to society to encourage persons who have been denied entry to equal participation in American Society, especially to equal participation in employment opportunities.

We regularly review our personnel procedures which are associated with the recruiting, hiring, training and promoting of our employees to assure ourselves that all have an equal opportunity in employment without regard to race, color, sex, religion, national origin, sexual orientation, age or handicap. To assist me in implementing this policy, Sandra Mackey has been selected to serve as the Company's EEO Officer. She is specifically assigned to develop and implement programs, practices and procedures and to establish a reporting and monitoring system which will aid in assuring that equal opportunity is offered to all employees and job applicants.

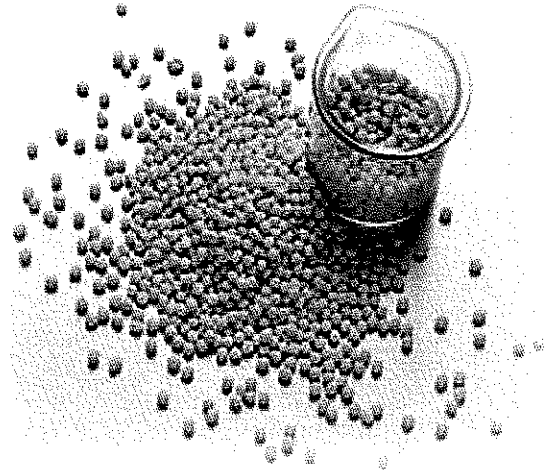
Even after we have developed our procedures, the final step in implementing the Equal Opportunity Policy is to receive the cooperation and support of all employees and applicants. Your continued active support is important.



N. Blue, Chairman and CEO



REPLACE THE DEICER, NOT THE STRUCTURE



SPEC: CRYOTECH CMA[®]

SOLID COMMERCIAL DEICER

BENEFITS

- Low corrosion: less corrosive than tap water
- Safe for concrete: the safest deicer for concrete, even new concrete cured at least 28 days
- Excellent inhibitor: reduces chloride corrosion
- Safe for the environment: readily biodegradable, low toxicity
- Residual effect: requires fewer applications than other common deicers
- Multi-purpose: use straight, with salt, with sand, or as a liquid

PERFORMANCE

- Works best above 20°F (-7°C)
- Has long lasting effect - better than salt or urea
- Breaks/inhibits bond between snow/ice and pavement
- Creates a dry, powdery snow which improves traction

APPLICATION

- Apply early in the storm to prevent snow/ice bonding
- First application:
 - Commercial = 15-20 lbs/1000ft² (75-100 g/m²)
 - Highway = 300-400 lbs/lane mile (20-40 g/m²)
- Wait at least 20 minutes to remove snow/ice
- Re-apply when new snow/ice accumulation shows first tendency to bond

ENVIRONMENT

- Biodegrades to carbon dioxide and water
- Calcium and magnesium increase soil permeability
- Essentially non-toxic to aquatic species
- Poor mobility in soil - unlikely to reach groundwater
- Safe for vegetation
- Does not contain nitrogen or chlorides

HANDLING

- May be stored indefinitely if kept dry
- Take care to avoid caking caused by excess moisture
- Excessive handling may cause dustiness

SEE REVERSE SIDE FOR PRODUCT SPECIFICATIONS
COMPLETE TECHNICAL BROCHURE AVAILABLE UPON REQUEST

ISO 9001
CERTIFIED



FM 39092

ISO 14001
CERTIFIED



EMS 89384

AN ISO 9001:2000 & 14001:2004 CERTIFIED COMPANY

PRODUCT SPECIFICATIONS - CRYOTECH CMA[®]

COMPOSITION Calcium Magnesium Acetate (CMA)
 3:7 Ca to Mg molar ratio
 Hydrated CMA + other acetates 96% minimum
 Inert Material 4% maximum

PARTICLE SIZE

Sieve	% Passing
4	90
14	10

SHAPE Hard spherical pellet

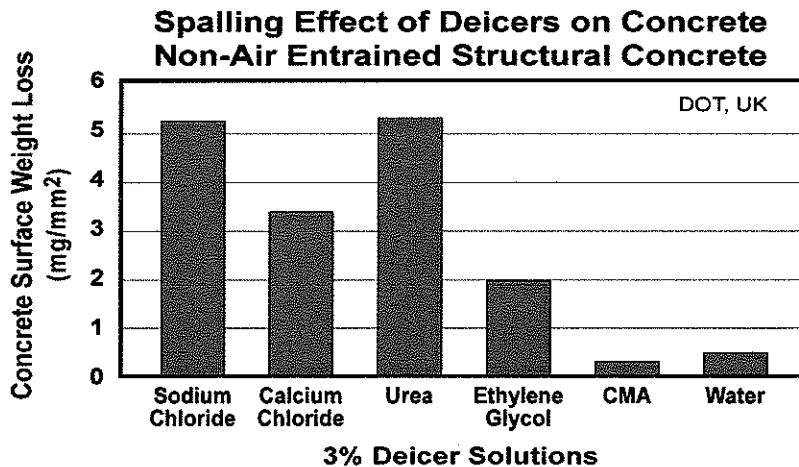
BULK DENSITY 40 lbs/ft³ to 44 lbs/ft³
 (0.65 g/cm³ to 0.79 g/cm³)

TYPICAL pH 8 to 10 in a 10% solution

RESIDUAL BASE Maximum 0.4 meg base/gm

PACKAGING 25 kg (55 lbs) poly bags - (40 bags minimum)
 1000 kg (2205 lbs) Super Sacks - (1 SS minimum)
 Bulk - (20 metric ton minimum)

Spalling Effect of Deicers on Concrete



Revised - 11/06

FOR ORDERING INFORMATION CONTACT:
 Ph: 319.372.6012 or 800.346.7237 Fax: 319.372.2662 E-mail: deicers@cryotech.com

CRYOTECH CMA®

MATERIAL SAFETY DATA SHEET

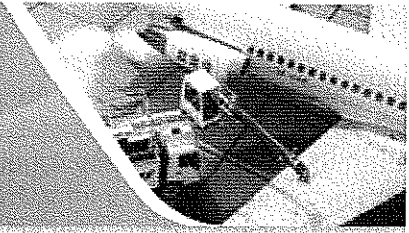


<p>1. PRODUCT NAME & DESCRIPTION</p> <p>Cryotech CMA® Deicer</p> <p>MANUFACTURED AND SUPPLIED IN THE USA BY Cryotech Deicing Technology 6103 Orthoway Fort Madison, IA 52627 United States</p> <p>Cryotech Contact Information Telephone: (800)346-7237 FAX: (319)372-2662 email: deicers@cryotech.com website: http://www.cryotech.com</p>	<p>4. FIRST AID MEASURES</p> <p>Chemical Emergency: Spill, leak, fire, or accident call Chemtrec day or night (800)424-9300; Outside continental USA call (703)527-3887</p> <p>EYE CONTACT: No first aid procedures are required. However, as a precaution flush eyes with fresh water for 15 minutes. Remove contact lenses if worn.</p> <p>SKIN CONTACT: No first aid procedures are required. As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.</p> <p>INHALATION: Since this material is not expected to be an immediate inhalation problem, no first aid procedures are required.</p> <p>INGESTION: If swallowed, give water or milk to drink and telephone for medical advice. Consult medical personnel before inducing vomiting. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.</p>															
<p>2. CHEMICAL COMPOSITION</p> <p>The percent compositions are given to allow for the various ranges of the components present in the whole product and may not equal 100%.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Percent</th> <th style="text-align: left;">Component</th> <th style="text-align: left;">CAS#</th> </tr> </thead> <tbody> <tr> <td>100%</td> <td>Cryotech CMA® Deicer</td> <td></td> </tr> <tr> <td>Containing</td> <td></td> <td></td> </tr> <tr> <td>96%</td> <td>Hydrated Calcium Magnesium and other acetates</td> <td>76123-46-1</td> </tr> <tr> <td><4.0%</td> <td>Water-insoluble material</td> <td></td> </tr> </tbody> </table> <p>CAS - Chemical Abstract Service Number</p>	Percent	Component	CAS#	100%	Cryotech CMA® Deicer		Containing			96%	Hydrated Calcium Magnesium and other acetates	76123-46-1	<4.0%	Water-insoluble material		<p>5. FIRE FIGHTING MEASURES</p> <p>FLASH POINT: Not applicable AUTO IGNITION: No data available FLAMMABILITY LIMITS (% by volume in air): Lower: No data available Upper: No data available</p> <p>EXTINGUISHING MEDIA: Material does not burn.</p> <p>FIRE FIGHTING PROCEDURES: This material will not burn.</p> <p>COMBUSTION PRODUCTS: None</p> <p>NFPA RATINGS: Health 0; Flammability 0; Reactivity 0; Special NDA:</p> <p>HMIS RATINGS: Health 0; Flammability 0; Reactivity 0; Special NDA: (Least - 0, Slight - 1, Moderate - 2, High - 3, Extreme - 4) These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint Coating Association.</p>
Percent	Component	CAS#														
100%	Cryotech CMA® Deicer															
Containing																
96%	Hydrated Calcium Magnesium and other acetates	76123-46-1														
<4.0%	Water-insoluble material															
<p>3. HAZARD IDENTIFICATION (also see Sections 11 and 12)</p> <p>CAUTION! - MAY CAUSE EYE IRRITATION</p> <p>EYE CONTACT: This substance is not expected to cause prolonged or significant eye irritation</p> <p>SKIN IRRITATION: This substance is not expected to cause prolonged or significant skin irritation</p> <p>DERMAL TOXICITY: If absorbed through the skin, this substance is considered practically non-toxic to internal organs.</p> <p>RESPIRATORY/INHALATION: If inhaled, this substance is considered practically non-toxic to internal organs.</p> <p>INGESTION: If swallowed, this substance is considered practically non-toxic to internal organs.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: None established per OSHA, PEL and ACGIHLV (TWA)</p>	<p>6. ACCIDENTAL RELEASE MEASURES</p> <p>Chemical Emergency: Spill, leak, fire, or accident call Outside continental USA call (703)527-3887 Chemtrec day or night (800)424-9300;</p> <p>Sweep up spills and transfer to a container for disposal. See section 13. If needed, wash spillage area with plenty of water.</p>															
	<p>7. HANDLING AND STORAGE</p> <p>Avoid contact with skin and eyes. Do not store or handle product with systems constructed of parts that have galvanized steel, zinc or brass components.</p>															

CRYOTECH CMA®
MATERIAL SAFETY DATA SHEET

<p>8. EXPOSURE CONTROLS/PERSONAL PROTECTION</p> <p>EYE PROTECTION: No special eye protection is usually necessary.</p> <p>SKIN PROTECTION: No special skin protection is usually necessary.</p> <p>RESPIRATORY PROTECTION: No special respiratory protection is normally required. However, if operating conditions create high airborne concentrations, the use of an approved respirator is recommended.</p> <p>VENTILATION: No special ventilation is necessary. However, if operating conditions create high airborne concentrations of this material, special ventilation may be needed.</p>	<p>13. DISPOSAL CONSIDERATION Based on information available to Cryotech Deicing Technology, this product is neither listed as a hazardous waste nor does it exhibit any of the characteristics that would cause it to be classified or disposed of as an RCRA hazardous waste. If product should spill or be otherwise unsuitable for normal deicing applications, it may be absorbed on suitable materials and disposed of in sanitary landfill unless state or local regulations prohibit such disposal.</p>																																						
<p>9. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>SOLUBILITY: Partially soluble in water.</p> <p>Appearance: White to off-white spherical granule</p> <p>BOILING POINT: NA</p> <p>MELTING POINT: NA</p> <p>EVAPORATION: NA</p> <p>SPECIFIC GRAVITY: 1.2 min</p> <p>VAPOR PRESSURE: No data available</p> <p>PERCENT VOLATILE (VOLUME %): No data available</p> <p>VAPOR DENSITY (AIR = 1): No data available</p> <p>pH: 8-10</p>	<p>14. TRANSPORT INFORMATION Not restricted under any transport regulations.</p>																																						
<p>10. STABILITY & REACTIVITY</p> <p>HAZARDOUS DECOMPOSITION PRODUCTS: Not applicable</p> <p>STABILITY: Stable.</p> <p>HAZARDOUS POLYMERIZATION: Polymerization will not occur.</p> <p>INCOMPATIBILITY: None</p> <p>SPECIAL PRECAUTIONS: READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.</p>	<p>15. REGULATORY INFORMATION</p> <p>DOT SHIPPING NAME: Not designated as a hazardous material by the Federal DOT.</p> <p>DOT HAZARD CLASS: Not Applicable</p> <p>DOT IDENTIFICATION NUMBER: Not Applicable</p> <p>SARA 311 CATEGORIES:</p> <table border="0"> <tr> <td>1. Immediate (Acute) Health Effects:</td> <td>Yes</td> </tr> <tr> <td>2. Delayed (Chronic) Health Effects:</td> <td>No</td> </tr> <tr> <td>3. Fire Hazard:</td> <td>No</td> </tr> <tr> <td>4. Sudden Release of Pressure Hazard:</td> <td>No</td> </tr> <tr> <td>5. Reactivity Hazard:</td> <td>No</td> </tr> </table> <p>REGULATORY LISTS SEARCHED:</p> <table border="0"> <tr> <td>01 = SARA 313</td> <td>02 = MASS RTK</td> </tr> <tr> <td>03 = NTP Carcinogen</td> <td>04 = CA Prop. 65</td> </tr> <tr> <td>05 = MI 406</td> <td>06 = IARC Group 1</td> </tr> <tr> <td>07 = IARC Group 2A</td> <td>08 = IARC Group 2B</td> </tr> <tr> <td>09 = SARA 302/304</td> <td>10 = PA RTK</td> </tr> <tr> <td>11 = NJ RTK</td> <td>12 = CERCLA 302.4</td> </tr> <tr> <td>13 = MN RTK</td> <td>14 = ACGIH TLV</td> </tr> <tr> <td>15 = ACGIH STEL</td> <td>16 = ACGIH Calculated TLV</td> </tr> <tr> <td>17 = OSHATWA</td> <td>18 = OSHA STEL</td> </tr> <tr> <td>20 = EPA Carcinogen</td> <td>21 = TSCA Sect 4(e)</td> </tr> <tr> <td>22 = TSCA Sect 5(a)(e)(f)</td> <td>23 = TSCA Sect 6</td> </tr> <tr> <td>24 = TSCA Sect 12(b)</td> <td>25 = TSCA Sect 8(a)</td> </tr> <tr> <td>26 = TSCA Sect 8(d)</td> <td>28 = Canadian WHMIS</td> </tr> <tr> <td>29 = OSHA CEILING</td> <td></td> </tr> </table> <p>None of the components of this material are found on the regulatory lists indicated.</p>	1. Immediate (Acute) Health Effects:	Yes	2. Delayed (Chronic) Health Effects:	No	3. Fire Hazard:	No	4. Sudden Release of Pressure Hazard:	No	5. Reactivity Hazard:	No	01 = SARA 313	02 = MASS RTK	03 = NTP Carcinogen	04 = CA Prop. 65	05 = MI 406	06 = IARC Group 1	07 = IARC Group 2A	08 = IARC Group 2B	09 = SARA 302/304	10 = PA RTK	11 = NJ RTK	12 = CERCLA 302.4	13 = MN RTK	14 = ACGIH TLV	15 = ACGIH STEL	16 = ACGIH Calculated TLV	17 = OSHATWA	18 = OSHA STEL	20 = EPA Carcinogen	21 = TSCA Sect 4(e)	22 = TSCA Sect 5(a)(e)(f)	23 = TSCA Sect 6	24 = TSCA Sect 12(b)	25 = TSCA Sect 8(a)	26 = TSCA Sect 8(d)	28 = Canadian WHMIS	29 = OSHA CEILING	
1. Immediate (Acute) Health Effects:	Yes																																						
2. Delayed (Chronic) Health Effects:	No																																						
3. Fire Hazard:	No																																						
4. Sudden Release of Pressure Hazard:	No																																						
5. Reactivity Hazard:	No																																						
01 = SARA 313	02 = MASS RTK																																						
03 = NTP Carcinogen	04 = CA Prop. 65																																						
05 = MI 406	06 = IARC Group 1																																						
07 = IARC Group 2A	08 = IARC Group 2B																																						
09 = SARA 302/304	10 = PA RTK																																						
11 = NJ RTK	12 = CERCLA 302.4																																						
13 = MN RTK	14 = ACGIH TLV																																						
15 = ACGIH STEL	16 = ACGIH Calculated TLV																																						
17 = OSHATWA	18 = OSHA STEL																																						
20 = EPA Carcinogen	21 = TSCA Sect 4(e)																																						
22 = TSCA Sect 5(a)(e)(f)	23 = TSCA Sect 6																																						
24 = TSCA Sect 12(b)	25 = TSCA Sect 8(a)																																						
26 = TSCA Sect 8(d)	28 = Canadian WHMIS																																						
29 = OSHA CEILING																																							
<p>11. TOXICOLOGICAL INFORMATION</p> <p>EYE IRRITATION: The Draize Eye Irritation Score (range, 0-110) in rabbits is 8.7</p> <p>SKIN IRRITATION: The Draize Skin Primary Irritation Score (range, 0-8) for a 4-hour exposure (rabbits) is 0.1. This material was not a skin sensitizer in the Buehler Guinea Pig Sensitization Test.</p> <p>DERMAL TOXICITY: The dermal LD50 in rabbits is >5.0 g/kg</p> <p>RESPIRATORY/INHALATION: The 4-hour inhalation LC50 in rats is 4.6 mg/liter</p> <p>INGESTION: The oral LD50 in rats is greater than 5000 mg/liter. Additional Toxicological Data: The 96-hour LC50 in rainbow trout (<i>Salmo gairdneri</i>) is >1000 mg/L. The 48-hour LC50 daphnia (<i>Daphnia magna</i>) is >1000 mg/L. Results of a 28-day oral toxicity study in rats showed that daily doses of 1000 mg/kg of Cryotech CMA Deicer caused no significant toxicity.</p>	<p>16. OTHER INFORMATION</p> <p>ADDITIONAL HEALTH DATA COMMENT: Effects of overexposure: High concentration of dust may cause irritation of eyes, nose and throat, especially for people with chronic respiratory problems. This Material Safety Data Sheet contains environmental, health and toxicology information for your employees. Please make sure this information is given to them. It also contains information to help you meet community right-to-know/emergency response reporting requirements under SARA Title III and many other laws. If you resell this product, this MSDS must be given to the buyer or the information incorporated in your MSDS. Discard any previous edition of this MSDS. Latest version of this MSDS can be found at http://www.cryotech.com</p>																																						
<p>12. ECOLOGICAL INFORMATION</p> <p>COD (TOD): 0.75 g O₂/g</p> <p>BOD₂₀ @ 2° C: 0.40 g O₂/g</p> <p>BOD₂₀ @ 10° C: 0.67 g O₂/g</p>																																							

The above information is accurate to the best of our knowledge. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use or misuse are beyond our control, **Cryotech Deicing Technology, a Division of General Atomics International Services Corporation makes no warranty, either express or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon.** Cryotech Deicing Technology, a Division of General Atomics International Services Corporation assumes no responsibility for any injury or loss resulting from the use of the product described herein. User should satisfy himself that he has all current data relevant to his particular use.

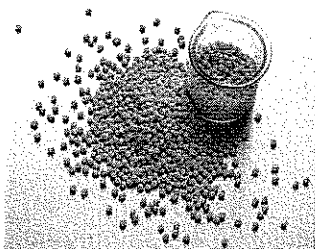


Deicing Products > Commercial > Cryotech CMA®

- **CMA®**

- Customer Profile
- Specifications and MSDS
- Performance
- Environmental Impact
- Application Rates
- Corrosion
- Concrete Compatibility
- Other Info
- Bibliography
- SAFETEA-LU

Cryotech CMA® Calcium Magnesium Acetate



Cryotech CMA® is granulated calcium magnesium acetate, a patented chemical formulation from dolomitic lime and acetic acid. It was first identified as a low corrosion, environmental alternative to road salt by the U.S. Federal Highway Administration in the late 1970's. Cryotech, and its predecessor Chevron, then tested and commercially developed the technology. Today, CMA is used worldwide to answer environmental concerns and solve problems associated with corrosion and concrete spalling.

CMA is generally used in a solid form and spread on the surface like other deicers. Although CMA is effective to the same temperatures as salt, CMA has many unique performance characteristics. Therefore, first-time users should review product application guidelines closely. For answers to frequently asked questions regarding CMA, please see the Questions and Answers information sheet.

Often CMA is used as a corrosion inhibitor, blended with road salt at rates greater than 20% CMA by weight. It is available from Cryotech in a 40% blend as CMA40®.

CMA is also used in liquid form, generally for anti-icing roads and bridges. Here, the fluid is applied prior to a storm event to prevent snow and ice from bonding to the surface. Liquid CMA is typically formulated in the field from dry CMA. Contact Cryotech for mixing instructions.

Please see the CMA Fact Sheet for a brief summary of CMA's benefits, application information, and product specifications.

Cryotech CMA® offers these advantages:

- Low Corrosion - About as corrosive as tap water
- Safe for Concrete - No more damage than from water
- Excellent Inhibitor - Reduces chloride corrosion
- Safe for the Environment - Low toxicity and biodegradable
- Multi-Purpose - Use straight, with salt, with sand, or as a liquid

Customer Profile

Typical CMA customers are concerned with concrete spalling, corrosion or environmental issues. They include transportation agencies, military installations, universities, property management firms, and commercial facilities. They require the performance of a solid deicer without the risk of negative environmental impact or infrastructure damage generally associated with chlorides and urea. For these reasons, CMA is often specified by design engineers for use on bridge decks, parking garages and sidewalks, and by operation managers to solve environmental problems such as ground water contamination, soil compaction and vegetation burn.



Product Specifications

COMPOSITION:

Calcium Magnesium Acetate (CMA) (3:7 Ca to Mg molar ratio)
Hydrated CMA + other acetates 96% minimum
Inert Material 4% maximum

Particle Size:

Sieve	% Passing
4	90
14	10

SHAPE: Hard, spherical pellet

BULK DENSITY: 40 lb/ft³ to 44 lb/ft³ (0.65 g/cm³ to 0.79 g/cm³)

RESIDUAL BASE: Maximum 0.4 meg base/gm pH 8 to 10 in a 10% solution

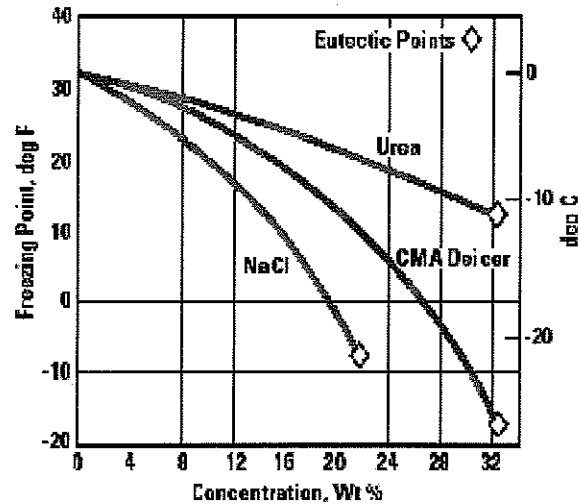
pH: 8 to 10 in a 10% solution

PACKAGING: 25 kg (55 lb.) poly bags; 1000 kg (1 metric ton - 2205 lbs.) Super Sacks, bulk
Minimum orders: 40 - 25 kg bags, 1 Super Sack, 21 metric tons (46,305 lbs.) bulk

See product MSDS for more information.

Product Performance

CMA has been used successfully since 1986 by snow fighters worldwide. It is effective over a similar temperature range as road salt: performance decreases below 20 degrees F (-7 degrees C). Effectiveness is generally enhanced by traffic, sunlight, and warmer temperatures. Because CMA is acetate-based instead of chloride-based, it has unique performance characteristics. Over the years many techniques have been tested and adopted to increase its efficiency.

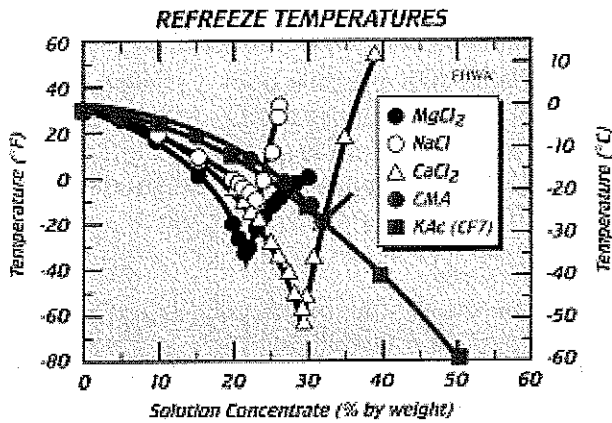


The refreeze temperatures and performance of CMA and KAc (Cryotech CF7®), are addressed in the following excerpt from the **Federal Highway Administration's Manual of Practice for an Effective Anti-icing Program: A Guide for Highway Winter Maintenance Personnel**.

B.4 CMA and KAc (CF7)

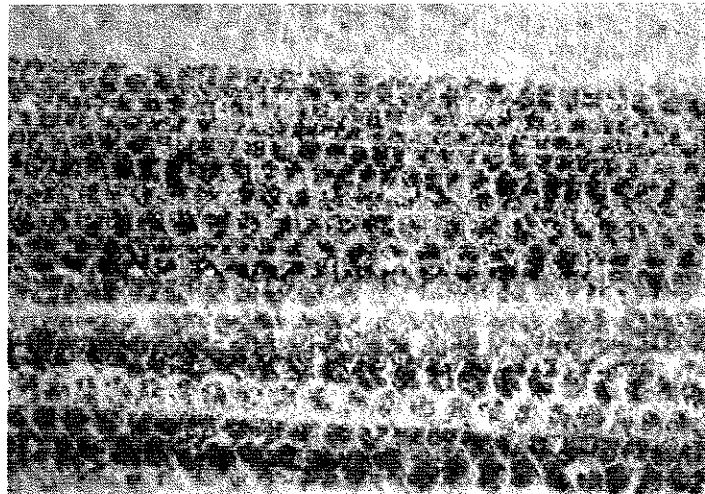
The curve for CMA (Figure 17) was determined from different percent concentration solutions made by dissolving commercially available CMA supplied in a dry pellet form. The curve for KAc (CF7) was determined using a commercially available liquid form of KAc (CF7). The eutectic temperature for the CMA water system in Figure 17 is -27.5°C (-17.5°F) at a concentration of 32.5 percent. The eutectic for the KAc (CF7) - water system is -60°C (-76°F) at a concentration of 49 percent. The curves for the CMA and KAc (CF7) almost coincide with each other. Also, they have a much flatter slope than the other three curves. This is an important feature of both CMA and KAc (CF7) solutions. The refreeze temperature of CMA and KAc (CF7) solutions rises slower with dilution than do the refreeze temperatures of either NaCl, CaCl₂, or MgCl₂. This feature makes them well suited for being used in a liquid form during anti-icing treatments. This is especially true for their use in a liquid form for the pretreatment of bridge decks in anticipation of frosting, or localized icing conditions.

Figure 17



CMA Works Differently

When mixed with snow, CMA interferes with the ability of snow particles to adhere to each other or to the surface. It does not create a flowing brine like salt, but keeps the snow lighter and drier improving traction. Applied early in the storm, CMA prevents the formation of snow pack and the bonding of ice to the pavement surface, so snow and ice can be removed more easily by plow, broom or shovel.



CMA treated snow appears drier

CMA Has Residual Action

Because CMA does not produce a running brine, it does not move off the surface like other deicers. Therefore, fewer applications are needed during a storm and from storm to storm. Experience has shown that surfaces treated with CMA often exhibit anti-icing properties during subsequent periods of freezing moisture.

CMA Is Applied "Bottom Up"

Early application is the key to effective performance of all deicers, including CMA. At the beginning of a snow event, a heavier application of CMA may be appropriate depending on local conditions. Snow plows and the action of traffic will remove the snow - leaving a residual layer of CMA. Application rates may be decreased as the storm continues.

Environment and Toxicology

CMA research conducted in a variety of academic and private laboratories indicates that negative environmental and toxicological impacts are highly unlikely from its use as a deicer. Of the information collected it can be said that:

1. Concentrations used to deice roads have little to no toxic effects on grass, trees or roadside vegetation;
2. Has little to no toxic effects on aquatic species, including vertebrates and invertebrates;
3. Does not mobilize pre-existing heavy metals;
4. Does not increase algae, periphyton or phytoplankton biomass;
5. Is unlikely to cause problems in treatment plants receiving CMA in storm water runoff;
6. Is unlikely to have significant negative impacts on dissolved oxygen in receiving water;
7. Has low acute mammalian toxicity with effects similar or less severe than those of sodium chloride.

BIODEGRADABILITY

The chemical oxygen demand (COD) of CMA was determined using EPA Method 410.1:

COD = 0.75 g O₂/g

The biological oxygen demand (BOD) of CMA was determined using EPA approved dilution methods (Hach). The 20-day incubation BOD value at 10°C is reasonably similar to the COD value suggesting that biological oxidation progresses to the endpoint in 20 days.

BOD₂₀ @ 2°C = 0.40
BOD₂₀ @ 10°C = 0.67

AQUATIC TOXICITY

EPA method 600/4-85-013 was used for measuring the acute toxicity of CMA to freshwater and marine organisms. No mortality was observed at any test level. Based on these study results CMA can be considered to be relatively harmless under generally recognized criteria for assessing acute aquatic toxicity.

Species	Exposure	LC50
Daphnia	48 hours	>1000 mg/L
Rainbow Trout	96 hours	>1000 mg/L

Environmental Impact CMA Versus Road Salt

Environmental Impact	CMA	Salt (NaCl)
Soils	Biodegradable in soil. No adverse effect on soil compaction and strength. Increases soil permeability	Sodium may accumulate in soil Breaks down soil structure, increases erosion. Causes soil compaction which decreases permeability.
Vegetation	Little or no adverse effect. May stimulate roadside plant growth. Acetate ion is the most abundant organic acid metabolite found in nature.	Osmotic stress and soil compaction harm root systems. Spray causes foliage dehydration damage. Many plant species are salt sensitive.
Groundwater	Poor mobility in soil, unlikely to reach groundwater. Ca, Mg increases water hardness.	Mobile Na and Cl ions readily reach groundwater. Increases Na and Cl concentrations in well water along with alkalinity and hardness.
Surface Water	Potential for oxygen depletion through biological oxygen demand(BOD) at concentration greater than 100 ppm in closed systems. Decomposes in 5 days at 20°C, 10 days at 10°C, 100 days at 2°C. Will not stimulate algae growth.	Causes density stratification in ponds and lakes which can prevent reoxygenation. Increases runoff of heavy metals and nutrients through increased erosion.
Aquatic Life	Less toxic to trout than salt. Minimal effect on trout eggs up to 5 times expected maximum runoff concentration of 1000 ppm. No effect on food chain (zooplankton, daphnia, bluegill, and fathead minnows) up to up to 1000 ppm.	Monovalent Na, Cl ions stress osmotic balance. Toxic levels: Na 500 ppm stickleback, Cl 400 ppm trout.
Human/Mammalian	Mild skin and eye irritant. Vinegar odor. Acute oral LD50 in rats greater than 5000 mg/kg. Essentially nontoxic.	Sodium linked to heart disease, hypertension. Cl causes unpleasant taste in drinking water. Mild skin and eye irritant. Acute Oral LD50 in rats approximately 3000 mg/kg. Slightly toxic. Contributes to winter road kills of wildlife.
Water Treatment Plants	No significant increase in BOD or impact on bacterial activity.	No significant impact at expected concentrations.
Air Pollution	Can reduce sand use and resulting particulate emissions.	Can reduce sand use and resulting particulate emissions.

Wildlife Conservation



When sodium chloride is used as a deicer, it can result in roads becoming salt licking stations for wild animals, particularly deer. CMA has been used in deer management areas of Scandinavia to prevent road accidents. In Finland, CMA mixed with sand at rates of 18-24 pounds per ton (15-20 kilograms per cubic meter) kept sand from freezing. Additionally this CMA rate was sufficient to deter reindeer from roadways. CMA has the aroma of vinegar, which does not appeal to animals.

Application Rates

CMA application rates vary according to climate and maintenance practices. CMA is applied at rates similar to road salt, but heavier in the first application and lighter as the storm continues. Typical application rates:

250 to 400 pounds per lane mile
5 to 15 pounds per thousand square feet
20 to 40 grams per square meter

CMA Customer Application Rates				
Agency	Location	Rate lb/ln mi	g/m ²	Daily Traffic (vehicles/day)
MI DOT	Zilwaukee Bridge	300	24	45000
MA DPW	ROUTE 25	300	24	20000
CALTRANS	Mammoth Lakes	375	30	12000
Norway	Mjosa Bridge	375	30	7000
Japan	City of Sapporo	375	30	25000

The bulk density of CMA is about 40 pounds/cubic foot compared to 70 pounds/cubic foot for salt. Since CMA is lighter, applications based on weight will appear to have 75% more pellets on the road surface compared to an equivalent application of salt. For further application/handling information, please see the Commercial Application Guide or the Highway Application Guide.

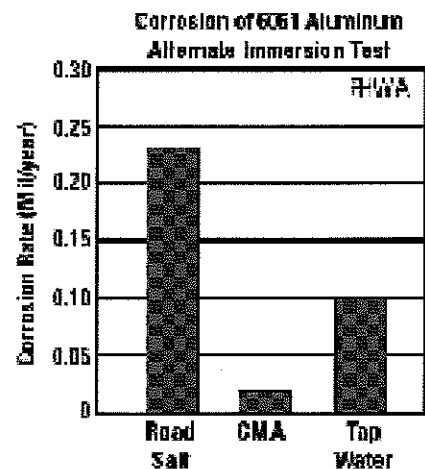
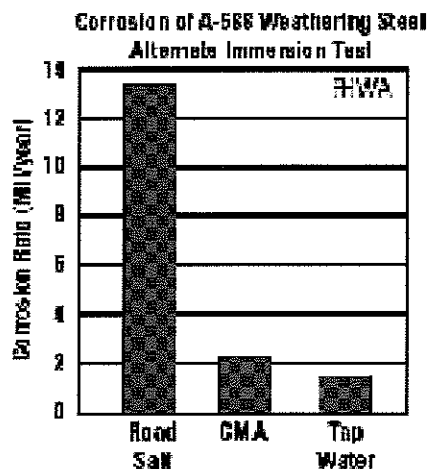
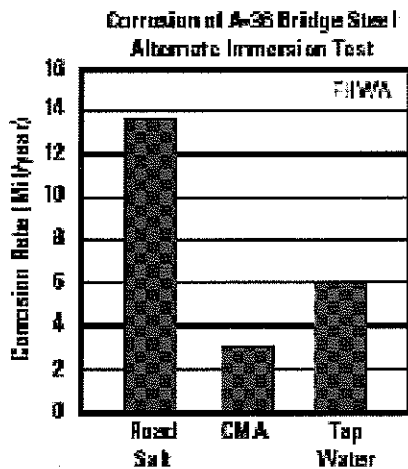
Corrosion Data

Corrosion Properties

CMA exhibits very low corrosion rates on metals found in bridges, roadways, parking garages, and other steel and concrete systems. Commonly described as being about as corrosive as tap water, CMA is often used as the corrosion standard by which other deicers are judged. Years of real-world use coupled with laboratory tests throughout the 1980's and 1990's sponsored by the U.S. FHWA, U.K Department of Transport, and other independent institutions have concluded: CMA is a proven low corrosion deicer.

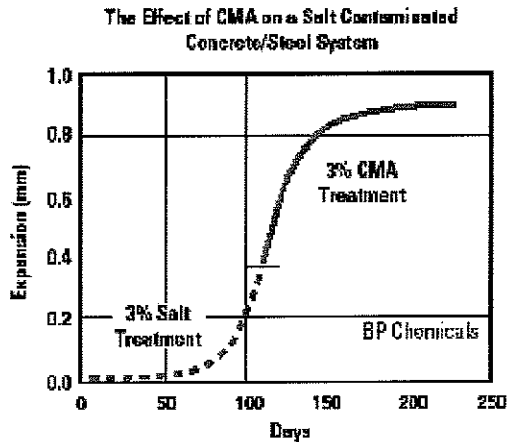


Damage from chloride-based deicers

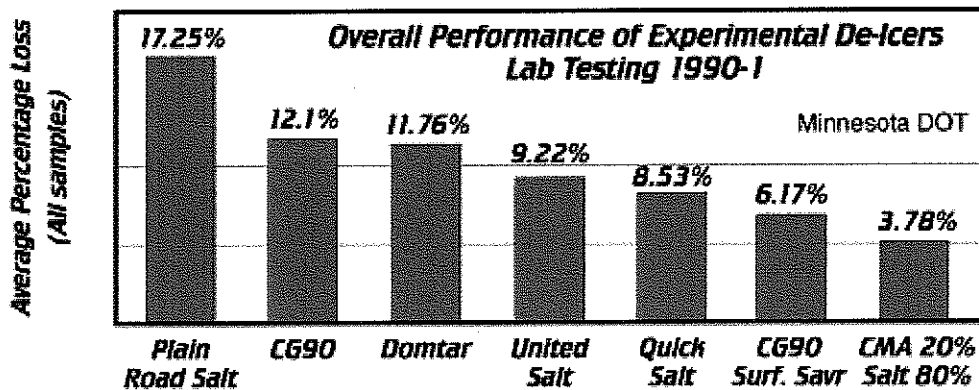
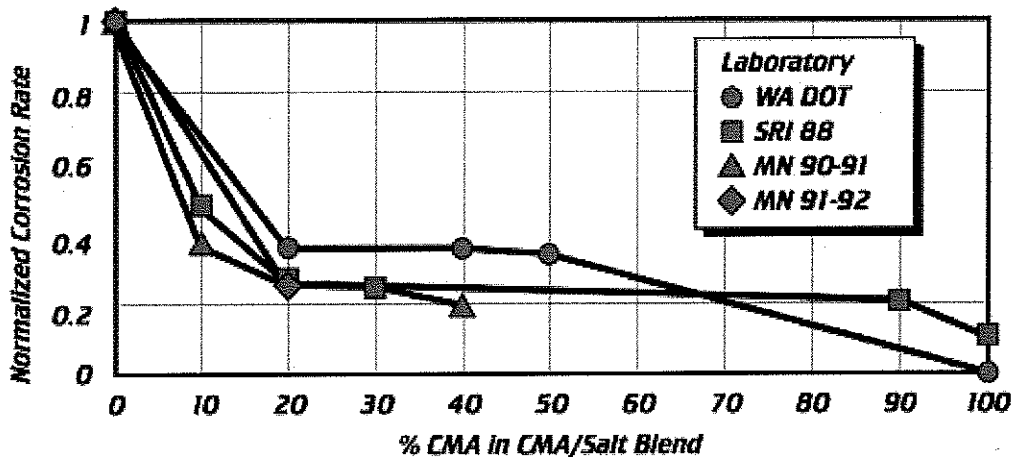


Corrosion Retardation

A switch to CMA on chloride-contaminated concrete structures may extend their useful life. Tests by the Denmark Ministry of Transport with steel rebar in chloride-contaminated concrete showed that when samples were treated with CMA solutions, corrosion rates were reduced. Later tests by BP Chemicals concluded: "CMA is non-corrosive towards steel reinforcement in concrete and can arrest incipient corrosion induced by prior use of rock salt deicers."

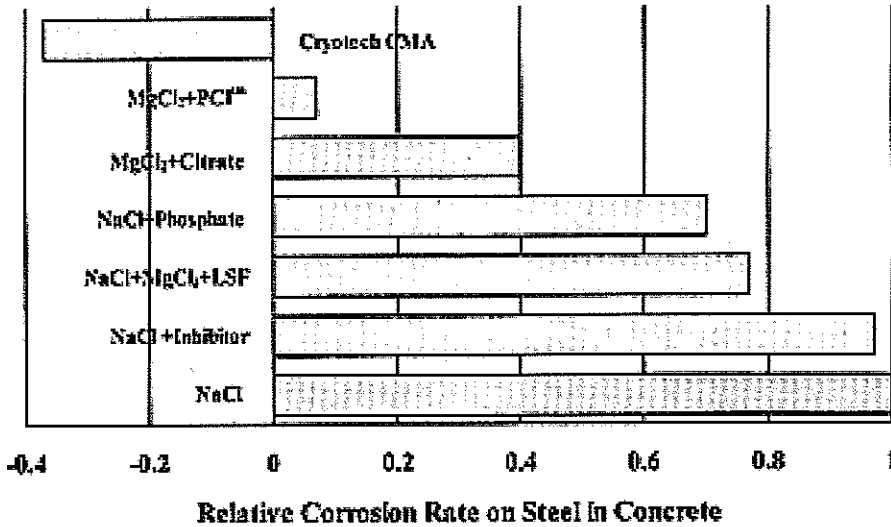


Corrosion Inhibitor



The FHWA evaluated the corrosion effects of various "inhibited" deicers with the following results:

Corrosion Rates of Various Deicers



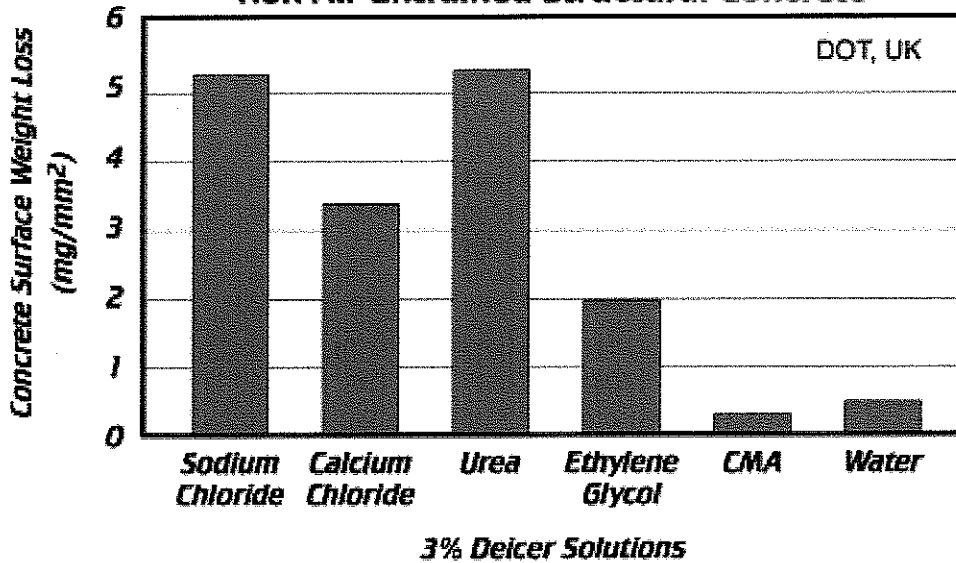
A number of laboratory tests suggest that CMA may be an effective corrosion inhibitor when combined with salt. Although tests were different in type and duration of exposure, all indicated that as little as 20% CMA in a CMA/salt blend resulted in a 70% to 80% reduction in corrosion. As expected, the best corrosion protection results from the use of pure CMA.

Concrete Compatibility

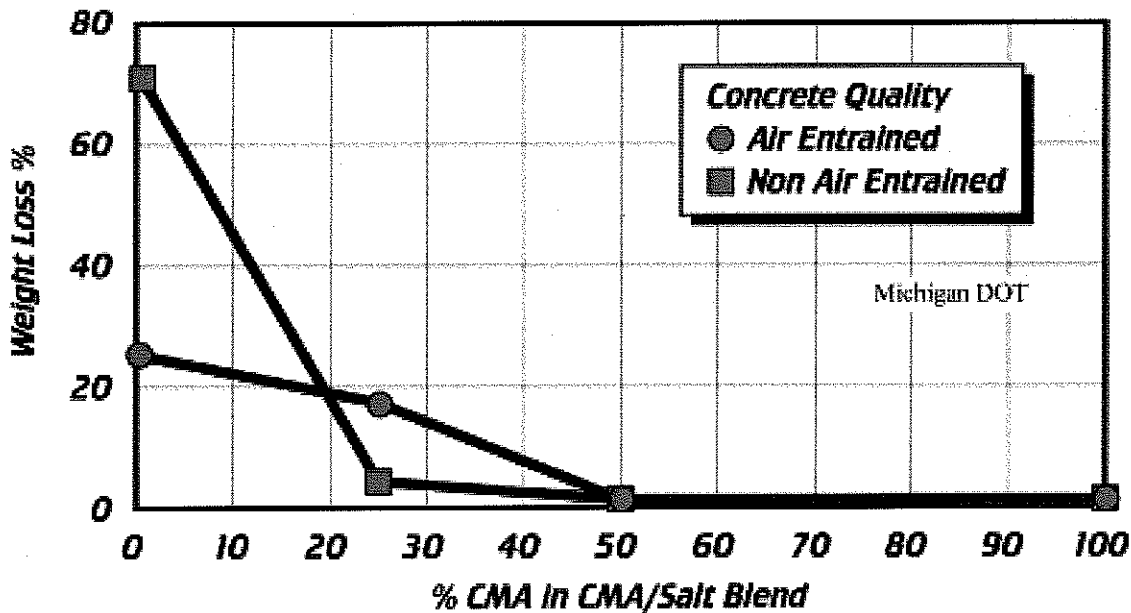


Many engineers specify CMA because it does not chemically attack concrete nor does it increase spalling caused by the freeze-thaw cycling of water. A U.K. Department of Transport study concludes: "With the exception of CMA, all of the deicing chemicals tested resulted in a greater deterioration of the concrete than water alone...CMA was the only chemical on weak structural concrete which satisfied the criterion for scaling damage."

Spalling Effect of Deicers on Concrete Non-Air Entrained Structural Concrete



Testing by Michigan DOT confirmed that CMA dramatically reduced spalling in both air-entrained and non air-entrained concrete compared to salt alone. Blending small amounts of CMA (minimum 20% by weight) with sodium chloride resulted in a reduction in salt-induced concrete scaling.



Other Information

Applying liquid deicers to dry pavement will reduce friction between tires and the pavement surface. For this reason alone, user training is important prior to initial use.

Please contact Cryotech at (800)346-7237 or (319)372-6012, or email.

CMA Comes In Various Forms



CMA

Cryotech provides CMA in bulk, 1 metric ton (2205 lb) supersacks, or 25 kg (55 lb) bags. CMA should be used at temperatures above 20°F (-7°C). CMA should be stored indoors or in weather-proof containers. Covering bulk CMA is advised in high humidity areas. When properly stored, CMA will remain effective for years.

CMA Salt Blends

Cryotech provides CMA and a high quality grade of salt pre-blended in a CMA concentration of 40% (CMA40®). This product is recommended where protection from corrosion and concrete spalling

is needed, but limited quantities of salt can be tolerated. CMA/salt blends should be stored with the same precautions as CMA.

Liquid CMA

A 25% CMA solution can be prepared by mixing Cryotech CMA at a rate of 3 lb/gal (0.38 kg/l) of potable water. At higher concentrations some CMA may not dissolve. At 25% concentration, CMA has a gel point of 8°F (-13°C), a eutectic point of 4°F (-16°C), and specific gravity of 1.14. Detailed mixing instructions are available - call Cryotech with questions.



Liquid CMAK®

Cryotech provides liquid CMA enhanced by the addition of Cryotech CF7, a potassium acetate-based deicing product. The end-product, trade named Cryotech CMAK, has a lower freezing point than liquid CMA, yet carries many of its corrosion and environmental benefits. CMAK is recommended for use in automated anti-icing systems like that pictured below. Containing no chlorides, it combines the low-corrosion properties of CMA with the high performance of potassium acetate. Contact Cryotech for freeze-point specific formulations. CMAK is a patented product - customers wishing to blend it in the

field may be granted authorization from Cryotech to do so. See MSDS for additional information.

Bibliography

Following please find a list of technical information with a brief description following thereafter.

1. Amerhein, C. and Strong, J. E., The Effect of Deicing Salts on Trace Metal Mobility in Roadside Soils. In Proceedings of: The Environmental Impact of Highway Deicing, University of California, Davis, California, October 1989.

As an alternative to NaCl, calcium magnesium acetate (CMA) is gaining popularity in selected areas around the country and in California. Calcium magnesium acetate at a Ca/Mg ratio of 3:7 has been found to be the most effective deicer (Schenk, 1985) and is less toxic to fish, zooplankton, and phytoplankton and less corrosive than chloride salts (Horner, 1988).

The effect of calcium magnesium acetate on trace metal mobility in roadside soils should generally be beneficial. The acetate provides some pH buffering and the decomposition of acetate produces HCO_3^- , which will increase the pH of the soil and decrease the solubility of trace metals coprecipitated with oxides, hydroxide, and carbonate. The Ca and Mg ions are beneficial to soil structure, maintaining the porosity and aggregate stability whereas Na tends to destroy soil structure. Mobilization of dispersed clays and organic matter occurs when adsorbed Na is high and the ionic strength is low. Thus, dilute solutions of NaCl and pure snowmelt are likely to mobilize metals through the process of organic matter solubilization and clay dispersion.

2. Connolly, J. P., Analysis of the Environmental Fate of ICE-B-CON® and its Impact on Receiving Water Dissolved Oxygen, HydroQual, Inc., Mahwah, New Jersey, April 1990.

The biodegradation kinetics in natural waters and soils of the acetate in a calcium magnesium acetate (CMA) formulation developed by Chevron Chemical Company and marketed under the trade name ICE-B-GON® were quantified from laboratory experiments. These kinetics were used to project the impact of this CMA on the dissolved oxygen of receiving waters. The laboratory experiments indicated that the degradation process may be quantified as a first-order reaction in which the degradation rate is a function of temperature and microbial activity. Model simulations indicated that significant load reduction can occur as a result of acetate degradation in soil as highway runoff passes over field prior to entering a receiving water. In an alternate scenario in which the CMA accumulates in the snowpack and does not begin to degrade immediately, the potential for a significant impact is increased.

3. Dobson, M.C., The Effects of Salt (NaCl) and Calcium Magnesium Acetate (CMA) on the Growth of Various European Tree Species, Preliminary Report, Forestry Research Division, Farnham, Surrey, United Kingdom, 1990.

A limited number of tree species have been screened for tolerance to CMA, and those that have been tested are not planted in significant numbers in Britain. This preliminary report outlines the results obtained to date from research, partly funded by BP, into the effects of NaCl and CMA on the growth of various European tree species. It contains data on parameters of tree growth and soil ion concentrations. The final report will contain additional data on foliar analysis and will include a full discussion of the results.

4. Horner, R. R., Environmental Monitoring and Evaluation of Calcium Magnesium Acetate (CMA), National Cooperative Highway Research Program Report 305, Transportation Research Board, National Research Council, April 1988.

This report contains findings from research to examine the environmental effects of calcium magnesium acetate (CMA) through laboratory and field experimentation. Previous research by others has suggested CMA as an alternative to the commonly used chloride-bearing highway deicers. With the completion of this study, state highway agencies considering the use of CMA now have access to information on its environmental effects. Specific guidance have been developed, and, in the few instances where research results are not definitive, field monitoring plans are suggested for use when circumstances dictate a conservative approach to the application of CMA.

5. Jones, P. H., et al., Environmental Impact of Road Salting, Institute of Environmental Studies, University of Toronto, July 1986.

The purpose of this report is to provide a comprehensive resource document concerning the environmental impacts of road salt. This document will be of use to MTC Regional Environmental Planners in assessing the impacts of road salting activities on ground and surface water quality, and terrestrial aquatic biota. Alternatives to the use of sodium chloride are not considered.

6. Leiser, A. T., John, S. A. Evaluation Of The Effects of Calcium Magnesium Acetate on Selected Plant Species, In Proceedings of: The Environmental Impact of Highway Deicing, Department of Environmental Horticulture, University of California, Davis, California, October 1990.

The two deicing agents (CMA and NaCl) were applied in solution to soils and by spray to plant tops to investigate the possible effects of CMA to roadside vegetation using NaCl as the control. Soil application rates were selected to bracket the rates of NaCl actually applied to highways so that soil concentrations would equal, and at the highest rate, exceed those attained in soils within 25 feet of the roadway. Spray application rates were selected in the range and to exceed the concentrations found in snowmelt actually sampled from highway surfaces. One plant of each species was included in each replicate as a non-treated control.

7. Pollock, S. J., Mitigating Highway Deicing Salt Contamination of Private Water Supplies in Massachusetts, In Proceedings of: The Environmental Impact of Highway Deicing, University of California, Davis, California, October 1989.

The purpose of this report is to document the effectiveness of two of the preventive and remedial actions that are used by MDPW to alleviate salt contamination of private water supplies. These actions are reducing salt on state highways and use of salt substitute, calcium magnesium acetate.

8. Washbrook, D. M., Investigation into the Effects of BP Clearway CMA on the Activated Sludge Process at Rye Meads Sewage Treatment Works, Thames Water, March 1989.

The results of this test have shown no detrimental effects on sewage treatment, and it is unlikely that any problems would be encountered if the use of Clearway CMA became widespread.

9. Winters, G. R., et al., Environmental Evaluation of Calcium Magnesium Acetate (CMA), Report No. FHWA/RD-84/094, California Department of Transportation, June 1985.

This report presents the results of a literature survey and a limited laboratory study on the environmental impacts of Calcium Magnesium Acetate (CMA). Laboratory tests were performed on fish, zooplankton, phytoplankton, common roadside plants and soils. No information was found on surface water quality, groundwater quality, or air quality. CMA is less toxic than NaCl to Rainbow trout, Fathead Minnows, and most plant species tested. CMA is not toxic enough to prevent it from being used as a deicer. Recommends additional studies to determine how CMA impacts natural systems.

10. Chollar , B. H. and Virmani, Y. P., Effects of Calcium Magnesium Acetate on Reinforced Steel Concrete, Federal Highway Administration, Public Roads Vol. 51, No. 4, March 1988.

Results indicated that the potential of the black steel rebars in slabs ponded with salt solutions started increasing numerically within the first 3 months of exposure, while that of rebars in slabs ponded with CMA solution did not increase at all during that time period. The CMA solutions did not cause any significant potential shift or corrosion after 4 years on/off ponding in an outdoor environment.

11. Chollar , B. H. and Virmani, Y. P., Effects of Calcium Magnesium Acetate on Reinforced Steel Concrete, Federal Highway Administration, Public Roads Vol. 51, No. 4, March 1988.

Results indicated that the potential of the black steel rebars in slabs ponded with salt solutions started increasing numerically within the first 3 months of exposure, while that of rebars in slabs ponded with CMA solution did not increase at all during that time period. The CMA solutions did not cause any significant potential shift or corrosion after 4 years on/off ponding in an outdoor environment.

12. Locke, K. E. and Kenneley, K. K., Corrosion of Highway and Bridge Structural Metals by CMA, Federal Highway Administration Report FHWA/RD-86/064, June 1986.

This report describes a study of the corrosive tendencies of reagent grade calcium magnesium acetate (CMA) and a commercial grade CMA on metals used in bridge construction including reinforcing steel on concrete. The results of an electrochemical and exposure study indicate CMA is much less corrosive to the exposed metals than found with sodium chloride.

13. Man, M.C.M., Hazell, L.B., Smith, R.P., On-Line Measurement of Simulated Reinforcement Corrosion in Concrete Under Action of De-Icers, British Petroleum Research Center, London, U.K., October 1989.

It has been demonstrated that, compared to rock salt, acetate deicers are at least a factor of ten times less corrosive towards steel reinforcement in a model concrete. Changing from rock salt to acetate deicers should extend considerably the lifetime of steel reinforced concrete elevated highways and bridge structures, even those already damaged by previous use of rock salt.

14. Nadezhdin, A., et al., The Effect of Deicing Chemicals on Reinforced Concrete, Domtar Inc., Senneville, Quebec, Canada, Domtar Chemicals Group, Sifto Salt Division, Mississauga, Ontario Canada, Report to Transportation Research Board, January 1988.

This paper addresses the role played by deicing chemicals in the deterioration of reinforced concrete. The use of rock salt as a deicing chemical has given rise in the last few years to important environmental concerns because of the potential damage to concrete pavements. Several newer and faster bench scale methods of study and materials evaluation are described and compared to the ASTM recommended techniques. The difference in freezing temperatures between concrete pore solution and an outside deicer solution is shown to be one of the important factors in the spalling process. The importance of an anisotropic character of freezing zone is also outlined.

15. Slick D.S., Effects of Calcium Magnesium Acetate (CMA) on Pavements and Motor Vehicles, Federal Highway Administration Report FHWA/RD-87/037, April 1987.

This report describes a study of the effects of reagent grade and commercial grades of calcium magnesium acetate (CMA) on all non-metallic materials used in highway and bridge construction and on all motor vehicle parts. The results of this study indicate CMA has much less effect on the non-metallic highway materials and motor vehicle parts than found with sodium chloride.

16. The Danish Corrosion Center, Effect of CMA on Corrosion Properties of Rebar in Concrete, Denmark Ministry of Transport, December 1990.

This study investigated the effect of CMA on corrosion of steel reinforcement in salt contaminated concrete. The results of the study show that the application of CMA to concrete already contaminated with chloride delays the onset of corrosion. This work, along with recent studies by the Michigan Department of Transportation, BP Chemicals Ltd. in the United Kingdom and the Federal Highway Administration, confirms the corrosion inhibiting properties of CMA in concrete.

17. Fleege, E., Salt Additives and Alternatives Corrosion Study, Minnesota, Department of Transportation, May 1991.

The Minnesota Department of Transportation has committed itself to the development of methods and techniques to reduce the negative aspects associated with deicing agents and still maintain current levels of service during the winter for the traveling public. This is being accomplished by either of two (2) methods; either to reduce the corrosiveness of the de-icing materials and/or to reduce the risk of ground water contamination by reducing the amount of sodium chloride that is used as a de-icing agent.

18. Bacchus, A., Financial Implications of Salt vs. CMA as a Deicing Agent: Cost & Benefits Estimated by an MTO Expert Group, The Research and Development Branch, Ministry of Transportation of Ontario, December 1987.

It is salt which historically has been used to keep Ontario roads passable and safe in winter for commercial, commuter, and recreational traffic. Salt is very effective as a deicer and costs relatively little per ton, but it is known to have damaging effects on vehicles, reinforced concrete highway bridges, parking garages, groundwater, vegetation, and other private property. MTC continues to seek methods of reducing salt usage and to search for affordable alternative deicers that are more benign to the environment. Calcium Magnesium Acetate (CMA) has been identified as one of the most promising alternative deicers.

19. Hudson, Lawrence R., Calcium Magnesium Acetate (CMA) from Low-Grade Biomass, Paper, Presented at IGT Conference, Energy from Biomass and Wastes XI, Orlando, March 18, 1987.

Calcium Magnesium Acetate (CMA) is an alternative to salt for highway deicing. It was selected by the Federal Highway Administration (FHWA) as the long-term deicing material of choice based on several characteristics. Compared to salt, CMA is less corrosive, less damaging to concrete, and less harmful to plant and animal life.

20. Murray, D. M., Ernest, U.F. W. An Economic Analysis of the Environmental Impact of Highway Deicing Report No. EPA-600/2-76-105, Environmental Protection Agency, May 1976.

This study involves an analysis of the cost of damages that result from the use of salt (sodium chloride and calcium chloride) on highways to melt snow and ice. A large literature search and several surveys were carried out in order to determine the types and extent of damages that have occurred. This report contains over 320 references.

21. Nottingham, D., et al., Costs to the Public Due to the Use of Corrosive Deicing Chemicals and a Comparison to Alternate Winter Road Maintenance Procedures, Report No. AK-RD-84-14, Alaska Department of Transportation and Public Facilities, December 1983.

This paper represents a pragmatic attempt to quantify salt related damage to vehicles and bridges in the Anchorage area and to examine possible means of reducing the use of salt. Total program cost, as used in this report, includes direct and initial costs and indirect costs of loss of vehicle value and damage to bridge decks. The major avenues examined for reducing the total costs of the present Anchorage deicing program are: utilize heated storage buildings and stockpiling sand and replace salt with non-corrosive deicing chemicals. These options were selected based on simplicity, feasibility for the study area, and production of results similar to current maintenance procedures.

22. Vitaliano, D. F., An Economic Assessment of the Social Costs of Highway Salting and the Efficiency of Substituting a New Deicing Material, Rensselaer Polytechnic Institute, Economics Department, Troy, New York, February 1991.

The use of salt for deicing roads results in costs estimated at more than \$800 per ton, including the costs of repair and maintenance of roads and bridges, vehicle corrosion costs, and loss of aesthetic value through roadside tree damage. Additionally, there are probable health costs related to elevated sodium levels in drinking water. The new Surface Transportation Act of 1991 appears to replace the previous federal funding policy that was biased against the use of calcium magnesium acetate (CMA) with a new subsidy for its purchase that may lead to inefficient overuse.

23. Transportation Research Board Special Report #235 Comparing Salt and Calcium Magnesium Acetate," 1991.

The damaging and corrosive effects of road salt on cars and highways, as well as its impacts on terrestrial and aquatic ecosystems, have prompted investigations on a variety of alternative deicing compounds. These studies have revealed that calcium magnesium acetate (CMA) may prove to be a good alternative to sodium chloride. Before CMA can be used on a large economic scale, however, investigations of its effects on various aquatic and terrestrial roadside environments are needed. In this investigation, samples were taken from each of the ten lakes and were then incubated in situ with various concentrations of CMA to determine if there are any effects on natural lake phytoplankton growth. Within the scope of this investigation, CMA seems to have no or relatively small effect on phytoplankton biomass.

24. Elliott, H. A. and Linn, J. H., Effect of Calcium Magnesium Acetate on Heavy Metal Mobility in Soils, Agriculture Engineering Department, Pennsylvania State University, Journal of Environmental Quality 16(3), 1987.

Calcium Magnesium Acetate (CMA) is a promising replacement for traditional roadway deicing salts. CMA was studied to assess its impact on the mobility of metals in contaminated soils. Under the experimental conditions, acetate complexation played a minor role in metal mobilization. Highway deicing with CMA may temporarily increase translocation of metals in strongly buffered acid roadside soils. Input of acetate ions and an increase in exchangeable bases with sustained CMA use should render northeastern USA soils less vulnerable to acidification, thereby inhibiting conditions that promote metal solubilization.

25. Goldman, C. R., Environmental Effect of Calcium Magnesium Acetate on Natural Phytoplankton Populations in Ten Sierra Nevada and Klamath Mountain Lakes, In Proceedings of: The Environmental Impact of Highway Deicing, University of California, Davis, California, October 1989.

Sodium chloride, or common road salt, is by far the most popular chemical deicer, because it is reliable, inexpensive, and easy to handle, store and apply. Over the years, however, the widespread use of salt has been linked with many indirect costs, including damage to motor vehicles, infrastructure, and the environment. Recognizing these drawbacks, in 1980 the Federal Highway Administration identified calcium magnesium acetate (CMA) as a possible replacement for salt. Results have been promising, but the most significant impediment to its use has been its price, which is more than 20 times that of salt.

Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

Non-chloride Calcium Magnesium Acetate (Cryotech CMA®), Sodium Acetate (Cryotech NAAC®), and Potassium Acetate (Cryotech CF7®) are eligible for matching Federal Funds under the SAFETEA-LU act that was passed in August 2005. Through the SAFETEA-LU act, funds are available for low corrosive anti-icing/deicing applications and environmentally preferred anti-icers/deicers used on highway bridges through 2009. This act is building on the foundation provided by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 21st Century of 1998 (TEA-21), which originated to help preserve and rehabilitate America's bridges. There is approximately \$21.6 billion authorized through 2009 for the Highway Bridge Program section of the act.

For more information regarding the SAFETEA-LU act, please visit <http://www.fhwa.dot.gov/safetealu/index.htm>.



CRYOTECH CMA® Questions & Answers

What is CMA Deicer? Cryotech CMA® is solid calcium magnesium acetate, a low-corrosion, environmentally safe deicer. It is used on roads, bridges, parking garages, and corporate campuses, or wherever corrosion, concrete damage, or the environment are of concern. CMA can also be liquified in the field for anti-icing applications.

How is CMA made? CMA is a simple combination of dolomitic lime and acetic acid (a principal component of vinegar). CMA is produced at Cryotech's plant in Fort Madison, Iowa.

Why was CMA developed? There has long been a concern for damage to the environment and to structures like bridges and parking garages caused by the use of chloride deicers. In the 1970's, the Federal Highway Administration (FHWA) identified calcium magnesium acetate as the only low-corrosion chemical alternative to road salt that also protected the environment. Years of research and field applications have proven CMA is no more corrosive than tap water and does not harm vegetation or receiving waters.

How does CMA work? CMA, like road salt, works best above 20°F (-7°C), and is used at about the same rates as salt. Applied early in the storm, CMA prevents the formation of snow pack and the bonding of ice to the pavement surface. CMA interferes with the ability of snow and ice particles to adhere to each other or to the pavement, and therefore, the loose residue can be easily removed by broom or plow.

A key to successful use of CMA is a thorough understanding of the deicer's performance characteristics. Trained and experienced operators quickly adapt their applications and plowing techniques to take advantage of CMA's unique properties.

How can CMA be used?

- CMA can be used straight for direct application.
- CMA can be prewet with Cryotech CF7® Liquid Commercial Deicer (potassium acetate-based) to enhance its performance.
- CMA can be mixed with sand for direct application at various concentrations or to prevent the sand pile from freezing
- CMA can be mixed with salt to reduce the corrosive nature of salt and reduce the volume of salt applied.
- CMA can be liquified for use as a prewetting agent or for direct anti-icing applications.

How long does CMA last? CMA tends to remain on the pavement surface longer than ordinary deicers, working longer to prevent bonding. This residual action reduces application frequency and makes snow removal easier.

The refreeze temperature of CMA solutions rises slower with dilution than sodium chloride, calcium chloride, or magnesium chloride. This feature makes it well suited for anti-icing treatments, especially for use in the pretreatment of bridge decks in anticipation of frosting, or localized icing conditions.

Does CMA require any special handling or equipment? No, CMA is applied with the same equipment as other deicers. Furthermore, CMA can be stored indefinitely when kept dry.

Does CMA affect health? CMA is essentially non-toxic. A series of oral inhalation, eye and skin tests conducted in accordance with the U.S. Environmental Protection Agency (EPA) guidelines classify CMA as no more harmful to handle than common table salt.

Does CMA affect the environment? When absorbed into the soil, CMA's calcium and magnesium components benefit the soil structure, just as liming a garden improves permeability. The acetate portion of CMA biodegrades naturally.

Does CMA cause corrosion on roads, bridges, parking garages, etc.? No significant corrosion of steel, aluminum, or concrete has been found in repeated tests with CMA sponsored by the FHWA, state Departments of Transportation, and private researchers.

Does CMA act as a corrosion inhibitor? Laboratory studies have shown that CMA, when mixed with sodium chloride at a minimum 20% by weight, inhibits salt's naturally corrosive properties. Additionally, CMA reduces active corrosion when applied on chloride-contaminated structures, extending their useful life.

Does CMA reduce corrosion more than inhibited chloride products? Yes, CMA is essentially non-corrosive. FHWA studies conclude that no inhibited deicers compare with CMA in minimizing corrosion to steel imbedded in concrete.

Is CMA safe for concrete? CMA does not chemically attack concrete, nor does it increase spalling caused by the freeze/thaw cycle of water. A study by the UK Department of Transportation concludes: "With the exception of CMA, all of the deicing chemicals tested resulted in a greater deterioration of the concrete than water alone...CMA was the only chemical on weak structural concrete which satisfied the criterion for scaling damage."

How much does CMA cost? The purchase price of CMA is more than salt. However, independent studies have concluded the life-cycle costs of salt can be as high as \$3000 per ton (\$3.30/kg) when considering corrosion damage and environmental impact.

Is there government awareness of CMA? Yes, the U.S. Federal government allows for matching federal funds. In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA) providing states with 80% reimbursement for use of CMA on bridges, overpasses, and approaches. In 1998, the TEA-21 Act (Transportation Equity Act for the 21st Century) reaffirmed this reimbursement. Again in 2005, the federal government showed continued support by passing the SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy of Users). The FHWA has funded research to find inexpensive methods to produce CMA from biofermentation processes. Additionally, California, Massachusetts, Michigan, Nevada, New York, New Hampshire, and Vermont have all passed legislation concerning environmentally friendly deicers like CMA.

Is Cryotech ISO certified? In 2002, Cryotech's Fort Madison, Iowa plant achieved ISO 9001:2000 certification for its quality process systems, having been previously registered to ISO 9000:1994. ISO is an internationally recognized quality model. It provides assurance to customers that the products they receive are produced and shipped under rigorous international quality standards. In 2005, Cryotech also became an ISO 14001:2004 certified company, which is primarily concerned with what the company is doing to minimize the environmental effects of its activities. Every year Cryotech is audited by an independent registrar to ensure it is continually improving its processes and maintaining the ISO standards. Cryotech is the first manufacturer in North America in its industry to receive certification to these two standards.

How can I order CMA or obtain additional information?

Contact:

Cryotech Deicing Technology

6103 Orthoway

Fort Madison, Iowa 52627

Phone: 800/346-7237 or 319/372-6012

Fax: 319/372-2662

E-Mail: deicers@cryotech.com

Web: <http://www.cryotech.com>

Who are some of the users? A small sampling:

Cities

State DOT's

Arlington Hts., IL

TN, TX, WA, WV

Bellevue, WA

Pennsylvania Turnpike

Columbus, OH

East Lansing, MI

Essexville, MI

Oak Lawn, IL

Commercial

Blue Cross Blue Shield

Midwest Snowfighters, LLC

Cox Health Systems

Morristown Parking Authority

Kentucky, University of

Park Square Revival

Lewis Gale Hospital

St. Mary's Hospital

REFERENCES

For economic and field performance:

Blackburn, R.R., Fleege, E.J., Ketcham, S.A., and Minsk, L.D., "Manual of Practice for an Effective Anti-Icing Program", FHWA-RD-95-202, June 1996

Keep, D., and Parker, D., "Tests Clear Snow, Path for Use of Liquid Anti-Icing in Northwest", Roads & Bridges, August, 1995

Miller, W.L., Better Roads, "CMA Cuts Corrosion on Zilwaukee Bridge", February, 1993

Murray, D.M., Ernest, V.R.W., An Economic Analysis of the Environmental Impact of Highway Deicing, Report No. EPA-600/2-76-105, 1976

Transportation Research Board Special Report 235, "Comparing Salt and CMA", 1991

Vitaliano, D.F., An Economic Assessment of the Social Costs of Highway Salting and the Efficiency of Substituting New Deicing Material, Rensselaer Polytechnic Inst., Economics Dept., Troy, NY, 1991

For corrosion:

Bertocci, Ugo, "Impedance Spectroscopy for the Evaluation of Corrosion Inhibitors in Highway Deicers", FHWA, Publication No. FHWA-RD-96-178, 1997

Chollar, B.H., and Virmani, Y.P., "Effects of Calcium Magnesium Acetate on Reinforced Steel Concrete", FHWA, Public Roads Vol. 51, No. 4, 1988

Man, M.C., Evaluation of Corrosion Behavior of Acetate Deicers on Steel and Steel Reinforced Concrete, BPR Research Centre, London, UK, 1989

McCrum, R.L., Corrosion and Alternative Deicers, Materials and Technology Division, MIDOT, in proceedings of: Chemical Deicers and the Environment, Michigan State University, 1992

For concrete:

Hancock, D.A., "Assessment of De-Icing Chemicals for Scaling Resistance to Various Grades of Concrete", 1995

For environment:

Amrhein, C., and Strong, J.E., The Effect of Deicing Chemicals on Major Ion and Trace Metal Chemistry in Roadside Soil, in proceedings of: The Environmental Impact of Highway Deicing, UC-Davis, 1989

Goldman, C.R., Environmental Effect of CMA on Natural Phytoplankton Populations in Ten Sierra Nevada and Klamath Mountain Lakes, in proceedings of: The Environmental Impact of Highway Deicing, UC-Davis, 1989

McFarland, B.L., Environmental Impacts and Toxicological Characteristics of CMA, in proceedings of: Chemical Deicers and the Environment, Michigan State University, 1992



Date: June 1, 2006
To: To Whom It May Concern
From: Cryotech Deicing Technology
Subject: PNS Approved Products

Non-chloride Calcium Magnesium Acetate (Cryotech CMA®), Potassium Acetate (Cryotech CF7®), and Liquid CMA (A 25% mixture of Cryotech CMA® and potable water) are located on the Pacific Northwest Snowfighters (PNS) Association's approved product list. The transportation agencies of Washington, Oregon, Montana, Idaho, and the province of British Columbia formed PNS several years ago to outline specifications for deicing chemicals.

For more information regarding the PNS Association, please visit:
<http://www.wsdot.wa.gov/partners/pns/default.htm>.

~ MEMORANDUM ~

Date: October 1, 2006
To: To Whom It May Concern
From: Cryotech Deicing Technology
Subject: Cryotech CMA® Deicer Warranty

Cryotech Deicing Technology warrants that Cryotech CMA® deicer to be delivered hereunder shall conform to the specifications attached hereto; and upon receipt of payment therefore, shall be free from any security interest or encumbrance. Cryotech **disclaims** all warranties and conditions, either express or implied, including, but not limited to, implied warranties of merchantability and fitness for a particular purpose. In no event shall Cryotech be liable to the Buyer or to any third party for any indirect, incidental, special, consequential, punitive, or exemplary damages (including without limitation lost profits, lost savings, or loss of business opportunity) arising out of or relating to the deicer, or the use or inability to use the same, even if Cryotech has been advised of the possibility of such damages.

~ MEMORANDUM ~

Date: June 1, 2006

To: To Whom It May Concern

From: Cryotech Deicing Technology

Subject: **Safe, Accountable, Flexible, Efficient Transportation Equity Act:
A Legacy for Users**

Under the SAFETEA-LU act passed in August 2005, states may be eligible to receive Federal funding for environmentally preferred anti-icers/deicers used on highway bridges through 2009. Calcium Magnesium Acetate (Cryotech CMA®) and Sodium Acetate (Cryotech NAAC®) are included on the list of environmentally-friendly and low corrosion anti-icing/deicing applications. The SAFETEA-LU act builds on the foundation provided by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 21st Century of 1998 (TEA-21), which were originated to help preserve and rehabilitate America's bridges. There is approximately \$21.6 billion authorized through 2009 for the Highway Bridge Program section of the SAFETEA-LU act.

Attached you will find the Deicing Section of the SAFETEA-LU act.

**For more information regarding the SAFETEA-LU act, please visit
<http://www.fhwa.dot.gov/safetealu/index.htm>**

PUBLIC LAW 109-59—AUG. 10, 2005

**SAFE, ACCOUNTABLE, FLEXIBLE, EFFICIENT
TRANSPORTATION EQUITY ACT: A LEGACY
FOR USERS**

Public Law 109-59
109th Congress

An Act

Aug. 10, 2005
[H.R. 3]

To authorize funds for Federal-aid highways, highway safety programs, and transit programs, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Safe,
Accountable,
Flexible, Efficient
Transportation
Equity Act: A
Legacy for Users.
Inter-
governmental
relations.
23 USC 101 note.

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) **SHORT TITLE.**—This Act may be cited as the “Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users” or “SAFETEA-LU”.

(b) **TABLE OF CONTENTS.**—The table of contents for this Act is as follows:

- Sec. 1. Short title; table of contents.
Sec. 2. General definitions.

TITLE I—FEDERAL-AID HIGHWAYS

Subtitle A—Authorization of Programs

- Sec. 1101. Authorization of appropriations.
Sec. 1102. Obligation ceiling.
Sec. 1103. Apportionments.
Sec. 1104. Equity bonus program.
Sec. 1105. Revenue aligned budget authority.
Sec. 1106. Future Interstate System routes.
Sec. 1107. Metropolitan planning.
Sec. 1108. Transfer of highway and transit funds.
Sec. 1109. Recreational trails.
Sec. 1110. Temporary traffic control devices.
Sec. 1111. Set-asides for Interstate discretionary projects.
Sec. 1112. Emergency relief.
Sec. 1113. Surface transportation program.
Sec. 1114. Highway bridge program.
Sec. 1115. Highway use tax evasion projects.
Sec. 1116. Appalachian development highway system.
Sec. 1117. Transportation, community, and system preservation program.
Sec. 1118. Territorial highway program.
Sec. 1119. Federal lands highways.
Sec. 1120. Puerto Rico highway program.
Sec. 1121. HOV facilities.
Sec. 1122. Definitions.

Subtitle B—Congestion Relief

- Sec. 1201. Real-time system management information program.

Subtitle C—Mobility and Efficiency

- Sec. 1301. Projects of national and regional significance.
Sec. 1302. National corridor infrastructure improvement program.
Sec. 1303. Coordinated border infrastructure program.
Sec. 1304. High priority corridors on the National Highway System.
Sec. 1305. Truck parking facilities.
Sec. 1306. Freight intermodal distribution pilot grant program.
Sec. 1307. Deployment of magnetic levitation transportation projects.

“(B) incorporate such pay items into contract provisions to be included in each contract entered into by the State with respect to a highway project to ensure compliance with section 109(e)(2).

“(3) LIMITATION.—Nothing in the regulations shall prohibit a State from implementing standards that are more stringent than those required under the regulations.

“(4) POSITIVE PROTECTIVE MEASURES DEFINED.—In this subsection, the term ‘positive protective measures’ means temporary traffic barriers, crash cushions, and other strategies to avoid traffic accidents in work zones, including full road closures.”

(c) CLARIFICATION OF DATE.—Section 109(g) of such title is amended in the first sentence by striking “The Secretary” and all that follows through “of 1970” and inserting “Not later than January 30, 1971, the Secretary shall issue”.

SEC. 1111. SET-ASIDES FOR INTERSTATE DISCRETIONARY PROJECTS.

(a) IN GENERAL.—Section 118(c)(1) of title 23, United States Code, is amended by striking “\$50,000,000” and all that follows through “2003” and inserting “\$100,000,000 for each of fiscal years 2005 through 2009”.

(b) TECHNICAL AMENDMENTS.—

(1) SECTION 116.—Section 116(b) of such title is amended by striking “highway department” and inserting “transportation department”.

(2) SECTION 120.—Section 120(e) of such title is amended in the first sentence by striking “such system” and inserting “such highway”.

(3) SECTION 127.—Section 127(a) of such title is amended by striking “118(b)(1)” and inserting “118(b)(2)”.

(4) BICYCLE AND PEDESTRIAN SAFETY GRANTS.—Section 1212(i) of the Transportation Equity Act for the 21st Century (112 Stat. 196–197) is amended by redesignating subparagraphs (D) and (E) as paragraphs (2) and (3), respectively, and moving such paragraphs 2 ems to the left.

23 USC 402 note.

SEC. 1112. EMERGENCY RELIEF.

There are authorized to be appropriated for each fiscal year such sums as may be necessary for allocations by the Secretary described in subsections (a) and (b) of section 125 of title 23, United States Code, if the total of those allocations in such fiscal year are in excess of \$100,000,000.

SEC. 1113. SURFACE TRANSPORTATION PROGRAM.

(a) PROGRAM ELIGIBILITY.—Section 133(b) of title 23, United States Code, is amended—

(1) in paragraph (6) by inserting “, including advanced truck stop electrification systems” before the period at the end; and

(2) by inserting after paragraph (11) the following:

“(12) Projects relating to intersections that—

“(A) have disproportionately high accident rates;

“(B) have high levels of congestion, as evidenced by—

“(i) interrupted traffic flow at the intersection; and

“(ii) a level of service rating that is not better than ‘F’ during peak travel hours, calculated in accordance with the Highway Capacity Manual issued by the Transportation Research Board; and
“(C) are located on a Federal-aid highway.”.

(b) REPEAL OF SAFETY PROGRAMS SET-ASIDE.—

(1) REPEAL.—Section 133(d)(1) of such title is repealed.

(2) TECHNICAL AMENDMENTS.—Section 133(d) of such title is amended—

(A) in the first sentence of paragraph (3)(A)—

(i) by striking “subparagraphs (C) and (D)” and inserting “subparagraph (C)”; and

(ii) by striking “80 percent” and inserting “90 percent”;

(B) in paragraph (3)(B) by striking “tobe” and inserting “to be”; and

(C) in paragraph (3)—

(i) by striking subparagraph (C);

(ii) by redesignating subparagraphs (D) and (E) as subparagraphs (C) and (D), respectively; and

(iii) in subparagraph (C) (as redesignated by clause (ii)) by adding a period at the end.

23 USC 133 note.

(3) EFFECTIVE DATE.—Paragraph (1) and paragraph (2)(A)(ii) of this subsection shall take effect October 1, 2005.

(c) TRANSPORTATION ENHANCEMENT ACTIVITIES.—Effective October 1, 2005, section 133(d)(2) of such title is amended by striking “10 percent” and all that follows through “section 104(b)(3) for a fiscal year” and inserting the following: “In a fiscal year, the greater of 10 percent of the funds apportioned to a State under section 104(b)(3) for such fiscal year, or the amount set aside under this paragraph with respect to the State for fiscal year 2005.”.

(d) OBLIGATION AUTHORITY.—Section 133(f)(1) of such title is amended—

(1) by striking “1998 through 2000” and inserting “2004 through 2006”; and

(2) by striking “2001 through 2003” and inserting “2007 through 2009”.

Effective date.

(e) TECHNICAL CORRECTION.—Effective June 9, 1998, section 1108(e) of the Transportation Equity Act for the 21st Century (112 Stat. 140) is amended by striking “Section 133” and inserting “Section 133(f)”.

23 USC 133.

SEC. 1114. HIGHWAY BRIDGE PROGRAM.

(a) FINDING AND DECLARATION.—Section 144(a) of title 23, United States Code, is amended to read as follows:

“(a) FINDING AND DECLARATION.—Congress finds and declares that it is in the vital interest of the United States that a highway bridge program be carried out to enable States to improve the condition of their highway bridges over waterways, other topographical barriers, other highways, and railroads through replacement and rehabilitation of bridges that the States and the Secretary determine are structurally deficient or functionally obsolete and through systematic preventive maintenance of bridges.”.

(b) PARTICIPATION.—Section 144(d) of such title is amended to read as follows:

“(d) PARTICIPATION.—

“(1) BRIDGE REPLACEMENT AND REHABILITATION.—On application by a State or States to the Secretary for assistance for a highway bridge that has been determined to be eligible for replacement or rehabilitation under subsection (b) or (c), the Secretary may approve Federal participation in—

“(A) replacing the bridge with a comparable facility;

or

“(B) rehabilitating the bridge.

“(2) TYPES OF ASSISTANCE.—On application by a State or States to the Secretary, the Secretary may approve Federal assistance for any of the following activities for a highway bridge that has been determined to be eligible for replacement or rehabilitation under subsection (b) or (c):

“(A) Painting.

“(B) Seismic retrofit.

“(C) Systematic preventive maintenance.

“(D) Installation of scour countermeasures.

“(E) Application of calcium magnesium acetate, sodium acetate/formate, or other environmentally acceptable, minimally corrosive anti-icing and de-icing compositions.

“(3) BASIS FOR DETERMINATION.—The Secretary shall determine the eligibility of highway bridges for replacement or rehabilitation for each State based on structurally deficient and functionally obsolete highway bridges in the State.

“(4) SPECIAL RULE FOR PREVENTIVE MAINTENANCE.—Notwithstanding any other provision of this subsection, a State may carry out a project under paragraph (2)(B), (2)(C), or (2)(D) for a highway bridge without regard to whether the bridge is eligible for replacement or rehabilitation under this section.”.

(c) APPORTIONMENT OF FUNDS.—Section 144(e) of such title is amended—

(1) in the third sentence by striking “square footage” and inserting “deck area”;

(2) in the fourth sentence by striking “the total cost of deficient bridges in a State and in all States shall be reduced by the total cost of any highway bridges constructed under subsection (m) in such State, relating to replacement of destroyed bridges and ferryboat services, and,”; and

(3) in the seventh sentence by striking “for the same period as funds apportioned for projects on the Federal-aid primary system under this title” and inserting “for the period specified in section 118(b)(2)”.

(d) OFF-SYSTEM BRIDGES.—Section 144(g)(3) of such title is amended to read as follows:

“(3) OFF-SYSTEM BRIDGES.—

“(A) IN GENERAL.—Not less than 15 percent of the amount apportioned to each State in each of fiscal years 2005 through 2009 shall be expended for projects to replace, rehabilitate, paint, perform systematic preventive maintenance or seismic retrofit of, or apply calcium magnesium acetate, sodium acetate/formate, or other environmentally acceptable, minimally corrosive anti-icing and de-icing compositions to, or install scour countermeasures to, highway bridges located on public roads, other than those on a

Federal-aid highway, or to complete the Warwick Intermodal Station (including the construction of a people mover between the Station and the T.F. Green Airport).

“(B) REDUCTION OF EXPENDITURES.—The Secretary, after consultation with State and local officials, may reduce the requirement for expenditure for bridges not on a Federal-aid highway under subparagraph (A) with respect to the State if the Secretary determines that the State has inadequate needs to justify the expenditure.”

(e) BRIDGE SET-ASIDE.—

23 USC 144.

(1) FISCAL YEAR 2005.—Section 144(g)(1)(C) of such title is amended—

(A) in the subsection heading by striking “2003” and inserting “2005”; and

(B) in the first sentence by striking “2003” and inserting “2005”.

Effective date.

(2) FISCAL YEARS 2006 THROUGH 2009.—Effective October 1, 2005, section 144(g) of such title (as amended by subsection (d) of this section) is amended—

(A) by striking the subsection designation and all that follows through the period at the end of paragraph (2) and inserting the following:

“(g) BRIDGE SET-ASIDES.—

“(1) DESIGNATED PROJECTS.—

“(A) IN GENERAL.—Of the amounts authorized to be appropriated to carry out the bridge program under this section for each of the fiscal years 2006 through 2009, all but \$100,000,000 shall be apportioned as provided in subsection (e). Such \$100,000,000 shall be available as follows:

“(i) \$12,500,000 per fiscal year for the Golden Gate Bridge.

“(ii) \$18,750,000 per fiscal year for the construction of a bridge joining the Island of Gravina to the community of Ketchikan in Alaska.

“(iii) \$12,500,000 per fiscal year to the State of Nevada for construction of a replacement of the federally owned bridge over the Hoover Dam in the Lake Mead National Recreation Area.

“(iv) \$12,500,000 per fiscal year to the State of Missouri for construction of a structure over the Mississippi River to connect the City of St. Louis, Missouri, to the State of Illinois.

“(v) \$12,500,000 per fiscal year for replacement and reconstruction of State maintained bridges in the State of Oklahoma.

“(vi) \$4,500,000 per fiscal year for replacement of the Missisquoi Bay Bridge, Vermont.

“(vii) \$8,000,000 per fiscal year for replacement and reconstruction of State-maintained bridges in the State of Vermont.

“(viii) \$8,750,000 per fiscal year for design, planning, and right-of-way acquisition for the Interstate Route 74 bridge from Bettendorf, Iowa, to Moline, Illinois.

“(ix) \$10,000,000 per fiscal year for replacement and reconstruction of State-maintained bridges in the State of Oregon.

“(B) GRAVINA ACCESS SCORING.—The project described in subparagraph (A)(ii) shall not be counted for purposes of the reduction set forth in the fourth sentence of subsection (e).

“(C) PERIOD OF AVAILABILITY.—Amounts made available to a State under this paragraph shall remain available until expended.”;

(B) by striking paragraph (2); and

(C) by redesignating paragraph (3) as paragraph (2).

(f) CONTINUATION OF REPORT; FEDERAL SHARE.—Section 144 of such title is amended by adding at the end the following:

“(r) ANNUAL MATERIALS REPORT ON NEW BRIDGE CONSTRUCTION AND BRIDGE REHABILITATION.—Not later than 1 year after the date of enactment of this subsection, and annually thereafter, the Secretary shall publish in the Federal Register a report describing construction materials used in new Federal-aid bridge construction and bridge rehabilitation projects.

Federal Register,
publication.

“(s) FEDERAL SHARE.—

“(1) IN GENERAL.—Except as provided under paragraph (2), the Federal share of the cost of a project payable from funds made available to carry out this section shall be determined under section 120(b).

“(2) INTERSTATE SYSTEM.—The Federal share of the cost of a project on the Interstate System payable from funds made available to carry out this section shall be determined under section 120(a).”.

(g) TECHNICAL AMENDMENT.—Section 144(i) of such title is amended by striking “at the same time” and all that follows through “Congress”.

SEC. 1115. HIGHWAY USE TAX EVASION PROJECTS.

(a) ELIGIBLE ACTIVITIES.—

(1) INTERGOVERNMENTAL ENFORCEMENT EFFORTS.—Section 143(b)(2) of title 23, United States Code, is amended by inserting before the period the following: “; except that of funds so made available for each of fiscal years 2005 through 2009, \$2,000,000 shall be available only to carry out intergovernmental enforcement efforts, including research and training”.

(2) CONDITIONS ON FUNDS ALLOCATED TO INTERNAL REVENUE SERVICE.—Section 143(b)(3) of such title is amended by striking “The” and inserting “Except as otherwise provided in this section, the”.

(3) LIMITATION ON USE OF FUNDS.—Section 143(b)(4) of such title is amended—

(A) by striking “and” at the end of subparagraph (F);

(B) by striking the period at the end of subparagraph

(G) and inserting a semicolon; and

(C) by adding at the end the following:

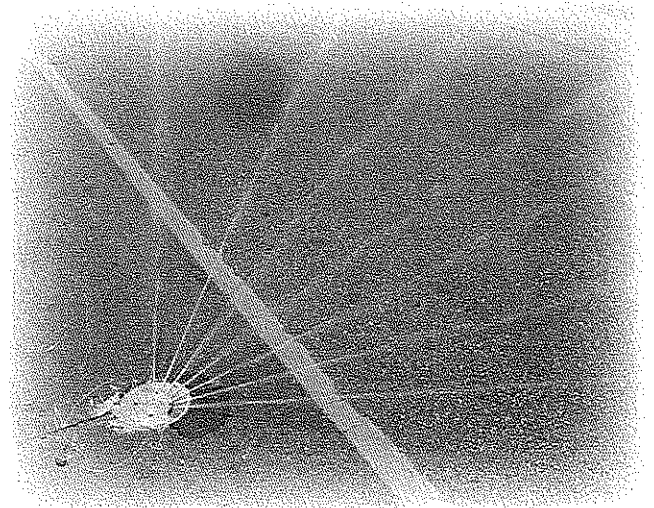
“(H) to support efforts between States and Indian tribes to address issues relating to State motor fuel taxes; and

“(I) to analyze and implement programs to reduce tax evasion associated with foreign imported fuel.”.

(4) REPORTS.—Section 143(b) of such title is amended by adding at the end the following:



REPLACE THE DEICER, NOT THE STRUCTURE



SPEC: CRYOTECH CF7[®]

LIQUID COMMERCIAL DEICER

BENEFITS

- Low corrosion: non-chloride based
- Fast: liquid formulation works on contact
- High performance: effective at -26°C (-15°F)
- Easy to handle: clear liquid, no agitation required
- Safe for the environment: non-persistent, readily biodegradable
- Multi-purpose: anti-icing, deicing, and prewetting solids
- Does not track like common deicers
- Is not slippery like common deicers

PERFORMANCE

- Has low freezing points -76°F (-60°C)
- When used as an anti-icer - prevents adhesion of snow/ice to pavement
- When used as a deicer - breaks snow/ice bonds prior to mechanical removal
- Does not refreeze as fast as common deicers - the residual effect requires fewer applications

APPLICATION

- Prewetting: apply at spreader outlet at a rate of 1.25 gallons per 100 lbs of solid deicer (130g/kg)
- Deicing:
Commercial = 1-3 gallons/1000ft² (50-150 g/m²) Highway = 60-180 gallons/lane mile (50-150g/m²)
- Anti-icing:
Commercial = 0.5 gallons/1000ft² (25-50 g/m²) Highway = 25-60 gallons/lane mile (25-50g/m²)
- Re-apply when new snow/ice accumulation shows first tendency to bond
- Plow promptly to reduce fluid dilution

ENVIRONMENT

- Readily biodegrades at low temperatures; has low BOD
- Does not contain nitrogen, sodium, or chlorides
- Low toxicity to fish, mammals, and vegetation

HANDLING

- CF7 should not be stored or plumbed through systems that use galvanized, zinc, or brass components
- Polyethylene containers are preferred, otherwise use carbon, low alloy, or stainless steel
- Best practices include storing totes and drums in areas protected from weather and exposure to direct sunlight
- Containers must be clean and free of rust, surface deposits, and residue

SEE REVERSE SIDE FOR PRODUCT SPECIFICATIONS
COMPLETE TECHNICAL BROCHURE AVAILABLE UPON REQUEST

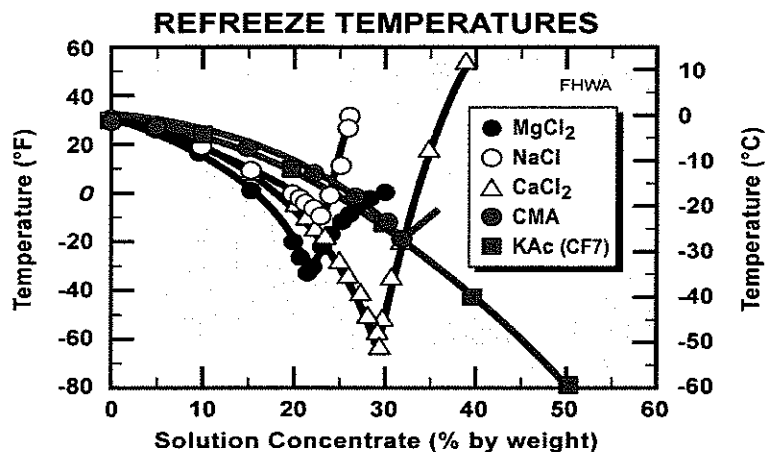


AN ISO 9001:2000 & 14001:2004 CERTIFIED COMPANY

PRODUCT SPECIFICATIONS - CRYOTECH CF7[®]

COMPOSITION	50% aqueous potassium acetate solution, by weight, plus corrosion inhibitors
APPEARANCE	Clear, colorless, mobile liquid, free from matter in suspension
DENSITY	At 20°C (68°F) = 10.7 lbs/gallon (1.282 g/cm ³)
VISCOSITY	At 20°C (68°F) = 10cp maximum At 0°C (32°F) = 20cp maximum
FLASH POINT	Nonflammable
FREEZING POINT	-60°C (-76°F)
MISCIBILITY WITH WATER	Complete
STORAGE	CF7 should not be stored or plumbed through systems that use galvanized, zinc, or brass components
TYPICAL pH	11.0 ± 0.5
SPECIFIC GRAVITY	At 20°C = 1.25 - 1.30
PACKAGING	55 gallon drums (208 liters) - (4 minimum) 265 gallon tote (1003 liters) - (1 minimum) Bulk - (4400 gallons minimum)

Phase
Diagrams of
Deicers



Revised -10/06

FOR ORDERING INFORMATION CONTACT:

Ph: 319.372.6012 or 800.346.7237 Fax: 319.372.2662 E-mail: deicers@cryotech.com

CRYOTECH CF7®

MATERIAL SAFETY DATA SHEET



1. PRODUCT NAME & DESCRIPTION

Cryotech CF7® Liquid Deicer

MANUFACTURED AND SUPPLIED IN THE USA BY

Cryotech Deicing Technology
6103 Orthoway
Fort Madison, IA 52627
United States

Cryotech Contact Information

Telephone: (800)346-7237
FAX: (319)372-2662
email: deicers@cryotech.com
website: <http://www.cryotech.com>

2. CHEMICAL COMPOSITION

The percent compositions are given to allow for the various ranges of the components present in the whole product and may not equal 100%.

Percent	Component	CAS#
100%	Cryotech CF7®	
Containing		
50%	Potassium Acetate	127-08-2
<1.0%	Corrosion Inhibitors in	
50%	Water	7732-18-5

CAS - Chemical Abstract Service Number

3. HAZARD IDENTIFICATION

(also see Sections 11 and 12)

CAUTION! - MAY CAUSE EYE IRRITATION

EYE CONTACT:

This substance is slightly irritating to the eyes and could cause prolonged (days) impairment of your vision. The degree of the injury will depend on the amount of material that gets into the eye and the speed and thoroughness of the first aid treatment. Signs and symptoms may include pain, tears, swelling, redness and blurred vision.

SKIN IRRITATION:

This substance is not expected to cause prolonged or significant skin irritation.

DERMAL TOXICITY:

The systematic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if it gets on the skin.

RESPIRATORY/INHALATION:

This material does not present an inhalation hazard.

INGESTION:

If swallowed, this substance is considered practically non-toxic to internal organs. Ingestion may cause irritation of the digestive tract which may result in nausea, vomiting and diarrhea.

This product contains potassium salts. Ingestion of large amounts (25 or more grams) of potassium salts usually causes a person to vomit. If the person is not suffering from a preexisting kidney condition, the absorbed potassium is rapidly excreted in the urine. However, very young children or individuals with compromised kidney and/or cardiac function could experience the following effects after ingesting excessively large doses of potassium salts: irritation and inflammation of the stomach lining, muscular weakness, burning, tingling and numbness sensations of hands and feet, slower heart beat, reduced blood pressure, irregular heart beat and cardiac arrest.

OCCUPATIONAL EXPOSURE LIMITS:

None Identified

4. FIRST AID MEASURES

Chemical Emergency: Spill, leak, fire, or accident call Chemtrec day or night (800)424-9300; Outside continental USA call (703)527-3887

EYE CONTACT:

Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. No additional first aid should be necessary. However, if irritation persists, see a doctor.

SKIN CONTACT:

No first aid procedures are required. As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.

INHALATION:

Since this material is not expected to be an immediate inhalation problem, no first aid procedures are required.

INGESTION:

If swallowed, give water or milk to drink and telephone for medical advice. DO NOT make the person vomit unless directed to do so by medical personnel. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.

5. FIRE FIGHTING MEASURES

FLASH POINT: NA

AUTO IGNITION: NA

FLAMMABILITY LIMITS (% by volume in air):

Lower: NA Upper: NA Non-flammable

EXTINGUISHING MEDIA:

NA - Material is not flammable

FIRE FIGHTING PROCEDURES:

This material normally will not burn.

COMBUSTION PRODUCTS:

Normal combustion forms carbon dioxide and water vapor.

NFPA RATINGS:

Health 1; Flammability 0; Reactivity 0; Special NDA:

(Least - 0, Slight - 1, Moderate - 2, High - 3, Extreme - 4)

These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint Coating Association.

6. ACCIDENTAL RELEASE MEASURES

Chemical Emergency: Spill, leak, fire, or accident call Outside continental USA call (703)527-3887 Chemtrec day or night (800)424-9300;

Contain spillage and absorb on suitable material e.g. sawdust, sand or earth. Transfer to a container for disposal. See section 13. Wash the spillage area with plenty of water.

7. HANDLING AND STORAGE

Avoid contact with skin and eyes.

Avoid breathing mists when spraying.

Store in clean vessels and containers.

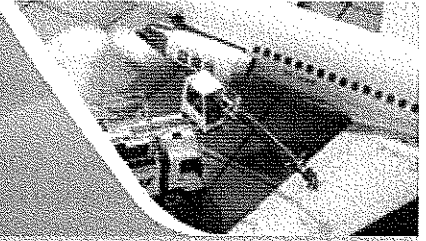
Do not store or handle product with systems constructed of wetted parts that have galvanized steel, zinc or brass components.

CRYOTECH CF7®

MATERIAL SAFETY DATA SHEET

<p>8. EXPOSURE CONTROLS/PERSONAL PROTECTION</p> <p>EYE PROTECTION: Do not get this material in your eyes. Eye contact can be avoided by wearing chemical goggles.</p> <p>SKIN PROTECTION: No special skin protection is usually necessary. Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be minimized by wearing protective clothing.</p> <p>RESPIRATORY PROTECTION: No special respiratory protection is normally required.</p> <p>VENTILATION: No special ventilation is necessary.</p>	<p>12. ECOLOGICAL INFORMATION</p> <p>COD (TOD): 0.30 g O₂/g BOD₂₀ @ 2° C: 0.30 g O₂/g BOD₂₀ @ 20° C: 0.30 g O₂/g BOD₅ @ 20° C: 0.14 g O₂/g</p>																																						
<p>9. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>SOLUBILITY: Completely miscible in water. Appearance: Clear, colorless to light straw colored liquid. (May be dyed blue at customer request)</p> <p>BOILING POINT: ~115°C MELTING POINT: -40°C EVAPORATION: No Data Available SPECIFIC GRAVITY: 1.28 @ 20°C VAPOR PRESSURE (20°C): 17 mm Hg PERCENT VOLATILE (VOLUME %): No Data Available VAPOR DENSITY (AIR = 1): No Data Available VISCOSITY: 6.5 cP @ 20°C</p>	<p>13. DISPOSAL CONSIDERATION Based on information available to Cryotech Deicing Technology, this product is neither listed as a hazardous waste nor does it exhibit any of the characteristics that would cause it to be classified or disposed of as an RCRA hazardous waste. If product should spill or be otherwise unsuitable for normal deicing applications, it may be absorbed on suitable materials and disposed of in sanitary landfill unless state or local regulations prohibit such disposal.</p>																																						
<p>10. STABILITY & REACTIVITY</p> <p>HAZARDOUS DECOMPOSITION PRODUCTS: None known.</p> <p>STABILITY: Stable.</p> <p>HAZARDOUS POLYMERIZATION: Polymerization will not occur.</p> <p>INCOMPATIBILITY: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc. Avoid prolonged contact with reactive metals such as magnesium and zinc, especially in closed systems where hydrogen gas may accumulate over time.</p> <p>SPECIAL PRECAUTIONS: READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.</p> <p>Store away from strong oxidizing materials.</p>	<p>14. TRANSPORT INFORMATION Not restricted under any transport regulations.</p>																																						
<p>11. TOXICOLOGICAL INFORMATION</p> <p>EYE IRRITATION: No product toxicology data available. The hazard evaluation was based on data from similar products.</p> <p>SKIN IRRITATION: No product toxicology data available. The hazard evaluation was based on data from similar products.</p> <p>DERMAL TOXICITY: No product toxicology data available. The hazard evaluation was based on data from similar products.</p> <p>RESPIRATORY/INHALATION: No product toxicology data available. The hazard evaluation was based on data from similar products.</p> <p>INGESTION: The oral LD50 in rats is greater than 5.0 g/kg.</p>	<p>15. REGULATORY INFORMATION</p> <p>DOT SHIPPING NAME: Not designated as a hazardous material by the Federal DOT. DOT HAZARD CLASS: Not Applicable DOT IDENTIFICATION NUMBER: Not Applicable SARA 311 CATEGORIES:</p> <table style="width: 100%; border: none;"> <tr> <td>1. Immediate (Acute) Health Effects:</td> <td style="text-align: right;">Yes</td> </tr> <tr> <td>2. Delayed (Chronic) Health Effects:</td> <td style="text-align: right;">No</td> </tr> <tr> <td>3. Fire Hazard:</td> <td style="text-align: right;">No</td> </tr> <tr> <td>4. Sudden Release of Pressure Hazard:</td> <td style="text-align: right;">No</td> </tr> <tr> <td>5. Reactivity Hazard:</td> <td style="text-align: right;">No</td> </tr> </table> <p>REGULATORY LISTS SEARCHED:</p> <table style="width: 100%; border: none;"> <tr> <td>01 = SARA 313</td> <td>02 = MASS RTK</td> </tr> <tr> <td>03 = NTP Carcinogen</td> <td>04 = CA Prop. 65</td> </tr> <tr> <td>05 = MI 406</td> <td>06 = IARC Group 1</td> </tr> <tr> <td>07 = IARC Group 2A</td> <td>08 = IARC Group 2B</td> </tr> <tr> <td>09 = SARA 302/304</td> <td>10 = PA RTK</td> </tr> <tr> <td>11 = NJ RTK</td> <td>12 = CERCLA 302.4</td> </tr> <tr> <td>13 = MN RTK</td> <td>14 = ACGIH TLV</td> </tr> <tr> <td>15 = ACGIH STEL</td> <td>16 = ACGIH Calculated TLV</td> </tr> <tr> <td>17 = OSHATWA</td> <td>18 = OSHA STEL</td> </tr> <tr> <td>20 = EPA Carcinogen</td> <td>21 = TSCA Sect 4(e)</td> </tr> <tr> <td>22 = TSCA Sect 5(a)(e)(f)</td> <td>23 = TSCA Sect 6</td> </tr> <tr> <td>24 = TSCA Sect 12(b)</td> <td>25 = TSCA Sect 8(a)</td> </tr> <tr> <td>26 = TSCA Sect 8(d)</td> <td>28 = Canadian WHMIS</td> </tr> <tr> <td>29 = OSHA CEILING</td> <td></td> </tr> </table> <p>None of the components of this material are found on the regulatory lists indicated.</p>	1. Immediate (Acute) Health Effects:	Yes	2. Delayed (Chronic) Health Effects:	No	3. Fire Hazard:	No	4. Sudden Release of Pressure Hazard:	No	5. Reactivity Hazard:	No	01 = SARA 313	02 = MASS RTK	03 = NTP Carcinogen	04 = CA Prop. 65	05 = MI 406	06 = IARC Group 1	07 = IARC Group 2A	08 = IARC Group 2B	09 = SARA 302/304	10 = PA RTK	11 = NJ RTK	12 = CERCLA 302.4	13 = MN RTK	14 = ACGIH TLV	15 = ACGIH STEL	16 = ACGIH Calculated TLV	17 = OSHATWA	18 = OSHA STEL	20 = EPA Carcinogen	21 = TSCA Sect 4(e)	22 = TSCA Sect 5(a)(e)(f)	23 = TSCA Sect 6	24 = TSCA Sect 12(b)	25 = TSCA Sect 8(a)	26 = TSCA Sect 8(d)	28 = Canadian WHMIS	29 = OSHA CEILING	
1. Immediate (Acute) Health Effects:	Yes																																						
2. Delayed (Chronic) Health Effects:	No																																						
3. Fire Hazard:	No																																						
4. Sudden Release of Pressure Hazard:	No																																						
5. Reactivity Hazard:	No																																						
01 = SARA 313	02 = MASS RTK																																						
03 = NTP Carcinogen	04 = CA Prop. 65																																						
05 = MI 406	06 = IARC Group 1																																						
07 = IARC Group 2A	08 = IARC Group 2B																																						
09 = SARA 302/304	10 = PA RTK																																						
11 = NJ RTK	12 = CERCLA 302.4																																						
13 = MN RTK	14 = ACGIH TLV																																						
15 = ACGIH STEL	16 = ACGIH Calculated TLV																																						
17 = OSHATWA	18 = OSHA STEL																																						
20 = EPA Carcinogen	21 = TSCA Sect 4(e)																																						
22 = TSCA Sect 5(a)(e)(f)	23 = TSCA Sect 6																																						
24 = TSCA Sect 12(b)	25 = TSCA Sect 8(a)																																						
26 = TSCA Sect 8(d)	28 = Canadian WHMIS																																						
29 = OSHA CEILING																																							
<p>16. OTHER INFORMATION This Material Safety Data Sheet contains environmental, health and toxicology information for your employees. Please make sure this information is given to them. It also contains information to help you meet community right-to-know/emergency response reporting requirements under SARA Title III and many other laws. If you resell this product, this MSDS must be given to the buyer or the information incorporated in your MSDS. Discard any previous edition of this MSDS. Latest version of this MSDS can be found at http://www.cryotech.com</p>																																							

The above information is accurate to the best of our knowledge. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use or misuse are beyond our control, **Cryotech Deicing Technology, a Division of General Atomics International Services Corporation makes no warranty, either express or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon.** Cryotech Deicing Technology, a Division of General Atomics International Services Corporation assumes no responsibility for any injury or loss resulting from the use of the product described herein. User should satisfy himself that he has all current data relevant to his particular use.



Deicing Products > Commercial > Cryotech CF7®

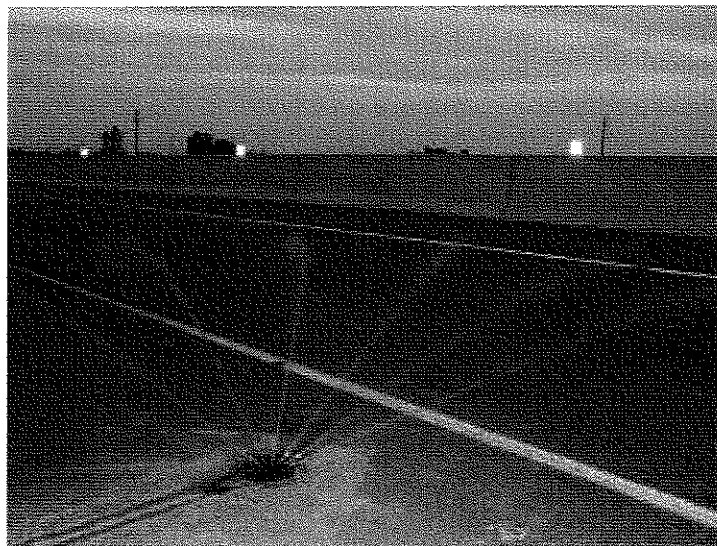
- **CF7®**

- Customer Profile
- Specifications and MSDS
- Performance
- Environmental Impact
- Application Rates
- Storage & Handling
- Other Info
- SAFETEA-LU

Description of Cryotech CF7®

Cryotech CF7® is a potassium acetate based liquid deicer containing no chlorides. It is safer for structural steel and reinforcing steel embedded in concrete and readily biodegrades with little environmental impact. CF7 has a freezing point of -60°C (-76°F), and is effective at temperatures of -26°C (-15°F) and below.

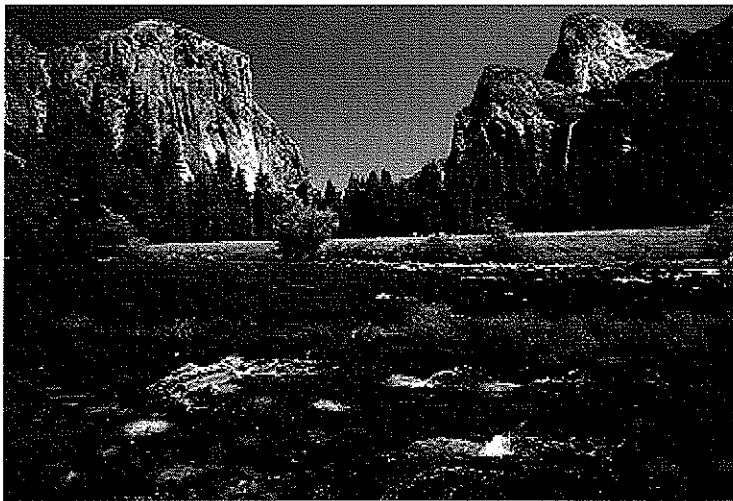
Please see the CF7 Fact Sheet for a brief summary of CF7's benefits, application information, and product specifications.



Highway 401/416 Interchange - Ottawa, Ontario

Cryotech CF7® offers these advantages:

- Low Corrosion -- Contains no chlorides
- High Performance -- Effective to -26°C (-15°F) and below
- Safe for the Environment -- Non-persistent and biodegradable
- Dual Purpose -- For prewetting solids or direct application
- Safe to Use -- Low toxicity to humans and aquatic organisms
- Easy to Handle -- A clear liquid, no agitation required
- Lasts Longer -- Requires fewer applications



Yosemite national Park, California

CF7 is an offshoot of Cryotech's runway deicing business. For both environmental and performance reasons, common glycol- and urea-based deicers are rapidly being replaced by Cryotech's E36® liquid runway deicer. The U.S. Environmental Protection Agency has publicly urged airports to consider the advantages of converting to E36.

Based on the characteristics of CF7, and on the best information available to Cryotech, CF7 is neither listed as a hazardous waste, nor does it exhibit any of the characteristics that would cause it to be classified or disposed of as a RCRA hazardous waste. For this and other reasons, CF7 may be considered an important tool in managing environmental issues associated with storm water run-off.

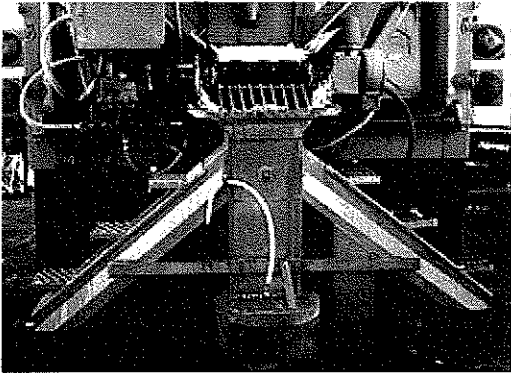
Customer Profile



Zilwaukee Bridge, Saginaw, MI The Zilwaukee Bridge is chloride-free. Since completion in 1988, CMA® and CF7 have been the only chemical deicers used on the Zilwaukee Bridge. To date, there is no evidence of chloride-induced corrosion.

Michigan DOT chose CF7 to prewet CMA as it was being applied. When prewet at the time of application, CMA does not bounce and roll, staying on the bridge surface longer. Since CF7 is a high performance deicer, there is an immediate effect. Michigan DOT has also modified equipment for direct application of CF7 for anti-icing and frost conditions.

Potential CF7 customers are typically concerned with deicing speed, environmental issues and/or corrosion. They include transportation officials, public works agencies, property management firms and industrial facilities requiring a high-performance liquid deicer for prewetting primary deicers like road salt and CMA, or sand. CF7 is appropriate for direct application when speed is critical. It is also suitable for use on outdoor mechanical handling systems such as conveyors and elevators, as well as on walkways, rail switches, and virtually all outdoor deicing applications.

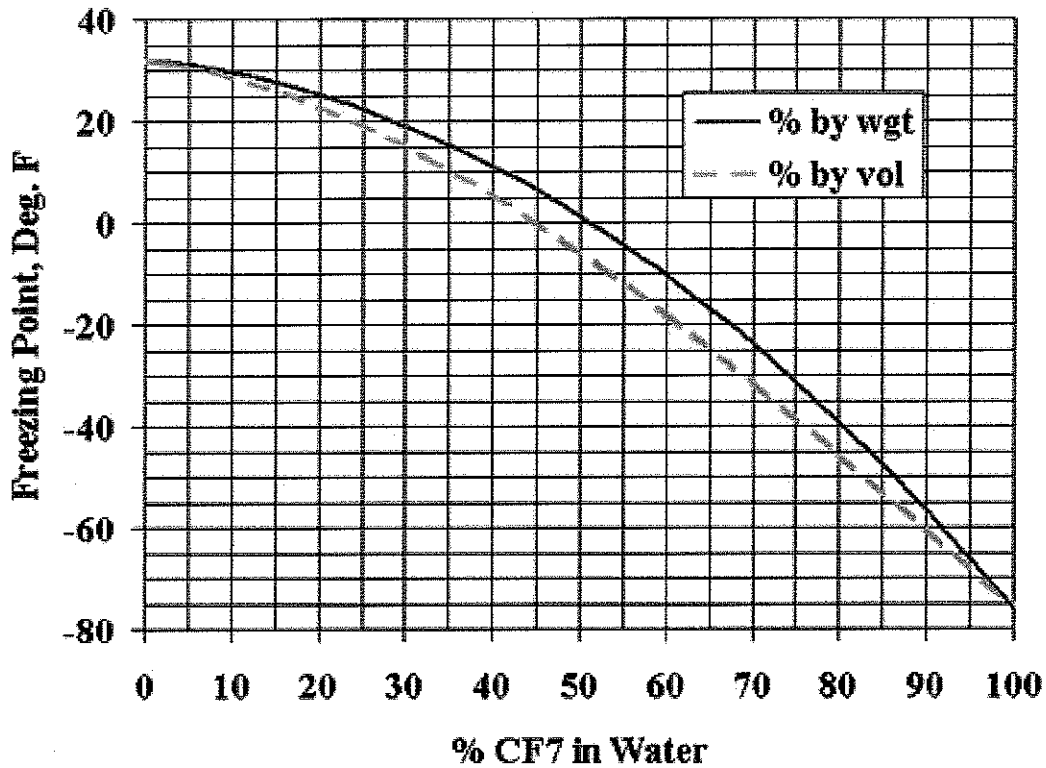


Product Specifications

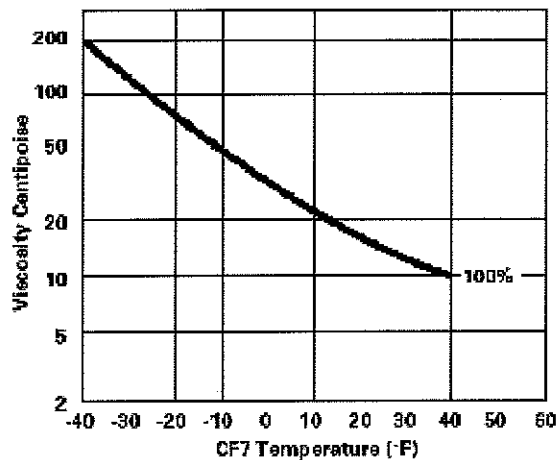
- Composition -- 50% minimum potassium acetate plus corrosion inhibitors, by weight
- Appearance -- Clear, colorless, mobile liquid, free from matter in suspension
- Density -- 1.28 gm/cm³ (10.7 lb/gal) @ 20°C (68°F)
- Viscosity -- 10 cp maximum @ 20°C (68°F) and 20 cp maximum @ 0°C (32°F)
- Flash Point -- Nonflammable
- Freezing Point -- -60°C (-76°F)
- Miscibility With Water -- Complete
- Storage -- No special storage required (do not use galvanized materials)
- Typical pH -- 11.0 ±0.5
- Specific Gravity -- 1.25 - 1.30 at 20°C
- Packaging --55 gallon drum; 265 gallon totes, bulk
Minimum orders: 4 drums, 1 tote, 4400 gallons bulk

For copies of Cryotech product guide specifications call (800)346-7237 or e-mail

Cryotech CF7 Freezing Point



This freezing point curve will help determine how much dilution CF7 can tolerate before reapplication is necessary to prevent freezing



The product viscosity chart will help determine pump requirements in application equipment at various temperatures.

See product MSDS for more information.

Performance

Prewetting Agent

CF7 is an effective prewetting agent for CMA, road salt, other solid deicers, and sand. Because CF7 has a very low freezing point (-60°C / -76°F) and is a clear liquid free from matter in suspension, it significantly improves the performance of solids and does not clog spray nozzles. Application rates follow, and should be considered starting points, as local conditions have a significant effect on fluid requirements.

Anti-icer

CF7 is an effective anti-icer, sprayed on the pavement before precipitation actually starts. A high traction film then exists to prevent adhesion of ice and snow, which is then mechanically removed. Uniform coverage and frequent plowing to prevent fluid dilution are important considerations in an anti-icing program. This technique is commonly used to keep bridge decks from freezing.

Deicer



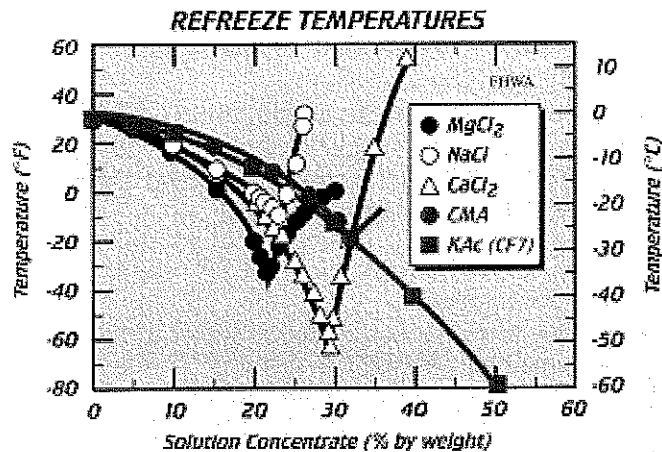
Experience suggests that CF7, when used as a deicer, may be applied in an even film or in bands on 4-6 inch (10-15 cm) centers. Banding the fluid minimizes dilution from melting, allowing CF7 to penetrate to the pavement to break the bonds of ice and snow prior to mechanical removal. Suggested application rates follow. CF7 is also used as an aid to solid deicers in heavy ice situations. Here, a solid deicer is first applied to punch holes in the ice. Then, CF7 is applied over the top, penetrating through the holes to the surface, quickly breaking the ice-to-pavement bonds so that mechanical removal can be more easily accomplished.

The refreeze temperatures and performance of CMA and KAc (Cryotech CF7®), are addressed in the following excerpt from the **Federal Highway Administration's Manual of Practice for an Effective Anti-icing Program: A Guide for Highway Winter Maintenance Personnel**.

B.4 CMA and KAc (CF7)

The curve for CMA (Figure 17) was determined from different percent concentration solutions made by dissolving commercially available CMA supplied in a dry pellet form. The curve for KAc (CF7) was determined using a commercially available liquid form of KAc (CF7). The eutectic temperature for the CMA water system in Figure 17 is -27.5°C (-17.5°F) at a concentration of 32.5 percent. The eutectic for the KAc (CF7) - water system is -60°C (-76°F) at a concentration of 49 percent. The curves for the CMA and KAc (CF7) almost coincide with each other. Also, they have a much flatter slope than the other three curves. This is an important feature of both CMA and KAc (CF7) solutions. The refreeze temperature of CMA and KAc (CF7) solutions rises slower with dilution than do the refreeze temperatures of either NaCl, CaCl₂, or MgCl₂. This feature makes them well suited for being used in a liquid form during anti-icing treatments. This is especially true for their use in a liquid form for the pretreatment of bridge decks in anticipation of frosting, or localized icing conditions.

Figure 17



Other Applications

CF7 can also be used to:

- Coat rail and truck beds, non-porous roofs, road signs, etc. so snow and ice do not adhere
- Keep rail switches open
- Free manhole covers, truck scales
- Keep conveyors ice-free
- Keep lavatory systems from freezing.

CF7 is also used in the creation of Cryotech CMAK, a blend of liquid CMA (calcium magnesium acetate) and CF7. CMAK is recommended for use in automated anti-icing systems. Containing no chlorides, it combines the low-corrosion properties of CMA with the high performance of potassium acetates. CMAK has a lower freezing point (<25F) than pure CMA, but retains many of CMA's attributes such as safety for steel embedded in bridge decks and parking garages. See MSDS for additional information.

Corrosion

Because CF7 is acetate based, it is compatible with most materials and is generally considered non-corrosive. Special corrosion inhibitors have been added to provide the same level of protection as E36, Cryotech's airport approved liquid deicer.

Avoid CF7 Use

- On low quality or non air-entrained concrete
- In direct application to galvanized metals
- In close proximity to non-watertight electrical systems
- In mixture with liquid chloride deicers like calcium chloride

Shelf Life

CF7 is stable and may be stored indefinitely if kept in clean, closed containers. Containers not adequately sealed may exhibit biological growth as a result of the fluid prematurely biodegrading. CF7 stored in rusty or contaminated containers may experience a reduction in inhibitor concentration and/or show fluid discoloration.

Environmental Impact

Tests with CF7 show it readily biodegrades at low temperatures and has a relatively low oxygen demand (BOD) when compared to glycol-based deicers. Toxicity tests rate CF7 "relatively harmless" to aquatic life, the most favorable classification used by the environmental community. And the fluid does not contain nitrogen. Therefore, CF7 is considered much safer for the environment than either glycol or urea.

As suggested by federal agencies, the following general summary of environmental and hazard information is provided. More detail is available in the MSDS. Complete test report documentation is available upon request.

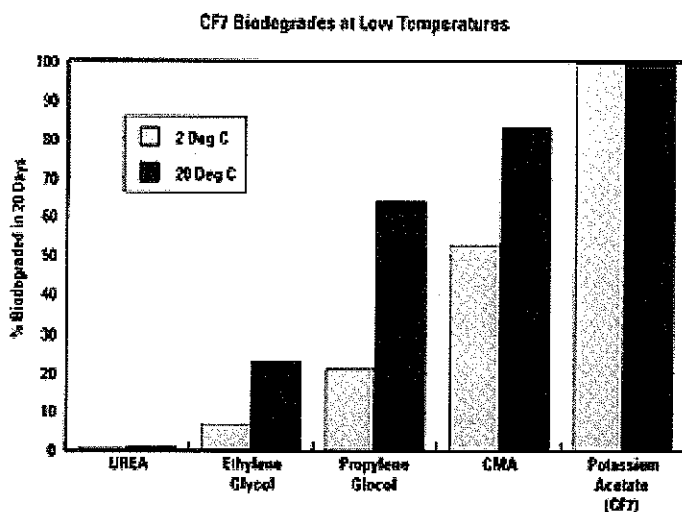
Biodegradability

The chemical oxygen demand (COD) of CF7 was determined using Environmental Protection Agency (EPA) Method 410.1.

- COD (TOD) = 0.30 gm O₂/g

The biological oxygen demand (BOD) of CF7 was determined using the EPA approved dilution method (Hach).

- BOD₂₀ @ 2°C = 0.30 gm O₂/g
- BOD₅ @ 10°C = 0.15 gm O₂/g
- BOD₅ @ 20°C = 0.14 gm O₂/g



Aquatic Toxicity

Current EPA methods were used for measuring the acute and chronic toxicity of CF7.

- Fathead minnow 7-day chronic, LC₅₀ (mg/L) > 1500
- Rainbow trout 96-hour acute, LC₅₀ (mg/L). > 2100
- Daphnia magna 48-hour acute, LC₅₀ (mg/L) > 3000

Hazard Information

- **Hazardous Waste & Shipping**

The RCRA regulations define hazardous waste in two ways: a listed hazardous waste or a characteristic hazardous waste. CF7 is not a listed hazardous waste. A waste may be considered hazardous if it exhibits any one of four characteristics - Corrosivity, toxicity, ignitability, or reactivity. A waste is corrosive under RCRA if it has a pH less than or equal to 2.0 or greater than or equal to 12.5. CF7 is not RCRA corrosive, toxic, ignitable or reactive; therefore, it is not a characteristic hazardous waste.

- **No Hazardous Components**

CF7 contains no hazardous components as described by SARA Title III, Section 302. Nor is CF7 designated as a hazardous chemical by the U.S. Department of Transportation. CF7 does not contain nitrates.

- **Spill Handling Procedures**

CF7 is not expected to present environmental problems. If product should spill, it should be absorbed and the resulting waste disposed of in a sanitary landfill unless state or local regulations prohibit such disposal.

- **Container and Product Disposal**

Based on information available to Cryotech Deicing Technology, CF7 is neither listed as a hazardous waste, nor does it exhibit any of the characteristics that would cause it to be classified or disposed of as a RCRA hazardous waste. Empty containers and product unsuitable for normal deicing operations may be disposed of in a sanitary landfill unless state or local regulations prohibit such disposal.

Application Rates

Anti-icing

CF7 is most effective when applied uniformly to pavement surface before freezing precipitation. Prompt mechanical removal of snow and ice is necessary to reduce fluid dilution. Additional applications may be necessary if snow and ice begin to bond to the surface.

- Apply.....0.5 gallons/1000 f² (25 g/m²)

Deicing

CF7 is an effective deicer when applied in an even film or in bands on 4-6 inch (10-15 cm) centers. The deicer penetrates to the pavement surface and breaks the bond of ice and snow prior to mechanical removal. Banding reduces dilution from melting and allows the fluid to penetrate. The amount of deicer needed varies with temperature and thickness of snow or ice, but should be in the following ranges.

- Apply on thin ice.....1.0 gallon/1000 f² (50 g/m²)
- Apply on 1" (2.5 cm) ice.....3.0 gallons/1000 f² (150 g/m²)

Prewetting

CF7 will speed the effect of solid deicers and abrasives. CF7 is applied at the spreader outlet, typically for prewetting rates of 5% to 15% by weight of solid material.

- Apply.....1.25 gallons per 100 lbs of deicer or sand (130 g/kg of deicer or sand)

Storage and Transport

The formulation of CF7 contains an inhibitor package designed to protect several metal alloys from accelerated corrosion and deterioration (e.g., cracking). The inhibitor package consists of fully dissolved compounds which, when exposed to metal alloys such as plain carbon or low alloy steels, will form a barrier on the alloy surface to prevent accelerated corrosion.

To maintain the full effectiveness of the inhibitor package Cryotech recommends shipping and storage of CF7 in non-metal containers such as polyethylene. In cases where this is not possible, shipment and storage can be accomplished with carbon, low alloy, or stainless steel containers. Storage and shipment containers should be strong enough to hold 10.68 lbs. per gallon of CF7, which is 28% heavier than water.

Shipping and storage in carbon or low alloy steel containers does not represent a major concern. However, the customer must be aware that this may result in depletion of the inhibitor concentration. The amount of depletion will depend on material composition, surface condition, and surface area.

When shipment or storage in carbon or low alloy containers is necessary, the container must be clean and free of rust and surface deposits. Rust and surface deposits (or scale) may become dislodged or dissolved and result in fluid degradation and discoloration. Additionally, tanks or containers which have been used for other materials must be drained and, at a minimum, rinsed, to remove the material before introducing CF7.

Note: Residue of chloride based deicer (especially CaCl_2 and MgCl_2) must be removed prior to filling. Avoid galvanized materials in piping and storage systems. Potassium acetate is known to have a relatively slow reaction with zinc-coated materials. This is not an issue for roadway appurtenances where exposure time is limited.

Standard Shipments

CF7 is shipped to customers in the following units:

- Rail Tank Cars.....18,000 gallons (68,000 liters)
- Tank Trucks.....4,400 gallons (16,600 liters)
- Isotanks.....4,000 gallons (15,000 liters)
- Totes.....265 gallons (1,000 liters)
- Drums.....55 gallons (200 liters)

Sampling Procedure

Reference the suggested sampling procedure prior to sending a sample to Cryotech's Quality Assurance Lab. Contact Cryotech with any questions by phone (800)346-7237 or email.

Maintenance Dispensing Equipment

- External surfaces of equipment used to dispense CF7 should be routinely rinsed with warm water or a high-pressure wash to prevent buildup of the fluid and other contaminants associated with winter maintenance operations. A thorough high-pressure washing with warm soapy water is recommended as equipment is removed from service after the deicing season.
- Diluted CF7 biodegrades naturally when exposed to air and other contaminants. This process quickens in warmer temperatures. Frequent rinsings will prevent any buildup that could result in formations of unsightly biological growth and superficial staining and pitting of some material.
- Undiluted CF7 kept in closed containers with minimal exposure to air does not degrade and may be stored indefinitely.

Applying liquid deicers to dry pavement will reduce friction between tires and the pavement surface. For this reason alone, user training is important prior to initial use.

Please contact Cryotech at (800)346-7237 or (319)372-6012, or email.

Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users

Non-chloride Calcium Magnesium Acetate (Cryotech CMA®), Sodium Acetate (Cryotech NAAC®), and Potassium Acetate (Cryotech CF7®) are eligible for matching Federal Funds under the SAFETEA-LU act that was passed in August 2005. Through the SAFETEA-LU act, funds are available for low corrosive anti-icing/deicing applications and environmentally preferred anti-icers/deicers used on highway bridges through 2009. This act is building on the foundation provided by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 21st Century of 1998 (TEA-21), which originated to help preserve and rehabilitate America's bridges. There is approximately \$21.6 billion authorized through 2009 for the Highway Bridge Program section of the act.

For more information regarding the SAFETEA-LU act, please visit <http://www.fhwa.dot.gov/safetealu/index.htm>.

Cryotech CF7 Freeze Point Data

% CF7 Solution	s.g. @20C	Freeze Pt. Degrees F	Freeze Pt. Degrees C	% CF7 Solution	s.g. @20C	Freeze Pt. Degrees F	Freeze Pt. Degrees C
0	1.000	32	0	50	1.140	1	-17
1	1.003	32	0	51	1.143	0	-18
2	1.006	32	0	52	1.146	-1	-18
3	1.008	31	0	53	1.148	-2	-19
4	1.011	31	0	54	1.151	-3	-20
5	1.014	31	-1	55	1.154	-5	-20
6	1.017	31	-1	56	1.157	-6	-21
7	1.020	30	-1	57	1.160	-7	-22
8	1.022	30	-1	58	1.162	-8	-22
9	1.025	30	-1	59	1.165	-9	-23
10	1.028	30	-1	60	1.168	-11	-24
11	1.031	29	-2	61	1.171	-12	-24
12	1.034	29	-2	62	1.174	-13	-25
13	1.036	28	-2	63	1.176	-15	-26
14	1.039	28	-2	64	1.179	-16	-27
15	1.042	28	-2	65	1.182	-17	-27
16	1.045	27	-3	66	1.185	-19	-28
17	1.048	27	-3	67	1.188	-20	-29
18	1.050	26	-3	68	1.190	-22	-30
19	1.053	26	-3	69	1.193	-23	-31
20	1.056	25	-4	70	1.196	-24	-31
21	1.059	25	-4	71	1.199	-26	-32
22	1.062	24	-4	72	1.202	-27	-33
23	1.064	24	-5	73	1.204	-29	-34
24	1.067	23	-5	74	1.207	-30	-35
25	1.070	22	-5	75	1.210	-32	-36
26	1.073	22	-6	76	1.213	-33	-36
27	1.076	21	-6	77	1.216	-35	-37
28	1.078	20	-6	78	1.218	-37	-38
29	1.081	20	-7	79	1.221	-38	-39
30	1.084	19	-7	80	1.224	-40	-40
31	1.087	18	-8	81	1.227	-42	-41
32	1.090	18	-8	82	1.230	-43	-42
33	1.092	17	-8	83	1.232	-45	-43
34	1.095	16	-9	84	1.235	-47	-44
35	1.098	15	-9	85	1.238	-48	-45
36	1.101	14	-10	86	1.241	-50	-46
37	1.104	14	-10	87	1.244	-52	-47
38	1.106	13	-11	88	1.246	-54	-48
39	1.109	12	-11	89	1.249	-56	-49
40	1.112	11	-12	90	1.252	-57	-50
41	1.115	10	-12	91	1.255	-59	-51
42	1.118	9	-13	92	1.258	-61	-52
43	1.120	8	-13	93	1.260	-63	-53
44	1.123	7	-14	94	1.263	-65	-54
45	1.126	6	-14	95	1.266	-67	-55
46	1.129	5	-15	96	1.269	-69	-56
47	1.132	4	-15	97	1.272	-71	-57
48	1.134	3	-16	98	1.274	-73	-58
49	1.137	2	-17	99	1.277	-75	-59
50	1.140	1	-17	100	1.280	-77	-60



2/13/06 - Material Compatibility and Storage of Cryotech CF7® Liquid Commercial Deicer

Customers frequently ask if material in their storage, handling, and application equipment is compatible with Cryotech CF7® (potassium acetate based) for application for bridges and roadways. There are technical differences between potassium acetate deicers from various producers, usually in the formulation of corrosion inhibitors. Therefore, some differences in material compatibility are expected. The following information applies to Cryotech CF7, which is 50% potassium acetate, by weight.

CORROSION INHIBITORS

Cryotech CF7® contains less than 1% proprietary corrosion inhibitors. These inhibitors create a protective barrier on the surface of various metals. Their performance is usually tied to the pH of the fluid. Diluted CF7 biodegrades naturally when exposed to air. This is an important reason for using the deicer. But by-products of the activity can be unsightly biological growth and superficial staining/corrosion. Therefore, the exterior surfaces of application equipment should be rinsed routinely with warm water after use.

EQUIPMENT CONSIDERATIONS

When selecting equipment to transport, store, and apply potassium acetate for bridges, elevated roadways and FAST systems, the following guidelines should be considered:

- **Pumps:** Stainless steel positive displacement pumps or properly sized centrifugal pumps with mechanical seals are preferred. Avoid pump bodies made of brass, cast aluminum or cast iron, because some castings are poor quality and may have reduced service life. Avoid large bore, low head (pressure) "trash" pumps. Avoid pumps with brass, zinc or galvanized wetted parts.
- **Pipes:** Stainless and carbon steel, PVC, polyethylene, and rubber are okay. Avoid galvanized metals because potassium acetate will react slowly with zinc giving off hydrogen gas.
- **Transfer Hoses:** We recommend wire reinforced chemical hoses with cross-linked polyethylene lining and an EPDM rubber cover. They should be rated for the system's pressure and vacuum. Stainless steel cam and groove fittings with locking cam levers and EPDM gaskets are also recommended.
- **Tanks:** Stainless steel, fiberglass or polyethylene are preferred. Carbon and alloy steel tanks may be used if clean and rust free. Tanks must be strong enough to hold CF7 which is heavier than water weighing 10.7 pounds per gallon.
- **Gaskets and Seals:** Butyl rubber, ethylene propylene rubber (EPM, EPDM), isoprene, natural rubber are preferred. Nitrile (Buna N), hypalon, neoprene rubber are generally acceptable. Avoid butadiene, fluorocarbon rubber, fluorosilicon, polyacrylate, polyurethane, SBR rubber (Buna S) and silicon rubber.

INSTALLATION CONSIDERATIONS

Obtain professional engineering assistance to ensure proper design and installation of tanks and components. Make certain the system has relief valves and low point drains, and that block valves can be opened without operator risk. Avoid dissimilar metals or provide properly engineered insulators to minimize the effect of galvanic corrosion. Potassium acetate has low viscosity and low surface tension. Therefore, high quality joints are needed for a leak-free system. Welded or flanged pipe joints are recommended. But if threaded fittings are used, a high quality pipe sealant is important.

STORAGE CONSIDERATIONS

Obtain professional engineering assistance to ensure proper design and installation of tanks and components. Make certain the system has relief valves and low point drains, and that block valves can be opened without operator risk. Avoid dissimilar metals or provide properly engineered insulators to minimize the effect of galvanic corrosion. Potassium acetate has low viscosity and low surface tension. Therefore, high quality joints are needed for a leak-tight system. Welded or flanged pipe joints are recommended. If threaded fittings are used, a high quality pipe sealant is important.

AVOID PROBLEMS

Do not use potassium acetate deicers with galvanized (zinc-plated) metals.
Do not use potassium acetate on poor quality concrete.
Do not mix potassium acetate deicers with deicers from different manufacturers.



11/21/05 - REACTION BETWEEN POTASSIUM ACETATE BASED DEICERS AND ZINC

This bulletin update reviews facts about zinc's reaction to Cryotech's CF7®, potassium acetate-based liquid deicer.

SUMMARY

A slow reaction may occur when potassium acetate deicer and zinc are exposed to each other. The reaction results from prolonged contact and is not an issue during normal use.

ZINC REACTION

Hot-dipped galvanizing places a coating of zinc on the surface of steel. Brass alloys also contain zinc. Although zinc has excellent properties to resist corrosion from atmospheric conditions, it is a fairly reactive metal. As a result, potassium acetate-based deicers, like CF7, can cause a slow reaction in storage systems containing zinc. With prolonged exposure this reaction may cause hydrogen gas to form and zinc to discolor and dissolve.

STORING CF7

CF7 should not be stored or plumbed through systems that use galvanized, zinc, or brass components.

FIELD USE

For a number of reasons there is seldom a reaction between potassium acetate and zinc coatings during application.

- Exposure is limited to short intervals.
- Precipitation causes the deicer to dilute.
- Corrosion reactions occur slowly at cold temperatures when deicers are applied.
- Even at low temperatures CF7 biodegrades within a few days.

Experience at the Zilwaukee Bridge near Saginaw, Michigan, where CF7 has been used for years, supports the conclusion that little to no reaction occurs between CF7 and galvanized materials during deicing operations. The bridge is essentially corrosion-free.

Minnesota Department of Transportation's Structural Metals and Bridge Inspection Engineer, Todd Niemann, P.E. conducted a project in November of 2005 to inspect and evaluate galvanized coating thickness measurements on an I35W bridge's expansion joints, light poles, and barrier expansion plates. The objective was to determine if CF7 anti-icing operations were creating advanced deterioration to galvanized products. CF7 has been used continuously through the bridge's fixed automated spray system (FAST) since 1999. The conclusion was that for all components, the present galvanizing thickness was adequate and as expected for the age and type of components.

CONCLUSION

Do not use galvanized, zinc, or brass tanks or piping for long-term storage of CF7. The exterior surfaces of application equipment should be routinely washed with warm soapy water.



3/13/07 - Proper Use of Cryotech CF7 and NAAC

Customers frequently ask how to properly use deicing chemicals when dealing with snow, freezing rain, and ice.

< winter during purposes complimentary serve can they And environment. the for safe considered are biodegrade, easily and acetate-based Because deicers. liquid solid both markets manufactures >

Liquid CF7® (potassium acetate) is generally used as an anti-icer to prevent snow and ice from bonding to the surface. The snow and ice can then be easily removed by broom or plow. Solid NAAC® (sodium acetate) is used as a deicer. It is also applied early in the storm but its purpose is to melt through an existing pack and break ice-to-pavement bonds prior to mechanical removal.

CF7 is more efficient than a solid deicer when applied as an anti-icer because it takes less energy to prevent surface bonding than to break existing bonds. Therefore, early liquid application followed by mechanical removal of snow and ice accumulation provides the best and most efficient method for combating winter storms.

"Early application" means applying just before the event or as precipitation begins to fall. CF7 rates range from 0.5-1.5 gallons per thousand square feet (25-75 grams per square meter) depending on weather conditions.

It is also important to evenly apply the fluid using low-pressure, large droplet nozzles. Surfaces can then be cleaned mechanically until bonds reform and dilution requires additional applications.

How long will it last? CF7 dilution from water generated by melt raises the solution freeze point. At some level of dilution it becomes ineffective. Other conditions such as air and surface temperatures, type and amount of precipitation, and deicer application rate also affect how long liquid deicers will last. The clearest signals that dilution has occurred are low friction and unsatisfactory snow or ice patches remaining after mechanical removal. Dilution can also be determined by computer monitored roadway sensors. Re-application is necessary when dilution occurs.

Solid NAAC is generally applied as a deicer on top of pack, but always early in the storm when possible. Pack results from surface bonding of snow and ice and is difficult to remove with liquid deicers. It is common for pack to build on roadways as well as on secondary areas like ramps that may not receive anti-icing treatments.

NAAC is applied on the wet area, ice, or pack. As it combines with moisture, NAAC changes from a solid to a liquid. This exothermic phase change – unique to NAAC – releases heat allowing each pellet to quickly penetrate the pack and break surface bonds. Application rates range from 5-15 pounds per thousand square feet (25-75 grams per square meter).

Here again, it is important to achieve even application. Because NAAC is produced as spherical pellets it spreads more evenly than flaked products. Spherical pellets are also more effective because they penetrate faster and deeper than flakes, which tend to dilute and refreeze.

In certain conditions, CF7 may be used with NAAC to assist with breaking up heavy pack. After holes are formed by NAAC, CF7 is applied over the top and thereby has a direct route to the pavement surface. This dual application speeds the deicing process.

CF7 is also recommended as a prewetting agent for NAAC to jump-start its phase change. This prewet also causes the solid to stick to the surface, minimizing product loss from wind and vehicle movements. During freezing rain, NAAC may be helpful when applied with CF7. This dual application extends operations by minimizing dilution of the liquid.

NAAC and CF7 should not be combined during routine anti-icing operations. CF7 is more efficient and the addition of NAAC is generally not helpful. The exception is use in the aforementioned freezing rain condition.

Technical assistance and on-site training are available by calling Cryotech at 800-346-7237.



Toxicity of Acetate-Based Deicers in Marine (Saltwater) Environments

Toxicity of deicers to marine organisms can be important to know when deicing applications are located where run-off can flow into saltwater environments. Cryotech acetate-based solid and liquid deicers are all considered basically non-toxic in this type of receiving water.

CF7 Acute Toxicity Testing Results Cryotech potassium acetate deicer for use on roads and bridges

48-hr LC50, minnows:	6,300 milligrams per liter (mg/L)
48-hr LC50, mysid:	1,400 mg/L

The EPA recognizes a chemical as "basically non-toxic" when acute toxicity results are above 1000 milligrams per liter.

E36 Acute Toxicity Testing Results Cryotech potassium acetate runway deicer

48-hr LC50, minnows:	6,300 mg/L
48-hr LC50, mysid:	1,400 mg/L

The EPA recognizes a chemical as "basically non-toxic" when acute toxicity results are above 1000 milligrams per liter.

NAAC Acute Toxicity Testing Results Cryotech anhydrous sodium acetate deicer for use on roads, bridges, and runways

48-hr LC50, minnows:	>7500 mg/L
48-hr LC50, mysid:	>7500 mg/L

The EPA recognizes a chemical as "basically non-toxic" when acute toxicity results are above 1000 milligrams per liter.

Chronic Toxicity Testing:

It is generally agreed by state agencies that acetate-based deicers are readily biodegradable and dissipate rapidly. The chance of chronic long-term exposure is therefore greatly reduced. Given that and the fact that Cryotech acetate-based deicers are basically non-toxic, chronic toxicity testing has not been required.

Notes:

This independent laboratory test data was generated using EPA recognized test protocols and deicer formulations provided by Cryotech.

EPA/600/4-90/027F: Method for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms; EPA/600/4-91/002: Short Term Methods of Estimating Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms and; EPA/600/4-91/003: Short Term Methods of Estimating Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms.



U.S. Department
of Transportation
**Federal Highway
Administration**

Publication No. FHWA-RD-96-178
March 1997

Impedance Spectroscopy for the Evaluation of Corrosion Inhibitors in Highway Deicers

Research and Development
Turner-Fairbank Highway Research Center
6300 Georgetown Pike
McLean, Virginia 22101-2296

1. Report No. FHWA-RD-96-178	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle IMPEDANCE SPECTROSCOPY FOR THE EVALUATION OF CORROSION INHIBITORS IN HIGHWAY DEICERS		5. Report Date March 1997	6. Performing Organization Code
7. Author(s) Ugo Bertocci		8. Performing Organization Report No.	
9. Performing Organization Name and Address Office of Engineering R&D Federal Highway Administration 6300 Georgetown Pike McLean, VA 22101-2296		10. Work Unit No. (TRAIS) 3E4b0142	11. Contract or Grant No. NAS/NRC RA Project Na 27.01.00.04
12. Sponsoring Agency Name and Address Office of Engineering R&D Federal Highway Administration 6300 Georgetown Pike McLean, VA 22101-2296		13. Type of Report and Period Covered Final Report February 1992 - July 1994	
14. Sponsoring Agency Code			
15. Supplementary Notes This work was performed while the author held a National Research Council/FHWA Research Associateship. The FHWA Research Advisor was John W. Peart. FHWA Contact: Robert A. Kogler			
16. Abstract Electrochemical impedance spectroscopy (EIS) measurements were carried out on steel bars embedded in concrete blocks that were immersed in aqueous solutions of commercial deicing salts, many of which had corrosion inhibitors added. The effectiveness of the inhibitors was assessed by monitoring the evolution of the EIS results for a period of 11 months. EIS was supplemented with open circuit potential and polarization measurements. From the results, a semiquantitative ranking of the commercial deicers tested as to their corrosivity could be derived.			
17. Key Words electrochemical impedance spectroscopy, corrosivity, corrosion inhibitors, deicers, sodium chloride, calcium magnesium acetate, rebar corrosion		18. Distribution Statement No restrictions. This document is available to the public through the National Technical Information Service, Springfield, VA 22161.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 82	22. Price

TECHNICAL SUMMARY

IMPEDANCE SPECTROSCOPY FOR THE EVALUATION OF CORROSION INHIBITORS IN HIGHWAY DEICERS

Purpose

The purpose of this work was, on the one side, to see if the addition of corrosion inhibitors to commercial deicing mixtures, which contain mainly chloride salts, can be shown to affect the corrosion behavior of steel in concrete. On the other, it was to evaluate the usefulness of electrochemical impedance spectroscopy (EIS) to obtain information on the corrosion of steel in concrete under fairly realistic conditions.

In order to simulate the conditions which are encountered in the field the measurements were carried out on steel rods embedded in concrete, exposed by immersion to solutions of various inhibitor-containing deicers. The measurements were taken over a period of 11 months, enabling one to have a picture of the progress of the corrosion process and to see whether or not corrosion was accelerating with time.

Materials tested

The six deicers tested (numbered from 1 to 6) were commercial products, so that their exact composition and exact nature of their inhibitors are not known. Two of the deicers were in liquid form, presumably because of the chloride salt is mainly $MgCl_2$, while the others contained mainly $NaCl$. Another deicer tested was a mixture of magnesium and calcium acetates, generally known as CMA. For comparison, a $NaCl$ solution without inhibitors was also tested.

Experimental procedures

The samples employed in the measurements consisted of concrete cylinders, 5 cm in diameter and 12.7 cm in length, in which four rods of A36 steel, 0.635 cm in diameter and 11.4 cm in length, were embedded in a square pattern. About 2.5 cm of the rods extended outside the upper end of the concrete cast. These samples were immersed in deicer containing solutions routinely on Mondays and taken out on Fridays, in order to ensure access to oxygen during the week-end drying periods. All chloride-containing solutions had a chloride concentration of 0.2 M.

Most of the EIS measurements were performed at the open circuit potential E_{oc} . The frequency range of the EIS measurements was pushed as much as possible toward the low frequencies, routinely to 0.5 mHz. To supplement the information provided by EIS, open circuit potential E_{oc} and polarization measurements were also performed. From the EIS data, the value of the corrosion resistance was obtained by fitting the results to an equivalent electrical circuit. The corrosion rate was then calculated with the aid of the results of the polarization measurements.

Composition of the solutions used in the measurements

#	Main constituents	Form	conc. Gr/L	Inhibitor	sol. pH
1	NaCl	solid	13	Mg phosphate	7.0
2	MgCl ₂	liquid	30	citrate	9.3
3	NaCl	solid	13	unknown	6.1
4	NaCl 83% MgCl ₂ 10%	solid	13	PCI™	6.8
5	MgCl ₂	liquid	35	PCI™	6.0
6	30% Ca(Ac) ₂ 70% Mg(Ac) ₂	solid	100	none	9.7
7	NaCl	solid	12	none	6.8

Conclusions

The tests carried out have shown that EIS can be employed for the long term study of corrosion in reinforced concrete, and can be used for ranking the deicer formulations as to their corrosion effects. Since the tests were carried out not on bare steel electrodes, but on rods embedded in concrete, the time required for obtaining meaningful results is quite long. This report describes about one year of tests, and yet in some cases it appears that a longer exposure would have been desirable in order to obtain more clear cut results. On the other hand, the data collected should be more reliable than tests on bare metal, because they probe the ability of the various inhibitors to penetrate the concrete, as well as the capability to counteract the deleterious effects of chloride salts which have already diffused into the material.

In the conditions employed in this study, a good correlation has been found between open circuit potential E_{oc} and corrosion resistance, and by implication corrosion rate. This correlation has been observed by many workers, and has led to the suggestion that a simple and inexpensive way to monitor the corrosion conditions of steel in reinforced concrete is that of measuring E_{oc} . However, it should be kept in mind that the correlation is largely of statistical nature, and there is a substantial scatter in the points, which might entail an uncertainty of more than one order of magnitude in corrosion rate for the same value of the potential.

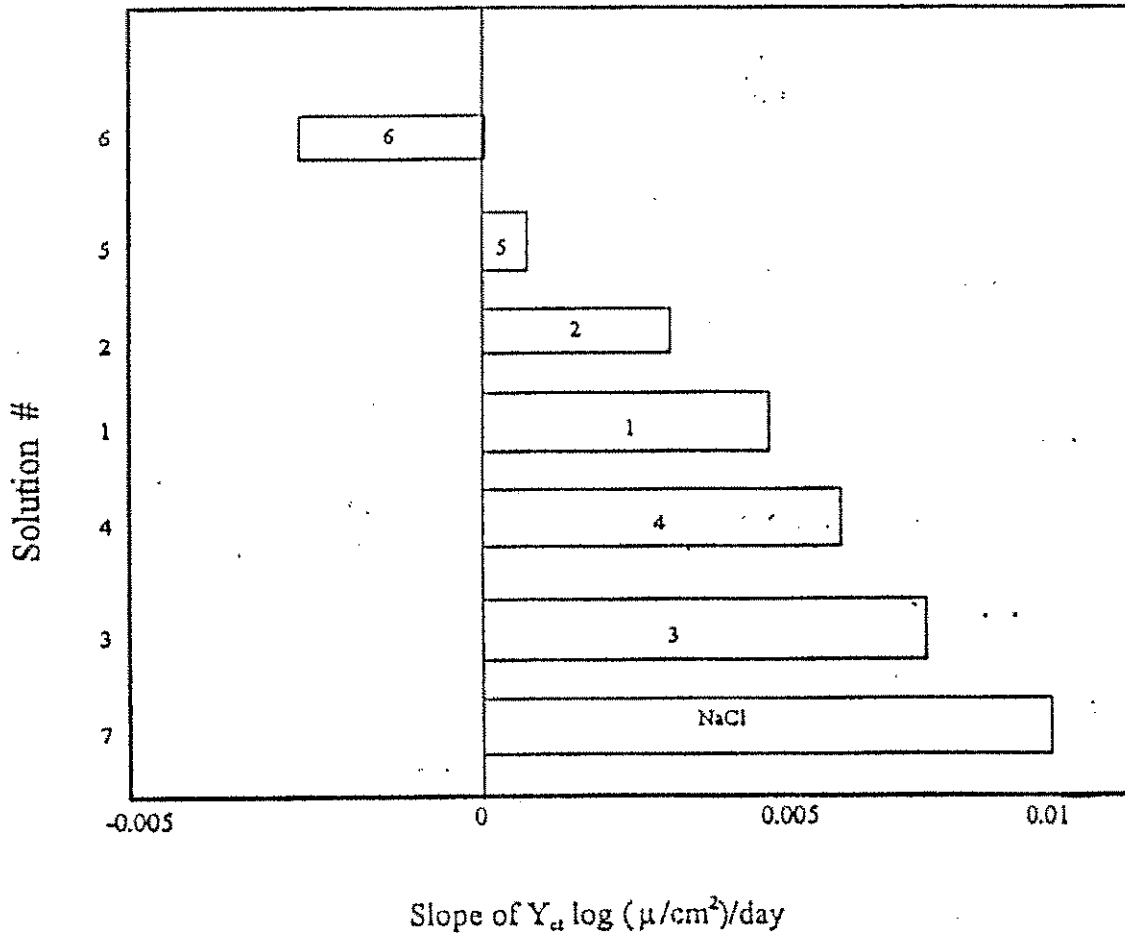
For a ranking of the six deicers, from the least to the most corrosive, one can choose the charge transfer admittance $Y_{ct} = 1/R_{ct}$, which is proportional to the corrosion rate, plotting its logarithm versus time and calculating a linear least-squares fit. The higher the slope of the straight line, the greater the corrosion rate becomes, indicating a failure to protect the steel on the part of the inhibitor. The resulting ranking is shown in the following list:

1. Solution #6 CMA
2. Solution #5
3. Solution #2
4. Solution #1 and #4

5. Solution #3 and #7 NaCl

The ranking can be presented graphically also, taking a semiquantitative aspect, as shown in the figure.

One should not, however, attach too much meaning to small differences in the numerical value of the slopes. Therefore it is doubtful that deicers #1 and #4 behave significantly better than plain road salt, #7. CMA (#6) is clearly superior to all others, but deicers #5 and to much more limited extent, deicer #2 have shown to be able to slow down corrosion.



Researcher-This study was performed by Dr. Ugo Bertocci while sponsored by FHWA/NRC under their cooperative Research Associateship program.

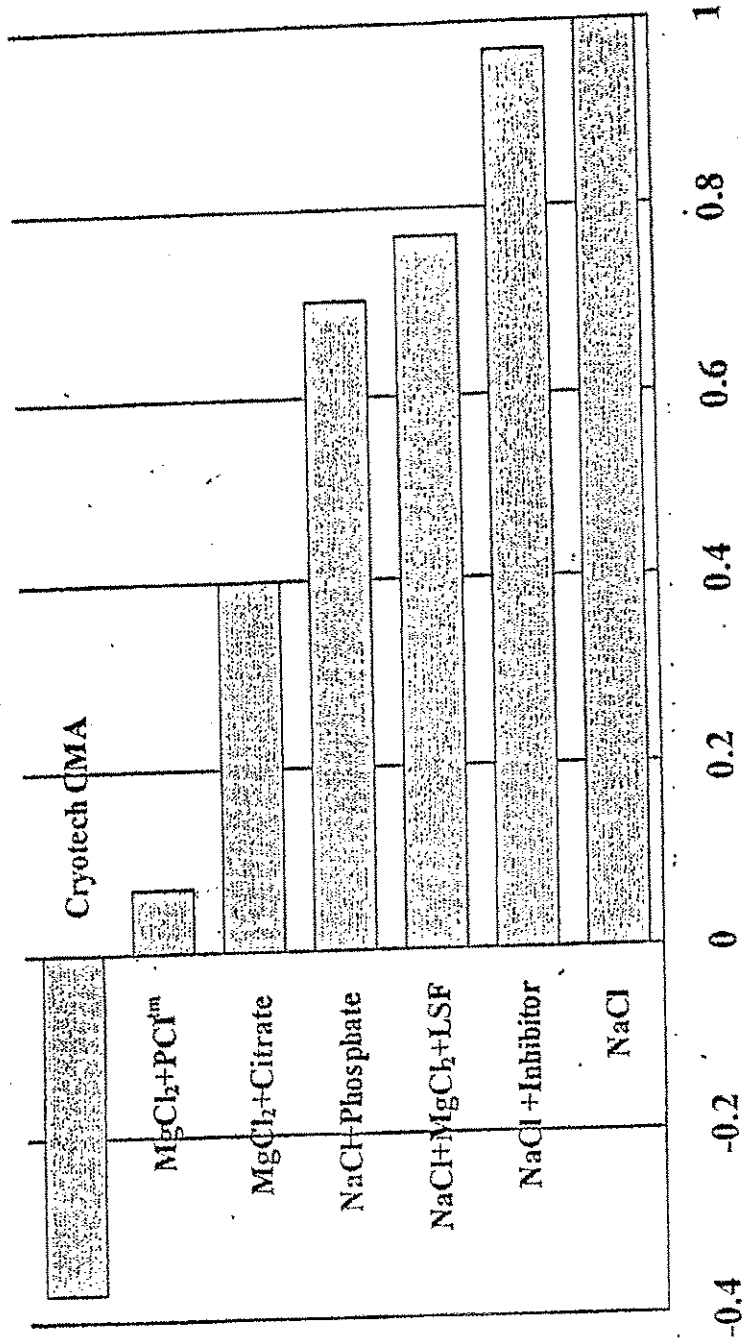
Distribution-This technical summary is being distributed according to a standard distribution. Direct distribution is being made to the Regions and Divisions.

Availability-The publication will be available in . Copies will be available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161. A limited number of copies will be available from the R&T Report Center, HRD-11, FHWA, 6300 Georgetown Pike, McLean, Virginia 22101-2296.

Key Words-electrochemical impedance spectroscopy, corrosivity, corrosion, inhibitors, deicers, sodium chloride, calcium magnesium acetate, concrete, rebar corrosion.

Notice-This technical summary is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The summary provides a synopsis of the study's final publication. The summary does not establish policies or regulations, nor does it imply FHWA endorsement of the conclusions or recommendations. The U.S. Government assumes no liability for the contents or their use.

Corrosion Rates of Various Deicers



Relative Corrosion Rate on Steel in Concrete

Publication No. FHWA-RD-96-178, "Impedance Spectroscopy for the Evaluation of Corrosion Inhibitors in Highway Deicers", US Federal Highway Administration, March 1997

~ MEMORANDUM ~

Date: October 1, 2006
To: To Whom It May Concern
From: Cryotech Deicing Technology
Subject: Cryotech CF7® Liquid Deicer

Cryotech Deicing Technology warrants that Cryotech CF7 deicer to be delivered hereunder shall conform to the specifications attached hereto; and upon receipt of payment therefore, shall be free from any security interest or encumbrance. Cryotech **disclaims** all warranties and conditions, either express or implied, including, but not limited to, implied warranties of merchantability and fitness for a particular purpose. In no event shall Cryotech be liable to the Buyer or to any third party for any indirect, incidental, special, consequential, punitive, or exemplary damages (including without limitation lost profits, lost savings, or loss of business opportunity) arising out of or relating to the deicer, or the use or inability to use the same, even if Cryotech has been advised of the possibility of such damages.



Date: June 1, 2006
To: To Whom It May Concern
From: Cryotech Deicing Technology
Subject: PNS Approved Products

Non-chloride Calcium Magnesium Acetate (Cryotech CMA®), Potassium Acetate (Cryotech CF7®), and Liquid CMA (A 25% mixture of Cryotech CMA® and potable water) are located on the Pacific Northwest Snowfighters (PNS) Association's approved product list. The transportation agencies of Washington, Oregon, Montana, Idaho, and the province of British Columbia formed PNS several years ago to outline specifications for deicing chemicals.

For more information regarding the PNS Association, please visit:
<http://www.wsdot.wa.gov/partners/pns/default.htm>.



CF7 Contacts

Our Cryotech CF7 liquid deicer has been used for some time through the FAST (fixed anti-icing spray technology) spray systems. It's a patented acetate-based deicer. There's no chloride to hurt the system or the bridge deck or supports. CF7 will provide for long-term performance of the FAST system.

Subject: Fixed Automated Bridge Spraying Systems

Reasons why CF7 is preferred:

- * Chloride free for long-term bridge life.
- * No agitation needed in storage or the charged system.
- * Environmentally acceptable.
- * Safe for the spraying system for long terms accurate application.
- * Proven safe for compatibility with asphalt concrete pavement materials.
- * Has a low freeze point so will work when needed. -76 F (-60 C)
- * CF7 has a longer residual action or dilutes slower than chloride deicers. (FHWA Manual of Practice on Anti-icing). It is a 50% concentrated solution.
- * Not slippery while providing good friction results.
- * Proven performance. CF7 used by State DOTs for the above reasons.
- * Long term cost effective.
- * Initial CF7 training provided at no charge.
- * Eligible for Matching Federal Funds – TEA-21.

Here are some contacts presently using our CF7 successfully through a fixed anti-icing spray technology bridge spraying system. For your weather, CF7 is a perfect product for use on the prevention of frost, icing or during light snow without plowing. Heavier snow requires liquid anti-icing methods along with plowing to reduce dilution.

Contacts:

1. Minnesota DOT has used our CF7 through an automated spray system in Winona, MN, and LaCrescent, MN the last three winters. They have used CF7 in a system on a bridge over the Mississippi on I-35 in downtown Minneapolis this last winter at temperatures below -26 F. MN DOT has had trouble in the past from black ice, frost on the bridge from the open river, steam from a nearby power plant and moister from the exhaust from rush hour traffic. CF7 keeps the bridge ice-free. MN DOT has published a report on the use of the system and CF7. They have dramatically reduced accidents over this bridge in a period of Minnesota's worst winter – 2000-1.

Chris Beckwith, Project Engineer, Minnesota DOT, Metro Division - Waters Edge 1500 W. County Road B2, Roseville, MN 55113, PH 651-582-1431 or

John Scharffbillig, Minnesota DOT, Office of Advanced Transportation Systems, Mail Stop 320, Room 244, 395 John Ireland Blvd, Roseville, MN 55113, PH 651-215-0402.

2. New York City DOT - Mr. Brandon Ward, City of New York, DOT, Bridge Maintenance 2 Rector St, 4th Floor, New York, NY 10006, PH 212-788-1720, Fax 212-788-2138. Used our CF7 through an automated spray system on the Brooklyn Bridge. Brandon Ward designed and documented its use on video and gave a presentation on this usage at a recent Pacific Northwest States Kelowna conference. He even went so far to say there was a definite difference in performance in our potassium acetate based CF7 as compared to another similar product.



3. Maryland DOT - Mr. Mike Layman, Maryland DOT, 1221 Braddock Rd, Lavale, MD 21502, PH 301-729-8483, Fax 301-777-5822. Now using our CF7. They previously used our CMAK (liquid CMA & CF7) in an Odin System on a remote bridge on a Maryland mountain interstate (4 lane) some distance from the truck station. They wanted to reduce accidents during winter activities, which they did. They had no reportable accidents this last winter on that bridge which previously had been a problem bridge. Just now completed a report for the Federal Highway Administration on their two years of use on the bridge. Feds picked up some of the cost of the system and product use.

4. North Dakota DOT - Troy Gilbertson, North Dakota DOT, 503 38th Street South, Fargo, ND 58103-1198, PH 701-239-8900. Used this winter without accidents so far at a bridge where they have had many accidents in the past years because of snow pack and ice. You can go on line and see the bridge by going to: 1. WWW.state.nd.us/dot/ 2. Click on Road & Traveler Info. 3. Info (RWIS). 4. Click on Summaries North Dakota. Go to the Buxton site and click on camera. You can go through various time shots.

5. Utah DOT - Sam Sherman, Utah DOT, Research & Development Div., 4501 South 2700 W, 4th Floor North, Salt Lake City, UT 84114-8410, PH 801-965-4438. Used CF7 in their Automated bridge system on bridge in Salt Lake City.

6. Other users – Utah DOT, Iowa DOT, Texas DOT, City of San Antonio, TX, Michigan DOT, Kent County, MI, Oregon DOT, Nebraska DOT, and U.S. Park Service.

Using liquid chloride based deicers like inhibited magnesium chloride through the system may cause corrosion damage not only to the spray system but also to the bridge or elevated roadway. Included with this bid is the FHWA report on long-term studies of inhibited chloride deicers that show the inhibitor does not protect steel in reinforced concrete.

One point to mention about galvanized materials mentioned on the brochure. This is only for storage tanks and pipes for prolonged exposure and is generally not an issue for roadway and airfield appurtenances where exposure time is limited. The Zilwaukee Bridge has been using CF7 since it opened in 1987 and the galvanized guardrails, inspection plates, and signposts look like new. I have photos. Contact: Mr. Michael P. Metiva, Michigan DOT, 3510 E Washington Avenue, Saginaw, MI 48601, PH 989-754-0916 Ext. 32.

Please call anytime. I think you'll find CF7 will work well for you. You can go to our web page at www.cryotech.com for more technical information. Thanks for taking the time to consider using CF7. I would be glad to visit with you after you have had a chance to review the CF7 information.

Sincerely,

Tony Myhra,
Product Manager
Cryotech Deicing Technology
8365 Birchwood Hills Road
Lake Shore, MN 56468
218/963-1515



MEMORANDUM

TO: CF7 CUSTOMERS
FROM: CRYOTECH DEICING TECHNOLOGY
SUBJECT: CF7 AND E36 LIQUID DEICING CHEMICALS
DATE: 11/9/06
CC: FILE

Cryotech CF7® is materially the same chemistry as Cryotech E36® – 50% potassium acetate solution plus a proprietary inhibitor package. CF7 is sold to commercial and government markets for use on roads, bridges, parking garages, sidewalks, etc., while E36 is sold to airports and military bases for use on runways and ramps. E36 is certified to AMS 1435 for runway use; CF7 is not. Any test data that references E36 is also applicable to CF7. However, because they are used for different applications, usage rates and training information is different for each product. For further information or questions, please contact Cryotech at 800-346-7237 or 319-372-6012.

You mentioned that you may have to bid the liquid for the automated system. CF7 will either come straight from our Fort Madison, Iowa plant or from our storage site.

Here are three distributors who have bid CF7 in the past and if more are needed, let us know:

**Mr. Peter Vercooteren, V & Associates, N8336 Deadwood Point, Fond du Lac, WI 54936
PH 920-923-4077, Cell PH 414/379-0601**

**April Heston, Cryotech Deicing Technology, 6103 Ortho Way, Fort Madison, IA 52627,
PH 800/346-7237.**

**Mark G Szczawinski, Warner Graham Company, 160 Church Lane,
P.O. Box 249, Cockeysville, MD 21030, PH 800-872-2300, PH 410-667-6200**

Here is ware some reasons CF7 is preferred for your system:

- . * Chloride free for long-term bridge life.
- . * No agitation needed in storage or the charged system.
- . * Environmentally acceptable.
- . * Safe for the spraying system for long terms accurate application.
- . * Proven safe for compatibility with asphalt concrete pavement materials.
- . * Has a low freeze point so will work when needed. -76 F.
- . * CF7 has a longer residual action or dilutes slower than chloride deicers. (FHWA Manual of Practice on Anti-icing). It is a 50% concentrated solution.
- . * Not slippery while providing good friction results.
- . * Proven performance.
- . * Eligible for matching Federal Funds – TEA 21