

***Preliminary Program***

**Fifth International Symposium on**

**Snow Removal and Ice Control Technology**

September 5-8, 2000  
Hotel Roanoke & Conference Center  
Roanoke, Virginia

*Conducted by*

TRANSPORTATION RESEARCH BOARD  
National Research Council

*In cooperation with*

VIRGINIA DEPARTMENT OF TRANSPORTATION  
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
FEDERAL HIGHWAY ADMINISTRATION  
U.S. Department of Transportation

The objective of the 5th International Symposium on Snow Removal and Ice Control Technology is to provide a forum for the exchange of information about state-of-the-art research and technology applications to improve snow removal and ice control operations in transportation systems. This symposium includes presentations on policy and management, environmental issues, IVHS/ITS technology, customer based performance measures, and innovative equipment. Maintenance engineers and researchers from the following countries have been invited to present their papers: Canada, Czech Republic, Denmark, Finland, France, Iran, Japan, Norway, Spain, Sweden, Switzerland, United Kingdom, and the United States. The symposium is being conducted by the Transportation Research Board (TRB) Committee on Winter Maintenance in cooperation with the Virginia Department of Transportation, American Association of State Highway and Transportation Officials (AASHTO), and the Federal Highway Administration.

Participation in the symposium is open to all interested parties. TRB extends a special invitation to representatives of federal, state, county and city departments of transportation, universities, and manufacturers of snow removal and ice control products. A question and answer period will follow each presentation. Participants are encouraged to make presentations on their work in snow removal and ice control during the *Open Session* Thursday evening.

## REGISTRATION

**Technical Program.** The registration fee for participants is \$375.00 for those who register by August 8, 2000 and \$425.00 for those who register after this date or at the symposium. A reduced registration fee is available for members of TRB Committee A3C09 and participants listed in the program. The registration fee covers breakfasts, breaks and lunches on Wednesday, Thursday and Friday for the technical program participants and a copy of the symposium preprints. Registration is on-site only after August 17. Cancellation received in writing by August 8 will be reimbursed in full. After August 8, there will be a \$50.00 processing fee. No refunds will be given after August 17, 2000.

**Open Format Spouse/Guests Activities.** Accompanying persons are invited to participate in a Get Acquainted Breakfast on Wednesday, September 6, 9:00 a.m. - 10:00 a.m. In addition to providing an opportunity for accompanying persons to get acquainted, a list of [activities in the Roanoke area](#) will be provided for individuals to develop their personal agenda.

**Symposium Participant and Spouse/Guests Activities.** Participants and their Spouse/Guests are invited (1) to visit the [Virginia Smart Road](#) in Blacksburg from Noon - 5:30 p.m. on Tuesday, (2) to attend a Reception from 6:30 p.m. - 8:00 p.m. on Tuesday, (3) to visit the equipment display at [Eastern Winter Maintenance Show](#) from 1:30 p.m. - 5:00 p.m. on Wednesday, and (4) participate in a Block Party at the [Farmers Market](#) from 6:00 p.m. - 8:00 p.m. on Wednesday. There is no charge to participate in these activities. The first activity is provided compliments of the [Virginia Tech Center for Transportation Research](#), and the second through fourth activities are provided compliments of the sponsors and supports of the Eastern Winter Maintenance Snow. Please indicate your intentions to participate in these activities on the enclosed Symposium Registration Form.

## ACCOMMODATIONS

The Symposium will be held at the [Hotel Roanoke & Conference Center](#), 110 Shenandoah Avenue, Roanoke, Virginia 24016. Limited rooms are available at the hotel on a first-come, first-served basis at the TRB conference rate of \$59.00 per room for single occupancy and \$69.00 per room for double occupancy plus applicable taxes until August 8, 2000. Contact the Hotel Roanoke and ask for the Transportation Research Board rate: (800) 222-8733, (540) 985-5900 or Fax the enclosed form to (540) 853-8290. Reservations will be accepted after August 8 based on availability.

## GROUND TRANSPORTATION

The Hotel Roanoke and Conference Center is located at 110 Shenandoah Avenue, approximately 5 miles from Roanoke Regional Airport, close to Interstate 81, Interstate 581 and US Route 460, and minutes from the scenic Blue Ridge Parkway. The Hotel Roanoke and Conference Center operates a complimentary Airport shuttle. On-site self-parking is \$5.00 per night, valet parking is available for registered guests at \$7.00 per night.

<p>The <b>Transportation Research Board</b> is a unit of the National Research Council, which serves as an independent advisor to the federal government on scientific and technical questions of national importance. The Research Council, jointly administered by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine, brings the resources of the entire scientific and technical community to bear on national problems through its volunteer advisory committees.</p>
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**Preliminary Program**  
**5<sup>th</sup> Symposium on Snow Removal and Ice Control Technology**  
**Hotel Roanoke & Conference Center**  
**September 5-8, 2000, Roanoke, VA**

*Tuesday, September 5, 2000*

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10:00 a.m. - Noon &  
4:00 p.m. - 7:00 p.m.

**Registration & Information**

Noon - 5:30 p.m.      **Visit [Virginia Smart Road](#) in Blacksburg**

6:30 p.m. - 8:00 p.m.      **Reception**

*Wednesday, September 6, 2000*

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7:00 a.m. - 5:00 p.m.      **Registration & Information**

7:00 a.m. - 8:30 a.m.      **Continental Breakfast**

8:30 a.m. - 9:30 a.m.      **Opening Session**

Leland D. Smithson, *Iowa Department of Transportation*, presiding

**Welcome**

- Wilfrid A. Nixon, *Chair, TRB Committee on Winter Maintenance*, and *Professor, University of Iowa*

**Keynote**, TBD

9:30 a.m. - 10:00 a.m.      **Break**

10:00 a.m. - Noon      **IVHS/ITS Technology: Part I**

Paul F. Keranen, *Minnesota Department of Transportation*, presiding

**Evolving ITS Technologies for Snowplows**, John Scharffbillig, *Minnesota Department of Transportation*; Craig R.

Shankwitz, *University of Minnesota*; Gregory E. Thompson, *SRF Consulting Group*

**Floating Car Road Weather Information Monitoring System**, Yrjo Pilli-Sihvola, *Finnish National Road Administration*

**Evaluation of an Automatic Vehicle Location System in an Urban Winter Maintenance Operations**, Daniel S. Roosevelt  
and Robert A. Hanson, *Virginia Transportation Research Council*; William M. Campenni, *Stuart AVL Technologies, Inc.*

**Application of International Scanning Tour Technology to Improve Snow and Ice Control Operations**, Leland D.

Smithson, *Iowa Department of Transportation*

Noon - 1:30 p.m.      **Lunch**

1:30 p.m. - 5:00 p.m.      **Visit Equipment Display at [Eastern Winter Maintenance Show](#)**

6:00 p.m. - 8:00 p.m.      **Block Party at [Roanoke's Farmers Marker](#)**

*Thursday, September 7, 2000*

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7:00 a.m. - 5:00 p.m.      **Registration & Information**

7:00 a.m. - 8:00 a.m.      **Continental Breakfast**

8:00 a.m. - 9:30 a.m.

## **Environmental Issues: Part I**

Donald M. Walker, *University of Wisconsin-Madison*, presiding

**Does a Salting Operation Match the Road and Weather Conditions? Results of a Finnish Follow-up**, Tapio J. Raukola and Mika Terhela, *Finnish National Road Administration*

**Winter Friction Project**, Jon Dahlen, *Norwegian Public Roads Administration*

**The Use of Abrasives in Winter Maintenance at the County Level**, Wilfrid A. Nixon, *University of Iowa*

9:30 a.m. - 10:00 a.m. **Break**

10:00 a.m. - Noon

## **General Topics: Part I**

Max S. Perchanok, Ontario *Ministry of Transportation*, presiding

**The Recent Situation of the Winter Road Management and the Traffic Accident in Hokkaido**, Hidetsugu Onuma, Masayuki Hirasawa and Shuichi Oikawa, *Hokkaido Development Bureau, Japan*

**Designing the Winter Weather Simulation Capability of the Virginia Smart Road**, Ed Shea and Ashwin Amanna, *Virginia Polytechnic Institute and State University*

**Millimeter Wave Radar Technology-Based Intelligent Winter Highway Systems**, Manabu Kaneko, Yasuhiko Kajiya, Masaru Matsuzawa and Nobuo Konagai, *Hokkaido Development Bureau, Japan*

**A Salt Spreader Test Bench for Improved Efficiency, Melting Agent Economies and Respect for the Environment**, Jean-Claude Valeux, Claude Darnault and Jacques Marignier, *French Ministry for Equipment, Housing, Transport and Tourism (MELT)*

## **Policy and Management: Part I**

Jere E. Meredith, *Kansas City Transportation Department*, presiding

**Experiments on Information Sharing for Better Winter Roads - Greater Sapporo White-Net Experimental Project**, Masaru Matsuzawa, Yasuhiko Kajiya, and Nobuo Konagai, *Hokkaido Development Bureau, Japan*; Yasuhiro Kaneda, *Hokkaido Development Engineering Center, Japan*

**Performance-Based Assessment of Winter Maintenance Using Level of Service (LOS)**, S. Edward Boselly III, *Weather Solutions Group*; Robert R. Blackburn, *Blackburn & Associates*

**Technological Support and Policy for Winter Service in the Czech Republic**, Karel Melcher, *Road and Motorway Directorate of the Czech Republic*

**Winter Maintenance Policy in Slovenia**, Polona Fazarinc, *Engineering Company for Public Roads, Slovenia*; Ljiljana Luis Herga, *Ministry of Transport and Communications, R Slovenia*; Peter Pengal, *Road Directorate of Slovenia*

Noon - 1:30 p.m.

**Lunch**

1:30 p.m. - 3:00 p.m.

## **General Topics: Part II**

Daniel S. Roosevelt, *Virginia Transportation Research Council*, presiding

**Development of Weathering Type Transportation System**, Jun Tsunabuchi and Shuuji Habu, *Mitsubishi Heavy Industries, Ltd. Japan*; Keishi Ishimoto, *Hokkaido Development Engineering Center, Japan*

**Development and Applications of a National Database on Road Salt Loadings for Canada**, Max S. Perchanok, Ontario *Ministry of Transportation, Canada*

**Estimation of Friction Coefficients at Rear-End Collision on Winter Roads Taking Slip Ratio of Tire While Braking Into Account**, Mansour Hadji Hosseinlou, *K.N. Toosi University of Technology, Iran*; Takashi Nakatsuji, *Hokkaido University, Japan*

## **Environmental Issues: Part II**

Andrew Mergenmeier, *Federal Highway Administration*, presiding

**Abrasives or Salt - A New Research on Their Impact on Security, Economy and Environment**, Ulrich Schlup, *Swiss Federal Roads Office, Switzerland*

**How to Reduce Streetdust in Densely Populated Communities**, Dan Langstrom, *Public Works Department of Helsinki, Finland*

**Environmental Effects of Sodium Chloride on De-Icing of Pavement Surfaces**, A. K. Darban and A. Foriero, *Laval University, Canada*; R. N. Yong, *University of Wales, Cardiff*

3:00 p.m. - 3:30 p.m.

**Break**

3:30 p.m.- 5:30 p.m.

## **IVHS/ITS Technology: Part II**

Tapio J. Raukola, *Finnish National Road Administration*, presiding

**The Baltic States RWIS Project: Developing a Joint Internet Application for the Road User**, Paivi K. Martikainen, *Finnish National Road Administration*

**XML Technology for New RWIS Applications - Development of Road Web Markup Language**, Yasuhiko Kajiya, Masaru Matsuzawa and Nobuo Konagai, *Hokkaido Development Bureau, Japan*

**Road Weather Information System in Finland**, Kimmo Toivonen and Jouko Kantonen, *Finnish National Road Administration*

**GIS/GPS/GSM Applications for the Winter Maintenance Management in the N-1 Motorway**, Luis Azcue and Luis Antona, *Ministry of Formento, Spain*

## **Customer Based Performance Measures**

Keishi Ishimoto, *Hokkaido Development Engineering Center*, presiding

**Client Oriented Winter Road Maintenance**, Jukka Karjalainen, *Finnish National Road Administration*

**Economic Evaluation of Snow-Removal Level by Applying the Contingent Valuation Method**, Yasuhisa Hayashiyama, *Tohoku University, Japan*; Shintaro Tanabe, *Hokkaido Development Engineering Center, Japan*; Fumihito Hara, *Hokkaido Development Engineering Center, Inc., Japan*

**The Development of Customer-Based Level of Service Measures for Snow and Ice Control by Caltrans**, Kris Kuhl, *California Department of Transportation*

**Municipal Winter Road Maintenance: Expectations and Requirements**, Alf Johansson, *Chalmers University of Technology, Sweden*; Ake Sandin, *Gothenburg City Street & Highway Company, Sweden*

5:30 p.m. - 8:00 p.m. Dinner (On Your Own)

8:00 p.m. - 10:00 p.m.

## **OPEN SESSION**

Wilfrid A. Nixon, *University of Iowa*, presiding

*Symposium participants are encouraged to make short presentations about their work in snow removal and ice control during this session. A sign-up sheet will be located at the registration desk for those interested in making a presentation. Presentations will be limited to five (5) minutes and will be made in the order of sign-up. Overhead and 35 mm projectors will be available for visual aids.*

*Friday, September 8, 2000*

7:00 a.m. - 5:00 p.m.

**Registration & Information**

7:00 a.m. - 8:00 a.m.

**Continental Breakfast**

8:00 a.m. - 9:30 a.m.

## **General Topics: Part III**

Joseph Althouse, *Dow Chemical Company*, presiding

**Temperature and Humidity Effects on the Co-Efficient of Friction Value After Application of Liquid Anti-Icing Chemicals**, Timothy Leggett, *Consultant*

**Results of Field Tests on Various Anti-Freezing Pavements**, Takashi Kawabata, *City of Sapporo, Japan*; Fumihito Hara, *Hokkaido Development Engineering Center, Inc., Japan*; Yasushi Takeichi, *Hokkai Gakuen University, Japan*; Chigako Yamamoto, *Hokkaido University, Japan*

**The Development and Use of an E-mail Based List-Serve for Winter Highway Maintenance**, Wilfrid A. Nixon and Mark A. Wilson, *University of Iowa*

9:30 a.m. - 10:00 a.m.

**Break**

10:00 a.m. - Noon

## General Topics: Part IV

Gordon T. Bell, *Surface Systems, Inc.*, presiding

### Advanced Decision Support for Winter Road

**Maintenance: FHWA Documentation of Requirements for Intelligent Transportation Systems**, Paul A. Pisano, *Federal Highway Administration*; Gary G. Nelson, *Mitretek Systems, Inc.*

### Target Luminance in Blowing Snow Conditions as a Function of Illuminance Conditions and Visual Range

Toru Hagiwara, *Hokkaido University, Japan*; Yasuhiko Kajiya, *Hokkaido Development Bureau, Japan*; Hitoshi Akasaka, *Iwasaki Electric Co. Ltd.*; Yasuyuki Matsumoto, *Department of Illumination Technology, Co., Ltd., Japan*; Shoji Kobayashi, *Koito Manufacturing Co. Ltd.*; Kenishi Mima, *Seiwa Electric MFG.CO., LTD*; Ryuji Imazu, *Sekisui Jushi Corporation, Japan*

### Incorporating Anti-Icing into the New Brunswick Department of Transportation Storm Response Guide

Dave Macfarlane, *New Brunswick Department of Transportation*

### Study on the Performance of the Porous Asphalt Pavement on the Winter Road Surface Conditions

Toru Watanabe, Tatsuya Saito and Seigo Yoshie, *Japan Highway Public Corporation*

Noon - 1:30 p.m.

**Lunch**

1:30 p.m.- 3:00 p.m.

## Innovative Equipment: Part I

Richard L. Hanneman, *Salt Institute*, presiding

### Evaluation of Methods for High Speed Application of Road Salt and Winter Sand

Max S. Perchanok, *Ontario Ministry of Transportation, Canada*

### Near IR Camera for Visual Weather Road Condition Reporting

Lester T. Yoshida and Mark D. Greer, *Surface Systems, Inc.*

### The Evolution of RWIS (Road Weather Information System) & FAST (Fixed Automatic Spray Technology)

Jerry R. Waldman, *Boschung America*

3:00 p.m. - 3:30 p.m.

**Break**

3:30 p.m. -5:00 p.m.

## Innovative Equipment: Part II

Graham B. Gilfillan, *Insurance Corporation of British Columbia*, presiding

### Virginia's Heated Bridge

Edward J. Hoppe, *Virginia Transportation Research Council*

### A Modeling Approach to Design of a Ground-Source Heat Pump Bridge Deck Heating System

Jeffrey D. Spitzer, *Oklahoma State University*

### Advances in Automated Bridge Deicing in Minnesota

Paul F. Keranen, *Minnesota Department of Transportation*

5:00 p.m. - 5:30 p.m.

## Closing Session

Leland D. Smithson, *Iowa Department of Transportation*, presiding

- Wilfrid Nixon, *Chair, TRB Committee on Winter Maintenance*, and *Professor, University of Iowa*

## Policy and Management: Part II

Daniel S. Roosevelt, *Virginia Transportation Research Council*, presiding

### Methods for Measuring and Reporting Winter Maintenance Activities

Torgeir Vaa, *SINTEF*

Transport Engineering

### Procedures for Winter Storm Maintenance Operations in Northern Arizona

S. Edward Boselly III, *Weather Solutions Group*; Robert R. Blackburn, *Blackburn & Associates*, Duane E. Amsler Sr, *AFM Engineering Services*

### System for Carrying Snow from Residential Roadsides in Municipal-Residential Partnership

Chigako Yamamoto, *Hokkaido University, Japan*; Takashi Kawabata, *City of Sapporo, Japan*; Fumihito Hara, *Hokkaido Development Engineering Center, Inc., Japan*

### Measuring the Efficiency of Winter Maintenance Practices

Rand Decker, John L. Bignel, Cambria M. Lambertsen and Kristie Porter, *University of Utah*

## Environmental Issues: Part III

Rand Decker, *University of Utah*, presiding

### Ice Control Technology with 20% Salt/Water Solution on Highways

Jens Christian Fønnesbech, *County of Funen, Denmark*

### Anti-Icing Operation Using a Prewetted, Fine-Graded Salt

Thomas J. Martinelli, *Wisconsin Department of Transportation*

### Assessment of the Performance of Pre-Wetted Salt for Snow Removal and Ice Control

Marilyn Burtwell, *Transport Research Laboratory, United Kingdom*

## Acknowledgements

**Program Committee:** Daniel S. Roosevelt, *Chair*; Joseph Althouse; Rand Decker; Graham B. Gilfillan; Keishi Ishimoto; Paul F. Keranen; Anne Leppanen; Jere E. Meredith; Andrew Mergenmeier; Wilfrid A. Nixon; Max S. Perchanok

**TRB Winter Maintenance Committee:** Wilfrid A. Nixon, *Chair*; Richard M. Balgowan; Gordon T. Bell; Rand Decker; Graham B. Gilfillan; Richard L. Hanneman; Keith L. Johnson; Yasuhiko Kajiyu; Paul F. Keranen; David A. Kuemmel; Torgeir Leland; Jere E. Meredith; Andrew Mergenmeier; L. David Minsk; Richard J. Nelson; Jan Olander; Richard D. Parker; Max S. Perchanok; Paul A. Pisano; Guy S. Puccio; Tapio Johannes Raukola; Leland D. Smithson; David Vieth; Donald M. Walker



NATIONAL RESEARCH COUNCIL

5<sup>th</sup> International Symposium on Snow Removal and Ice Control Technology
September 5-8, 2000 at The Hotel Roanoke & Conference Center • Roanoke, Virginia
Registration Form

✓ Yes! I will attend the Symposium.

Mail future correspondence to (please type or print):

Name Last First & Middle Initial Nickname for badge

Spouse/Guest (if attending) Nickname for badge

Affiliation

Address

City State/Country if International

Zip/Postal Code Telephone Fax

Table with 4 columns: Symposium Registration Fees, Earlybird (by August 8), After August 8 and On-site, Payment (must accompany form). Rows include Conference Participant and A3C09 Committee Member or Participant Listed in Program. Includes Enclosed Payment \$ field.

VISA MASTERCARD AMERICAN EXPRESS
Card #
Expiration / Signature

Check (payable to TRB Snow Symposium)
Purchase Order #
(TRB/NAS Federal Identification: 53-0196932, government agencies and universities only)

For planning purposes, indicate the number to attend (there is no fee for these activities):
Symposium Participant & Spouse/Guests
Spouse/Guests

Please register on-site after August 17. Cancellation received in writing by August 8 will be refunded in full. After August 8, there will be a \$50.00 processing fee. No refunds will be issued after August 17.

QUESTIONS? Contact Frank Lisle or Lizy Mani, Transportation Research Board, 2101 Constitution Avenue, NW, Washington, DC 20418, (202) 334-2950, Fax (202) 334-2003. For registration information contact Robert Neihouse (202) 334-2824.

For hotel reservations, contact The Hotel Roanoke and Conference Center and ask for the TRB \$59.00 single/\$69.00 double rate by August 8, (540) 985-5900, 1-800-222-8733, or Fax (540) 853-8290.

Please complete all information, keep a copy for your records, and send form with payment by August 8 to:

TRB, Box 289, Washington, DC 20055 or
Fax (202) 334-2299 [Credit Card Payments Only].



## Hotel Reservation Form

Transportation Research Board  
5<sup>th</sup> International Symposium on Snow Removal and Ice Control Technology  
Tuesday, September 5–Friday, September 8, 2000  
The Hotel Roanoke and Conference Center  
(540) 985-5900 • 1-800-222-8733 • Fax (540) 853-8290

**DEADLINE: August 8, 2000**

Mail hotel confirmation to **(please type or print)**:

Last Name \_\_\_\_\_ First \_\_\_\_\_

Organization \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip/Postal Code \_\_\_\_\_

Telephone (\_\_\_\_\_) \_\_\_\_\_ FAX (\_\_\_\_\_) \_\_\_\_\_ Country if International \_\_\_\_\_

Arrival: Day \_\_\_\_\_, September \_\_\_\_\_, 2000 \_\_\_\_\_  a.m.  p.m.

Departure: Day \_\_\_\_\_, September \_\_\_\_\_, 2000 \_\_\_\_\_  a.m.  p.m.

Room Type:  \$59.00\* Single Occupancy  \$69.00\* Double Occupancy, sharing with \_\_\_\_\_  
\* plus 10.5% tax

Special Requests (bed size, no smoking, accessibility needs, etc.): \_\_\_\_\_

\$ \_\_\_\_\_ Enclosed First Night Deposit Payable by:

VISA  MASTERCARD  AMERICAN EXPRESS  DINERS CLUB  DISCOVER  Check (payable to The Hotel Roanoke)

Card # \_\_\_\_\_ Expiration \_\_\_\_ / \_\_\_\_ Signature \_\_\_\_\_

The conference will be held at the Historic Hotel Roanoke and Conference Center, 110 Shenandoah Avenue, Roanoke, Virginia, 24016, (540) 985-5900, Guest Fax (540) 853-8290. Limited rooms are available on a first-come, first-served basis at the \$59.00 single, \$69.00 double rates until the block of rooms is reserved or August 8. Reservations will be accepted after August 8, 2000 based on availability and prevailing rates. Reservations must be guaranteed for arrival with a first night deposit. The group rate will be offered based upon availability for extended stays. Check-in time is 4:00 p.m. and check-out is 11:00 a.m. All rooms are equipped with voice mail, modem ports, remote control cable televisions, hair dryers, and irons. The hotel has 2 restaurants, an in-house fitness center and outdoor swimming pool.

Please don't be a "no-show"--if you cancel your plans to attend the symposium, remember to cancel your registration and hotel reservation. The first night deposit is not charged to reservations guaranteed by credit card unless you are a "no-show." Guaranteed reservations canceled by 4 p.m. the day of arrival are fully refundable. You will forfeit your deposit if cancellation notice is received after 4 p.m. When canceling a reservation by telephone, record the date, cancellation number, and the name of the person accepting the cancellation. While TRB staff cannot make, change, or cancel reservations, we are available to assist if you have this information and experience difficulty receiving a refund following the symposium.

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