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SECOND QUARTER TECHNICAL PROGRESS REPORT FOR THERMALLY MODIFIED SAND

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PREPARED FOR

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GE²T PROJECT No. 93093

June 14, 1994

MASTER

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PROJECT OBJECTIVE

The objective of the Demonstration project was to have the Alaska Department of Transportation & Public Facilities (ADOT&PF) Operation & Maintenance Section use Thermally Modified Sand (TMS) for the treatment of icy state roadways. The field test results will then be used to compare similar sections of icy roadways treated with conventional salted sand to the road test sections treated with TMS material. The Demonstration project took place on a state maintained roadway located in the south central area of Alaska, where typical air temperatures persist below freezing throughout most of the winter. The Demonstration project also included the evaluation on the workability of a large stockpile of TMS material that was left undisturbed throughout the 1993/94 winter season.

The work plan described in the proposed scope of work consists of five (5) separate tasks. These tasks are as follows:

Task 1 - Produce Thermally Modified Sand (TMS)

Task 2 - Construct Stockpiles of TMS Material

Task 3 - Apply TMS Material to Icy Roadways Maintained by the State

Task 4 - Evaluate Undisturbed TMS Material Stockpile

Task 5 - Prepare Quarterly and Final Reports

The following report is a summary of the work performed during the second quarter of the Demonstration project.

TASK 1 - PRODUCE THERMALLY MODIFIED SAND (TMS)

This task included the preparation of approximately 2,500 cubic yards of TMS material for use by ADOT&PF on a state maintained roadway near Palmer, Alaska. Because of the unusually mild winter conditions during the first quarter of the Demonstration

project, Mr. Dino Talavera was able to only produce approximately 800 to 1,000 cubic yards of TMS material. According to the National Weather Bureau in Anchorage, the average mean temperature at the Palmer Recording Station for the month of November was 24.6°F, which was 5.1°F higher than normal. The temperature for the month of December was 25.2°F which was 10.6°F higher than normal.

On January 10, 1994, Mr. Talavera prepared to continue the processing of sand into TMS material. Due to the temperature fluctuations, Mr. Talavera decided to also treat the TMS material which was previously processed for use by ADOT&PF during the first quarter of this project. Mr. Talavera resumed processing on January 11, 1994 and by January 20, 1994, he had re-processed 1,000 to 1,200 cubic yards of TMS material. The remaining 1,000 cubic yards of unprocessed sand was stockpiled in the TMS material staging area.

Mr. Peter Curtis, of GE²T, observed the processing of the TMS material and determined the optimum output of Mr. Talavera's equipment was approximately 1 cubic yard of TMS material per minute. With a light wind from the southwest, no snow and a temperature of 9°F weather conditions on January 11, 1994 proved to be ideal for the treatment of sand into TMS material.

TASK 2 CONSTRUCT STOCKPILE OF TMS MATERIAL

The TMS material produced under TASK 1 was separated into two (2) stockpiles at the ADOT&PF O&M facility located in Palmer, Alaska. Approximately 300 cubic yards of TMS material produced in the first quarter was monitored on a weekly basis by representatives of GE²T through the second quarter of the project. Evaluation of this testing is summarized in TASK 4.

Of the remaining sand purchased for the project, approximately 1,200 cubic yards was processed into TMS material to be used by ADOT&PF O&M and was located within the maintenance yard for easy access during the winter months (January through March). The area around the stockpiles was maintained (plowed), by ADOT&PF personnel, so that loading of the TMS material could be accomplished without any accessibility problems.

TASK 3 APPLY TMS MATERIAL TO ICY ROADS MAINTAINED BY THE STATE OF ALASKA

Under this task the stockpiled TMS material was used for application on a designated test section of state roadway in the Palmer area. On January 28, 1994 Mr. Chris Kepler and Mr. Bill McKechnie of ADOT&PF O&M, Mr. Peter Curtis and Mr. Robert Gilfilian of GE²T, Mr. Jim Palin of the Alaska Science & Technology Foundation (ASTF) and Mr. Dino Talavera met in Mr. Kepler's office to discuss the continuation of the Demonstration project. Mr. Talavera proposed a few modifications be made to the ADOT&PF sander trucks. Mr. Talavera believed these modifications would improve the spreading of the TMS material from the ADOT&PF trucks.

The first modification involved adding two (2) more vibrators on the sander trucks to provide additional vibrations to the sander box. There would then be a total of four (4) vibrators on each truck sander box. The second modification proposed the installation of a perforated PVC pipe along the grates at the top of the sander box. The pipe would be used to flush residual salted sand from the sander box walls. Mr. Kepler approved Mr. Talavera's modifications, provided all the modifications were properly removed after the completion of the demonstration project and the bolt holes sealed with stainless steel weld.

Mr. Talavera installed a 1-inch diameter PVC pipe around the perimeter of the sander box just below the attachment to the grate bracing. A 2-inch diameter fire hose was then spliced into the PVC piping so that water from an ADOT&PF water hydrant could be used to wash salted sand from the sander box walls.

The following is a summary of temperature measurements made on January 31, 1994:

<u>Medium</u>	<u>Time</u>	<u>Temperature</u>
Air	1140	34°F
TMS Material Stockpile	1140	19°F
TMS Material Discharge from Truck .	1230	23°F

Although temperatures were above freezing, testing of the TMS material was resumed on January 31, 1994. Mr. Talavera washed the sander box and the spreader conveyor for approximately 15 minutes. The truck sander was then allowed to dry (freeze) for approximately another 15 to 20 minutes. The truck was then loaded with approximately 10 cubic yards of TMS material and driven to the road test section (Palmer/Fishhook Road) for application to the roadway. The TMS material was successfully spread along the road test section with the help of the four vibrators.

Upon return to the ADOT&PF maintenance facility, Mr. Talavera requested an additional test of the spreading process be done. He wanted to load the sander truck with salted sand, discharge that load, reload the sander truck with TMS material (without washing out the sander box), then spread the newly loaded TMS material to observe if the salted sand residue affected the spreading of the TMS material. Mr. Kepler approved Mr. Talavera's request, but stated he wanted, at a later date, to test the TMS materials ability to spread under typical January weather conditions, with temperatures below freezing.

The above procedure was performed and the sander truck was reloaded with TMS material and driven to the road test section for application to the roadway. Approximately half of the load was discharged with all four (4) vibrators running continuously. However, the remaining TMS material "cemented" in the box and had to be manually removed from the ADOT&PF truck back at the maintenance yard by Mr. Talavera.

Additional road testing of the TMS material took place on February 10 and March 17, 1994. The following summarizes the observations made:

February 10, 1994

The air temperature was 16°F at 11 am. Mr. Talavera washed and air dried the sander box. The ADOT&PF sander truck was loaded with approximately 10 cubic yards of free flowing TMS material. The sander truck was driven to the road test section and application of the TMS material began. Only 1.5 cubic yards of TMS material discharged from the sander truck leaving an area approximately 2 square feet hollowed out around the sander conveyor. The TMS material that was applied to the road test section spread inconsistently

and sporadically. The remaining TMS material was manually removed from the sander box, by Mr. Talavera, at the ADOT&PF maintenance yard.

March 17, 1994

The air temperature was 20°F at 9 am. The ADOT&PF sander truck was washed of residual salted sand and air dried for 20 to 30 minutes. The truck was loaded with approximately 8 cubic yards of free flowing TMS material. The sander truck was driven to Knik-Goose Bay Road, an alternate test location on the outer limits of the ADOT&PF maintenance area. The road is located in the Wasilla area approximately 20 minutes from the ADOT&PF maintenance yard (refer to FIGURE 1).

During the spreading operation, the TMS material hollowed out above the sanding conveyor as previously observed and had to be manually forced through the spreader with the use of a crowbar. After approximately half the load was manually discharged, the four (4) vibrators appeared to adequately provide enough motion to dislodge and discharge the remaining 4 cubic yards of TMS material. Refer to the attached file memo dated March 18, 1994 by C. Peter Curtis for a detailed description of his observations. Also, attached is a copy of the ADOT&PF operator comments.

Grab samples of the TMS material were collected by Peter Curtis during this test run. The samples were tested to determine the moisture content in the TMS material stockpile and TMS material after discharge from the ADOT&PF truck. The test results are reported in the lab report MSTL No. 394063.

TASK 4 EVALUATE UNDISTURBED TMS MATERIAL STOCKPILE

Under this task the 300 cubic yards of stockpiled TMS material located at the ADOT&PF O&M facility was evaluated for workability throughout the entire winter. After the stockpile was constructed, thermistor probes were installed and the stockpile remained undisturbed during the winter season. Please refer to the attached Table titled *TMS - Field Report* which summarizes the weekly observations of the TMS material pilot stockpile.

Also, random grab samples of the pilot stockpile were obtained on March 3, 1994 and March 22, 1994 to determine particle sizing and moisture content. Please refer to the attached lab analysis 93093, consisting of two (2) test analyses, and 94063, consisting of four (4) test analyses.

TASK 5 PREPARE QUARTERLY AND FINAL REPORTS

This task consisted of the preparation of quarterly and final reports on the TMS demonstration project. During the second quarter reporting period several letters and memos of correspondence were prepared by Mr. Kepler, Mr. Gilfilian and Mr. Curtis. The correspondence reported activities during this period of the project. A chronological list of these letters is as follows (copies of the correspondence are attached to this report):

- February 28, 1994 - Memorandum regarding field inspections, prepared by Bob Gilfilian.
- March 7, 1994 - Memorandum regarding TMS material pilot stockpile, prepared by Peter Curtis.
- March 18, 1994 - Memorandum regarding field inspections report of TMS application, prepared by Peter Curtis.
- March 24, 1994 - Letter sent from Chris Kepler to Bob Gilfilian regarding status of TMS sand project.

CLOSURE

This Second Quarter progress report describes the work completed during the production and application of the TMS material. Similar to the findings of the first quarter, a considerable amount of work beyond the original scope of work was performed to improve the workability of the TMS material for large scale commercial use. Although the work completed under this quarter of the demonstration project was not entirely favorable, Mr. Talavera and ADOT&PF had earnestly worked towards developing solutions to the problems that were identified.

The next quarterly progress report will summarize the findings of the demonstration project and will be considered as the final report on this project.

ATTACHMENTS

FIGURE 1 - Map of Project Study Area

TMS - Field Reporting (Table)

**Gilfilian Engineering & Environmental Testing, Inc.
Lab Results**

**Correspondence and Memos
(Memos dated February 28, 1994, March 7, 1994 and March 18, 1994,
ADOT&PF Logs on Use of TMS Material dated March 17, 1994,
and Letter dated March 24, 1994)**

THERMALLY MODIFIED SAND TECHNICAL PROGRESS REPORT No. 2 FIGURE 1

&
 Inc.
 Wasilla, Alaska 99654
 Anchorage, Alaska 99503

**TMS - FIELD REPORT
GE²T 93093**

Sheet 1 of 2

DATE	12/17/93	12/23/93	01/05/94	01/12/94	01/19/94	01/28/94	02/04/94	02/11/94	02/18/94
AIR TEMPERATURE	-9°C Cloudy no winds	2.6°C Cloudy wind - 15 mph from NW	-5.8°C Cloudy wind - 25 mph	-5.2°C Cloudy light wind	-7.0°C Cloudy no wind	5.4°C Cloudy light wind	2.8°C Cloudy light wind	-13.2°C Clear no wind	-8.5°C Clear wind - 25 mph
TEMPERATURE °C									
Probe 1 - Location: South side 3' below surface	-1.9	-1.1	-1.3	-4.0	-3.0	-1.9	-1.0	-0.7	-4.0
Probe 2 - Location: South side 2' below surface	-1.6	-1.3	-3.1	-7.3	-4.5	-2.3	-1.0	-0.9	-7.0
Probe 3 - Location: South side 1' below surface	-1.5	-1.2	-5.7	-9.0	-5.8	-2.0	-0.8	-4.2	-10.9
Probe 4 - Location: North side 3' below surface						-0.6	-1.3	-1.0	-5.6
Probe 5 - Location: North side 2' below surface						-0.3	-1.2	-1.5	-9.8
Probe 6 - Location: North side 1' below surface						0.0	-0.7	-5.2	-13.3
Observations: - Free Flowing - FF - Frost Depth - FD - Snow Cover - SD - North side - N - South side - S - Not Measured - NM	FF 4" FD 0 SD	1/3 up S. Side FF 3" FD 2" SD	FF: NM FD: NM SC: N - 0 S - 2"	FF: NM FD: N - 36" S - 36" SC: N - 2" S - 1 1/2"	FF: NM FD: N - 32" S - 31" SC: N - 2" S - 1 1/2"	FF: NM FD: NM SC: No Snow	FF: South side to 15" FD: NM SD: No Snow	FF: None FD: NM SD: No Snow	FF: NM FD: NM SD: No Snow

**TMS - FIELD REPORT
GE²T 93093**

Sheet 2 of 2

DATE	02/25/94	03/04/94	03/11/94	03/18/94	03/25/94				
AIR TEMPERATURE	-14.5°C Clear light wind	-14.0 Snow light wind	-1.7 Partly Cloudy light wind	-7.0 Clear No wind	7.7 Partly Cloudy Windy				
TEMPERATURE °C									
Probe 1 - Location: South side 3' below surface	-5.9	-4.5	-2.7	-1.3	-1.9				
Probe 2 - Location: South side 2' below surface	-8.5	-5.5	-2.5	-1.2	-2.2				
Probe 3 - Location: South side 1' below surface	-11.2	-5.0	-1.7	-1.1	-1.5				
Probe 4 - Location: North side 3' below surface	-8.4	-5.3	-3.7	-2.0	-3.5				
Probe 5 - Location: North side 2' below surface	-12.3	-7.5	-3.4	-2.2	-3.4				
Probe 6 - Location: North side 1' below surface	-14.6	-7.7	-2.7	-4.0	-2.1				
Observations: - Free Flowing - FF - Frost Depth - FD - Snow Cover - SC - North side - N - South side - S - Not Measured - NM * Stockpile thawed due to high temperatures	FF: N - 0 S - 0 FD: N - 19" S - NM SC: No Snow	FF: NM FD: NM SC: 6 - 12" new snow	FF: N - 0 S - 0 FD: N - NM S - 6" SC: N - 0 S - 6"	FF: N - 7" S - 2" FD: N - 7" S - 2" SC: N - 1" S - 3-6"	FF: N - S - FD: N - 2* S - 2* SC: No Snow				

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Mat-Su Office: 1800 E. Parks Highway, Suite D-100, Wasilla, Alaska 99654
(907) 376-3005 • FAX (907) 373-5685

LAB REFERENCE NO. 394063

CLIENT: Dino Talavera

ADDRESS: _____

LEGAL/PROJECT NAME: TMS Project

DATE RECEIVED: 3/17/94 TIME RECEIVED: _____

DATE SAMPLED: 3/17/94 TIME SAMPLED: _____ SAMPLED BY CPC

Analysis Performed:

Results:

MOISTURE CONTENT

Sample No. 1: Sample from Stockpile at ADOT Yard

7.1 %

Sample No. 2: Sample from ADOT Truck Discharge

7.5 %

Sample collected by C. P. Curtis of GE²T on 3/17/94.

ND = None Detected

MCL = Maximum Contaminant Level

This analysis was performed by: Gilfilian Engineering & Environmental Testing

If you have any questions concerning the above results, please call me at 376-3005.

Kent Sheets, Soils Lab Manager

3/22/94

Date

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(907) 376-3005 • FAX (907) 373-3686

LAB REF. NO. 394063 DATE: 3/22/94
PROJECT NAME: Dino Talavera - TMS GE²T 93093
PROJECT LOCATION: Pilot Stockpile - South Side Free Flowing > 6"
TEST HOLE: _____ SAMPLE: _____ DEPTH: _____

SIEVE	% PASSING	SPECS:	COMMENTS
3 IN.			
2 IN.			Sample collected by Kent Sheets of GE ² T
1 ½ IN.			on 3/18/94.
1 IN.			
¾ IN.			Moisture Content 6.4%
½ IN.			
⅜ IN.	100		
#4	93		
#8			
#10			
#16	63		
#20			
#30			
#40	27		
#50			
#60	11		
#80			
#100	5		
#200	2.1		

Reviewed By: C. Peter Curtis

Date: 3/22/94

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(907) 376-3005 • FAX (907) 373-3686

LAB REF. NO. 394063 DATE: 3/22/94
PROJECT NAME: Dino Talavera - TMS GE²T 93093
PROJECT LOCATION: Pilot Stockpile - South Side at Surface
TEST HOLE: _____ SAMPLE: _____ DEPTH: _____

SIEVE	% PASSING	SPECS:	COMMENTS
3 IN.			
2 IN.			Sample collected by Kent Sheets of GE ² T
1 ½ IN.			on 3/18/94.
1 IN.			
¾ IN.			Moisture Content 7.6%
½ IN.	100		
⅜ IN.	99		
#4	90		
#8			
#10			
#16	57		
#20			
#30			
#40	23		
#50			
#60	9		
#80			
#100	5		
#200	2.6		

Reviewed By: C. Peter Curtis

Date: 3/22/94

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Mat-Su Office: 1800 E. Parks Highway, Suite D-100, Wasilla, Alaska 99654
(907) 376-3005 • FAX (907) 373-3686

LAB REF. NO. 394063 DATE: 3/22/94
PROJECT NAME: Dino Talavera - TMS GE²T 93093
PROJECT LOCATION: Pilot Stockpile - North Side - Free Flowing 76"
TEST HOLE: _____ SAMPLE: _____ DEPTH: _____

SIEVE	% PASSING	SPECS:	COMMENTS
3 IN.			
2 IN.			Sample collected by Kent Sheets of GE ² T
1 ½ IN.			on 3/18/94.
1 IN.			
¾ IN.			Moisture Content 7.2%
½ IN.			
3/8 IN.	100		
#4	88		
#8			
#10			
#16	56		
#20			
#30			
#40	26		
#50			
#60	11		
#80			
#100	6		
#200	2.9		

Reviewed By: C. Peter Curtis

Date: 3/30/94

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Mat-Su Office: 1800 E. Parks Highway, Suite D-100, Wasilla, Alaska 99654
(907) 376-5005 • FAX (907) 373-5686

LAB REF. NO. 394063 DATE: 3/22/94
PROJECT NAME: Dino Talavera - TMS GE²T 93093
PROJECT LOCATION: Pilot Stockpile - North Side at Surface
TEST HOLE: _____ SAMPLE: _____ DEPTH: _____

SIEVE	% PASSING	SPECS:	COMMENTS
3 IN.			
2 IN.			Sample collected by Kent Sheets of GE ² T
1 ½ IN.			on 3/18/94.
1 IN.			
¾ IN.			Moisture Content 19%
½ IN.			
⅜ IN.	100		
#4	90		
#8			
#10			
#16	61		
#20			
#30			
#40	29		
#50			
#60	13		
#80			
#100	8		
#200	4.1		

Reviewed By: C. Peter Curtis

Date: 3/30/94

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Mat-Su Office: 1800 E. Parks Highway, Suite D-100, Wasilla, Alaska 99654
(907) 376-3005 • FAX (907) 373-3686

PROJECT NUMBER: 93093 DATE: 3/3/94

PROJECT NAME: Dino Talavera: TMS Sand - 19" Below Surface

TEST HOLE: SAMPLE: DEPTH:

SIEVE	% PASSING	SPECS:	COMMENTS
3 IN.			Sample collected by Kent Sheets of
2 IN.			GE ² T on 2/25/94.
1 ½ IN.			
1 IN.			Moisture Content 6.86%
¾ IN.			
½ IN.			
⅜ IN.	100		
#4	94		
#8	80		
#10	76		
#16			
#20			
#30			
#40	29		
#50			
#60	11		
#80			
#100	5		
#200	1.9		

Reviewed By: C. Peter Curtis

Date: 3/3/94

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(907) 376-3005 • FAX (907) 373-3686

PROJECT NUMBER: 93093 DATE: 3/3/94

PROJECT NAME: Dino Talavera: TMS Sand - 6" Below Surface

TEST HOLE: SAMPLE: DEPTH:

SIEVE	% PASSING	SPECS:	COMMENTS
3 IN.			Sample collected by Kent Sheets of
2 IN.			GE ² T on 2/25/94.
1 ½ IN.			
1 IN.			Moisture Content 5.85%
¾ IN.			
½ IN.			
3/8 IN.	100		
#4	86		
#8	70		
#10	66		
#16			
#20			
#30			
#40	26		
#50			
#60	12		
#80			
#100	7		
#200	4.1		

Reviewed By: C. Peter Curtis Date: 3/4/94

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MEMORANDUM

TO: TMS Demonstration Project
GE²T Project No. 93093

FROM: Bob Gilfilian *BG*

DATE: February 28, 1994

SUBJECT: Field Inspection Report

At 9:45 a.m. on February 25, 1994, Bob Gilfilian arrived at the ADOT&PF Palmer Maintenance Facility on Springer Loop Road in Palmer, Alaska. Took several photographs of the ADOT&PF salted sand stockpile and the TMS stockpiles with the TMS processing equipment.

At 10:00 a.m. I met Kent Sheets of GE²T at the TMS long-term storage stockpile. Mr. Sheets measured the temperature profiles on the south and north sides of the stockpile. The air temperature was approximately -14 degrees C. Mr. Sheets then attempted to hand dig a hole on the east side of the stockpile. The surface of the stockpile was frozen solid and required about 20 minutes of digging with a steel bar to break through the frost layer. The depth of the frozen layer was approximately 19-inches and the sand below the frozen layer appeared to be relatively free flowing.

Duplicate soil samples were collected at depths of 6-inches and 20-inches below the surface of the stockpile for subsequent laboratory tests (moisture content and gradation) and microscopic examination. The samples were visually examined on-site with a 30 power microscope. The microscopic examination noted the following differences in the ice content between the frozen sand (6-inch depth) compared to the free flowing sand (20-inch depth):

- * The frozen sand from the 6-inch depth contained numerous distinct ice crystals that appeared to be the size of the fine to medium sand particles. There also appeared to be a film of frozen water on the individual sand particles (determined by placing a warm point of a pen on the soil particles that caused moisture to appear on the soil particles).

Memo to Project Files
2/28/94 Field Visit
TMS Demonstration Project

- * The sample of free flowing sand collected at the 20-inch depth did not contain any visible ice crystals. Similar to the observations with the sample from the 6-inch depth, there appeared to be a film of ice on the individual sand particles.

Bob Gilfilian checked the conditions of the other sand stockpiles stored at the site. All of the stockpiles of processed TMS material appeared to be frozen solid on all sides of the piles. The ADOT&PF stockpile of salt/sand mixture contained free flowing sand that could be easily hand shoveled. The undisturbed areas of the ADOT&PF stockpile had a surface layer approximately 6-inches thick that appeared frozen but broke up easily with the hand shovel.

Bob Gilfilian met with Mr. Bill McKechnie, Acting Supervisor for the maintenance facility. Bob Gilfilian asked if the Department would be willing to conduct another trial run with Mr. Talavera's TMS material. Mr. McKechnie expressed reservations about another attempt and said his supervisor, Mr. Chris Kepler (who was on annual leave), informed him that the Department wanted to terminate their involvement in the demonstration project - because the last trial run with TMS failed and caused them a considerable amount of extra work as earlier ones had done.

Mr. McKechnie stated that he would contact the Anchorage office and seek Mr. Boyd Brownfield's advice on the continuation of ADOT&PF involvement in the demonstration project. He suggested if the trial run was to be made that the TMS material be hauled to a long distance site such as Goose Bay Road. By doing so, we could evaluate the effect of long distance hauling on the TMS material as it consolidates in the bed of the truck. Mr. McKechnie will inform me the first part of next week as to their decision on the future the role of ADOT&PF in the demonstration project.

At approximately 11:15 a.m. Bob Gilfilian left the ADOT&PF Palmer Maintenance Facility.

GILFILIAN ENGINEERING & ENVIRONMENTAL TESTING, INC.

Professional Environmental Consultants

Main Office: 255 E. Fireweed Lane, Box 102, Anchorage, Alaska 99503-2025
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MEMORANDUM

TO: TMS Demonstration Project
GE²T Project No. 93093

FROM: C. Peter Curtis

DATE: March 7, 1994

SUBJECT: TMS Pilot Stockpile

Arrived at project site on March 7, 1994, at 2:00 P.M. and met with Bob Gilfilian and Bill MacKecknie.

The DOT loader was used to dig into the pilot stockpile approximately one-half way through the west side.

Sand was thawed to depths of 30" to 36" below the surface. There was an ice lens located throughout the stockpile. The ice lens ran from north to south, approximately 1" thick, and was at 40" $\pm$ from the surface at the north end and 60" $\pm$ from the surface at the south end, approximately 6' long.

Soil samples were collected above and below the ice lens for observations with a microscope. The following summarizes these observations:

<u>Location</u>	<u>Temperature</u>	<u>Ice Crystals</u>
Sample above ice lens	-0.1°C	Not apparent
Sample below ice lens	-0.3°C	Not apparent
Air temperature	7.4°C	—
Undisturbed Surface	0.0°C	—

The stockpile was frozen solid with pockets of free-flowing TMS.

Took pictures of the TMS test pits. Dug into untreated stockpile and found frost at 24" $\pm$.

Left the site at 3:15 P.M.

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MEMORANDUM

TO: TMS Demonstration Project
GE²T Project No. 93093

FROM: C. Peter Curtis

DATE: March 18, 1994

SUBJECT: Field Inspection Report

At 9:05 a.m. on March 17, 1994, Peter Curtis spoke to Wally, the ADOT & PF shop foreman. Wally said ADOT & PF was ready to begin the test.

The truck driver, Russ MacKecknie, (the same driver as on all the other tests) was washing the spreader with the power washer. He asked if Dino was upset with ADOT & PF. I said Dino was upset with the progress of his project.

The ADOT truck was washed by Dino at 9:15 a.m., and after washing sat for 20 to 30 minutes to allow the body to freeze.

Weather

Air Temperature:	South Direction	25.3°F	2' Above Ground
	North Direction	18.7°F	2' Above Ground

Dino Temperatures:	South Direction	33°F	4' Above Ground
	North Direction	10°F	1' Above Ground

High overcast, light wind from the north, temperature 20°F ±. It had snowed over the past two days and the stockpile was covered with 2 to 3 inches of dry snow.

TMS Stockpile: 3-inch frost layer.
Temperature: 2.7°C at 10:00 a.m.

10:00 a.m. Sample No. 1 was collected from the south face of the stockpile. TMS was loaded on the truck by 10:10 a.m. The truck left the ADOT yard at 10:15 a.m.

- 10:36 a.m. Arrived at Knik-Goose Bay Road and began spot sanding corners and hills.
- 10:50 a.m. ADOT stopped the sanding; TMS hollowed out under conveyor at Mile Post (MP) 7.0 Knik Goose Bay Road (KG). Dino used a crowbar to free the TMS sand.
- 10:55 a.m. The truck was back on Knik Goose Bay Road.
- 11:02 a.m. The truck stopped at MP 9.0. The TMS hollowed out above the conveyor. Obtained Sample No. 2 from the TMS waste which Dino shoveled out of the truck.
- 11:14 a.m. The truck stopped at MP 12.5 KG. The TMS hollowed out a third time, and Dino hand-emptied approximately 1 cubic yard of TMS from the truck along the roadway. I estimated approximately $\frac{1}{2}$ cubic yard of TMS had been spread by the ADOT truck thus far.
- 11:40 a.m. The load was emptied at MP 18. The TMS came out spotty and had many chucks of 1 to 3 inches in size, and several chucks 3 to 6 inches in size. The ADOT truck had the vibrator on constantly.
- 11:45 a.m. Ended at Goose Bay Airport. Returned to Wasilla.

Stopped along the way and collected chucks of TMS. TMS sand along the roadway was light with many chunks. The ADOT driver said he would have to plow the chunks off the road and resand.

Road Conditions

Knik Goose Bay Road from MP 9.0 was snow-packed with no evidence of salted sand. The air temperature was 25.4°F at 2 feet above the roadway. Partly sunny with high overcast.

FREEZE DRIED SAND USED ON PALMER FISHHOOK

<u>DATE</u>	<u>OPERATOR</u>	<u>AMOUNT</u>	<u>TIME</u>	<u>OPERATOR COMMENTS</u>
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Mar 17/994	Russell McKelmore	67 yds		
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Took 6-8 buckets out of stockpile before loading material from that spot

I needed to back-drag grates on sand to get rid of chunks.

Load needed to be barred down ^{three times} ~~five~~ and vibrator was run

Almost continuously before load came out.

STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

CENTRAL REGION — DIVISION OF MAINTENANCE & OPERATIONS

WALTER J. HICKEL, GOVERNOR

RECEIVED
3/28/94

4111 AVIATION AVENUE
P.O. BOX 196900
ANCHORAGE, ALASKA 99519-6900
(FAX 243-1512)

March 24, 1994

Robert Gilfillian, P.E.
Gilfillian Engineering & Environmental Testing, Inc.
255 E. Fireweed Lane, Suite 102
Anchorage, Ak 99503

Re: TMS Sand Project

Dear Bob:

Peter Curtis from your Wasilla office called me this morning and we discussed the future of the TMS Sand project.

In our opinion, the project should be terminated. The weather is too warm to make TMS sand and with the failure of the last truck test last week, it seems appropriate to stop.

Dino, or someone, needs to come up with a way to haul and distribute the sand that will work. Having the sand continually "freezing up" in the box is not acceptable. Also, in a true operational situation, no one could afford or rely on all the effort Dino put into processing the sand piles.

We don't believe that the sand was successful on the Palmer Fishhook test section. Unfortunately, that part of the test did not go very long, so good, solid conclusions are probably premature. However, we did observe that the snow pack and/or ice did not melt off except in the sun, and that was only because it was still early in the winter and it was relatively warm. The sand did provide some traction, but it took more loads of sand to accomplish the same benefit as the salted sand.

We did see one possible use for the sand. Early in the winter, before the sand would freeze, it could be used on gravel side roads where we don't want the snow pack to melt. This period of time would be short, however, and we would have to begin using dry chips as we normally do when the temperature dropped.

Robert Gilfillian, P.E.

-2-

March 24, 1994

It is regretful that the project was not more successful - mostly for Dino's sake. He worked hard and went through a lot of mental and physical anguish. He deserves an "A" for effort.

If you wish to discuss this, please call. It has been a real pleasure working with all of you.

Sincerely,

K. Chris Kepler, P.E.
MatSu District Superintendent

cc: Boyd Brownfield, P.E., M&O Director, Central Region

KCK/srf

DATE

FILMED

9 / 27 / 94

END