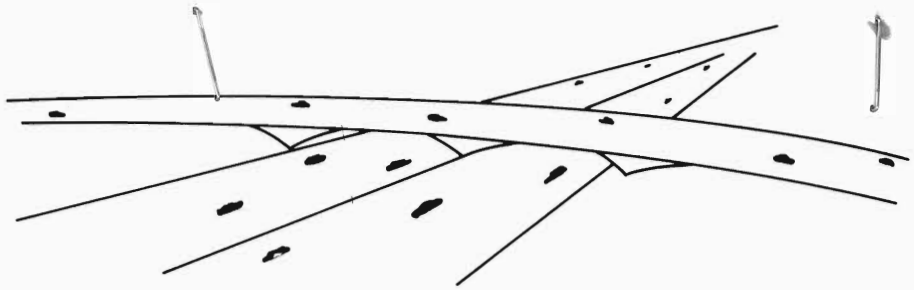


DEPARTMENTAL RESEARCH

Report Number SS 11.1

EXPERIMENTAL TESTS OF SP-3

TEXAS HIGHWAY DEPARTMENT

TEXAS HIGHWAY DEPARTMENT

AUSTIN, TEXAS 78701

December 17, 1968

IN REPLY REFER TO
FILE NO. D-8 R

.EXPERIMENTAL TESTS OF SP-3

TO: ALL DISTRICTS AND HOUSTON URBAN OFFICE

Gentlemen:

In the spring of 1967, the Department was contacted by Whitehurst-Richards Engineering Development Incorporated concerning the use of SP-3. This product is acidic in nature and apparently reacts with the aggregate and/or mortar but not with the asphalt. SP-3 is proposed as a product used to improve skid resistance by etching a renewed small scale texture on the existing pavement surface. There is no danger to vehicles after SP-3 is applied since the reaction is completed in approximately 20 minutes. Items of the manufacturer's literature are attached for further explanation.

In an effort to test the material, contact was made with Whitehurst-Richards and an experimental test was conducted in District 20 in May and June of 1968. Attached are the results of the experiment.

Sincerely yours

J. C. Dingwall
State Highway Engineer

By: R. L. Lewis

R. L. Lewis, Chief Engineer
of Highway Design

EXPERIMENTAL TESTS OF SP-3

Introduction:

This report contains the results of frictional tests performed on pavements treated with SP-3. The SP-3 product was furnished by Whitehurst-Richards Engineering Development, Incorporated, Baton Rouge, Louisiana. The material was applied and the necessary traffic protection during placement and testing was provided by District 20 personnel.

Procedure:

Frictional measurements were obtained with the Research Skid Trailer at 40 MPH and with a British Portable Tester. Placement of this product was supervised by personnel from Whitehurst - Richards.

Four test sections were selected in District 20 near Beaumont, Texas. Test section descriptions are as follows:

Location #1 - Asphaltic Concrete - With silicious and limestone coarse aggregate.

Location #2 - Surface Treatment - With limestone aggregate.

Location #3 - Asphaltic Concrete - With silicious and limestone.

Location #4 - Portland Cement Concrete - With predominant silicious coarse aggregate.

A control section was selected immediately prior to the treated section in each of the four locations (upstream to the traffic). The control section was not treated with SP-3 and was used to monitor any changes in the trailer or pavement that may occur during different test periods. All values were corrected using the initial control value for a particular section.

Whitehurst-Richards personnel indicated that an additive should be used with SP-3 when a soft limestone aggregate is found. Therefore, the treated section at location #2 was divided into two parts, one-half was treated with SP-3 and the other half was treated with SP-3 and the additive.

Results:

The results are given in the form of tables of friction values and plots of friction values obtained versus time. The tables and plots are attached and are believed to be self-explanatory.

SKID TEST TRAILER

VALUES BEFORE AND AFTER SP-3 TREATMENT

Loc.	Section	5-30-68 Before Treatment	5-30-68 After 1st Test	5-31-68 After 2nd Test	6-19-68 After 3rd Test	9-4-68 After 4th Test	Mean
1	Control	35	35	38	32	38	35.8
	SP-3	33	40	40	36	45	40.3
	Control(c)	35	35	35	35	35	35.0
	SP-3 (c)	33	40	37	39	42	39.5
2	Control	26	27	26	22	29	26.0
	SP-3	28	36	36	30	32	33.5
	Control (c)	26	26	26	26	26	26.0
	SP-3 (c)	28	35	36	34	29	33.5
	SP-3 + Add.(c)	28	32	29	25	24	27.5
3	Control	29	33		31	31	31.7
	SP-3	31	41		36	36	37.7
	Control (c)	29	29		29	29	29.0
	SP-3 (c)	31	37		34	34	35.0
4	Control	34	38		44		41.0
	SP-3	33	39		40		39.5
	Control(c)	34	34		34		34.0
	SP-3 (c)	33	35		30		32.5

Loc. 1: $\Delta = 4.5$; $\Delta f = 0.045$
Loc. 2: $\Delta = 7.5$; $\Delta f = 0.075$
Loc. 3: $\Delta = 6.0$; $\Delta f = 0.060$
Loc. 4: $\Delta = 1.5$; $\Delta f = 0.015$

Average $\Delta = 5.5$

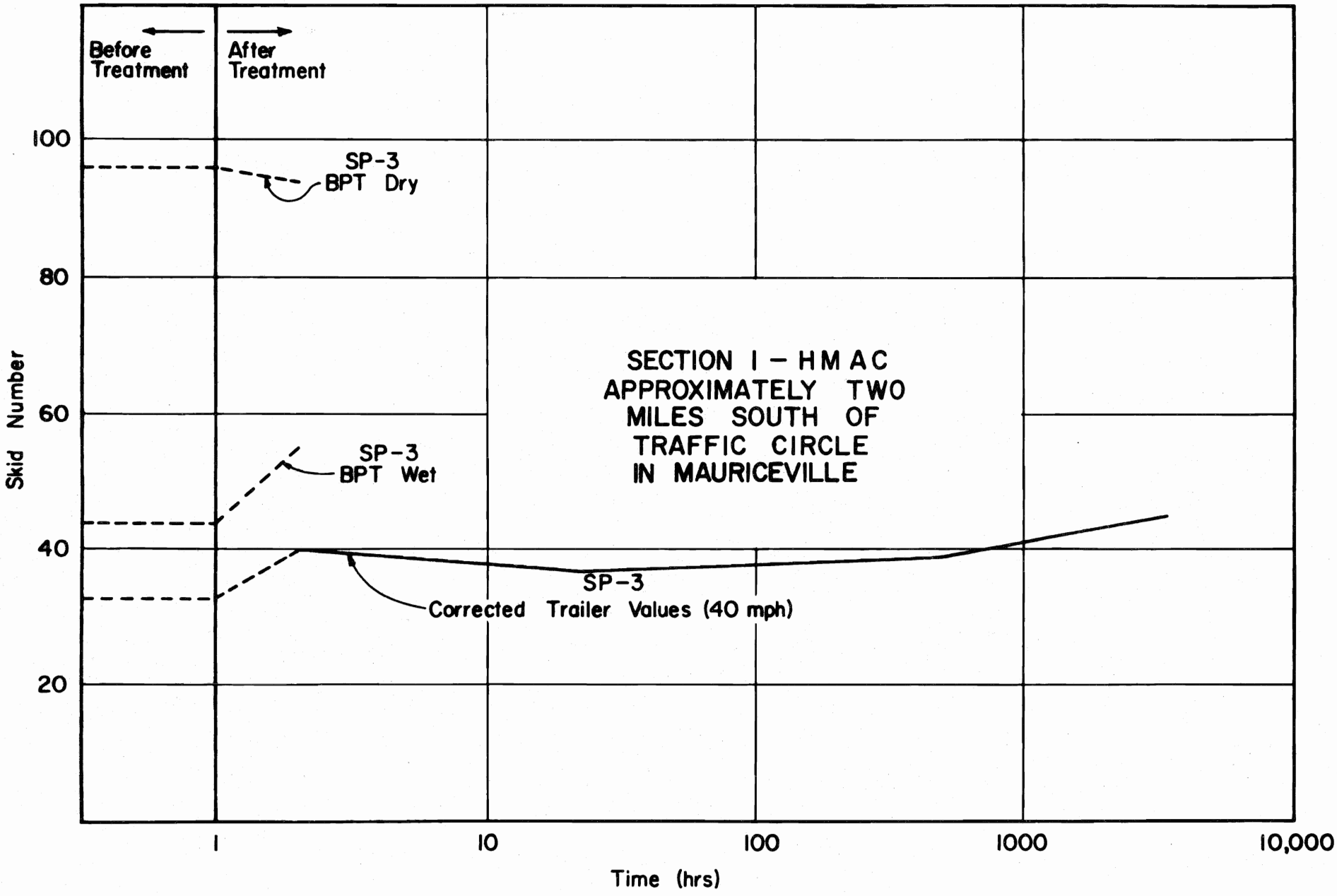
Average improvement in coefficient = 0.06

BRITISH PORTABLE TESTER

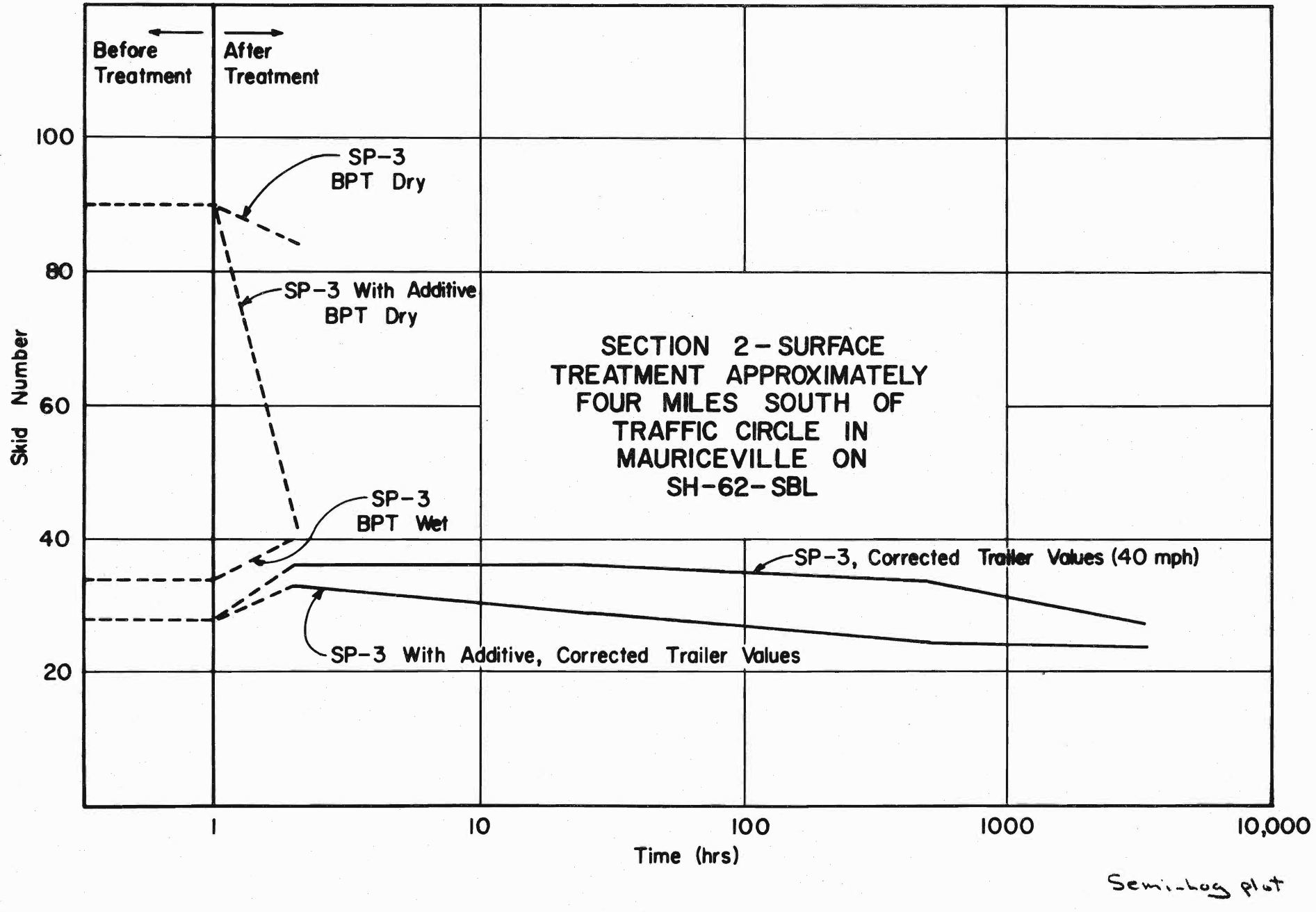
VALUES BEFORE AND AFTER SP-3 TREATMENT

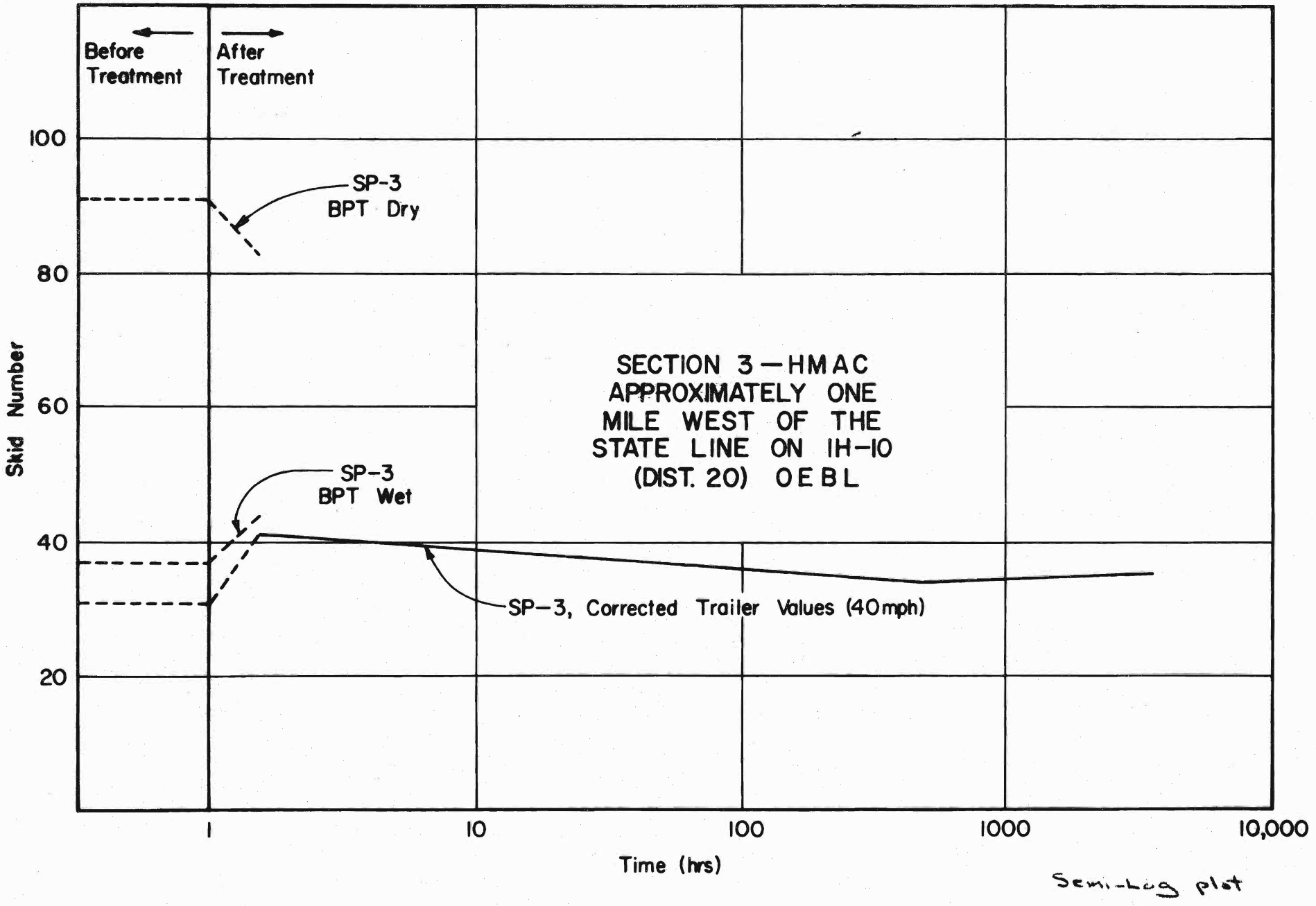
		10:00 P.M. May 30, 1968 Before Treatment		2:00 P.M. May 30, 1968 After Treatment	
Loc.	Section	Dry	Wet	Dry	Wet
1	Control	98	46	91	42
	SP-3	96	44	88	51
	Control (c)	98	46	98	46
	SP-3 (c)	96	44	95	55
2	Control	93	34	95	33
	SP-3	90	34	87	39
	Control (c)	93	34	93	34
	SP-3 (c)	90	34	85	40
	SP-3 + Add.(c)	-	-	41	36
3	Control	90	35	102	39
	SP-3	91	37	95	49
	Control (c)	90	35	90	35
	SP-3 (c)	91	37	83	44
4	Control	95	40	86	38
	SP-3	95	37	88	48
	Control (c)	95	40	95	40
	SP-3 (c)	95	37	97	50

Average Improvement in coefficient of friction on wet pavements is "0.093".



Semi-Log plot


Before Treatment
After Treatment
100
80
60
40
20
Skid Number
SP-3 BPT Dry
SP-3 With Additive BPT Dry
SP-3 BPT Wet
SECTION 2 - SURFACE TREATMENT APPROXIMATELY FOUR MILES SOUTH OF TRAFFIC CIRCLE IN MAURICEVILLE ON SH-62-SBL
SP-3, Corrected Trailer Values (40 mph)
SP-3 With Additive, Corrected Trailer Values
1
10
100
1000
10,000
Time (hrs)
Semi-Log plot


Before Treatment
After Treatment
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Skid Number
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BPT Dry
SP-3
BPT Wet
SECTION 3 — HMAC
APPROXIMATELY ONE
MILE WEST OF THE
STATE LINE ON IH-10
(DIST. 20) OEBL
SP-3, Corrected Trailer Values (40mph)
1
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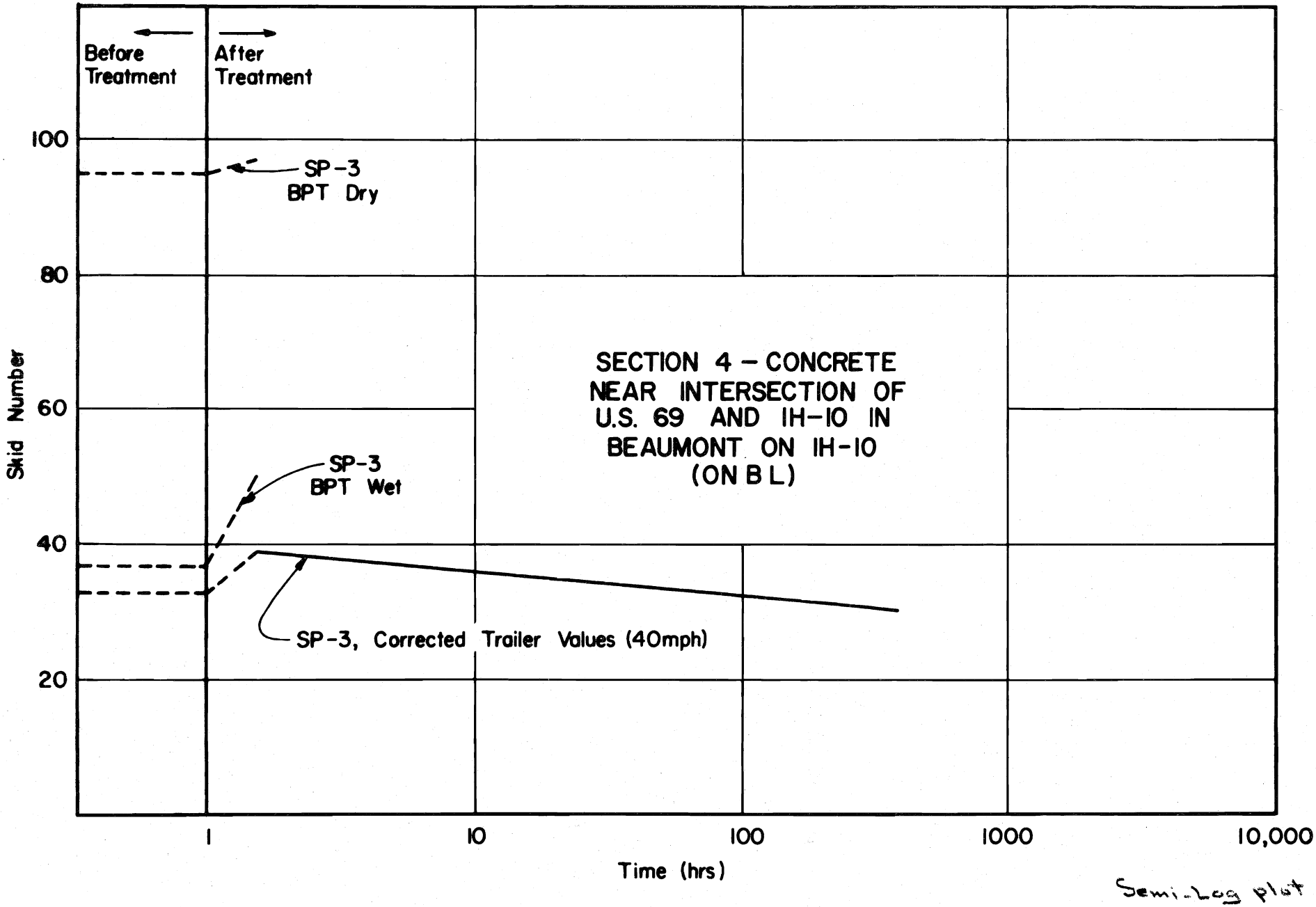
Time (hrs)
Semi-Log plot



Semi-Log plot

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A Brief Message from the Manufacturer to Everyone Concerned with HIGHWAY SAFETY and Our Growing Accident Rate.

We would like to introduce you to a unique new product — one which can greatly increase the safety of the roads and streets in your area: **SP-3 Anti-Slip Roadway Spray.**

SP-3 is an economical product, one that is easy to apply, and a product that has proven its effectiveness. Its application can be handled by your present personnel — no special training is necessary, if instructions are followed.

Enclosed are typical questions from among thousands we have received about SP-3, and we believe we have answered them to complete satisfaction. We have gone into some detail in this compilation of factual material, but if you still have unanswered questions, we welcome your inquiry.

Some cities and towns are instigating yearly full scale de-slicking programs for their streets. Should you desire, we will be happy to work with you or your traffic engineering department in preparing such at program at no cost to you.

For any further information you may write:

SLIP-PRUF SERVICE CORPORATION
P.O. Box 534
Baton Rouge, Louisiana 70821

You owe it to the citizens of your community to be constantly protective of their safety!

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Question: "What Is SP-3?"

SP-3 is an anti-slip roadway spray — called by many a "De-Slicking compound" — manufactured as a product designed to increase traffic safety by improving the skid resistance of road and highway surfaces to reduce wet weather skidding accidents.

SP-3 is a liquid concentrate, which is mixed with water in specified proportions and is sprayed onto roadway surfaces. Liquid SP-3, acidic in nature, is absorbed by the road surface, leaving it skid resistant **when wet. SP-3 is not a topping, not a coating, and leaves no visible change to the surface after application.** It is designed to give increased traction to vehicular traffic on wet, slippery roadway surfaces without altering the original appearance of the surface.

SP-3 is a specially formulated product which, when applied to worn or smooth pavements, of concrete or asphalt, reduces their wet-skid properties up to 90 per cent.

Question: "What Does SP-3 Do?"

MOST IMPORTANT. IT SAVES LIVES!

SP-3 is a revolutionary new product developed by the Slip-Pruf Service Corporation of Baton Rouge, La., which cuts skidding on wet surfaces, and increases traction by increasing the coefficient of friction on wet slippery roads.

HERE ARE PROBLEMS FACED IN
ATTEMPTING TO REDUCE ACCIDENTS
CAUSED BY SKIDDING AND SLIPPING
ON RAIN-WET ROADS

SKIDDING: Newest figures reveal that skidding is the primary cause in from 35 per cent to 40 per cent of all accidents. What causes skidding? One big reason is worn, smooth, polished pavements. And these pavements become smooth because of the increased traffic density throughout the United States today. These smooth roadways become even worse during wet weather. With the application of SP-3, on slippery roads, skid resistance is improved greatly when the surface is wet.

THERE ARE MORE CARS ON OUR HIGHWAYS: And these cars' tires all act as polishing agents for our roadways. Personal danger is increased with the passage of every car over a given strip of highway — particularly in areas where rainfall is a constant traffic safety problem.

ANY ROADWAY IS MORE HAZARDOUS WHEN WET: And all the more reason for seasonal applications of SP-3!

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Question: "How Is It Packaged?"

SP-3 Anti-slip Roadway Spray concentrate is packaged in 5-gallon disposable plastic containers, each equipped with a pouring spout. The container is packaged for shipment, and has a gross weight of 55 pounds.

SP-3 is sold only in 5-gallon containers only .

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Question: "How Is It Mixed?"

SP-3 Anti-Slip Roadway Spray is a concentrate, coming in 5-gallon plastic disposable containers equipped with pouring spouts.

Each container of 5 gallons of concentrate is to be mixed with 45 gallons of water, making a total of 50 gallons of roadway spray. Five gallons of SP-3 concentrate, after dilution, will service a minimum of 10,000 square feet of roadway surface.

Question: "How Is It Applied?"

SP-3 Anti-Slip Roadway Spray is easily applied by use of a 10-foot or 12-foot gravity flow spray bar attached to any convenient-sized container, ranging from a 500-gallon tank to one of 5,000 gallon size.

SP-3, as supplied, is in concentrated form, as mentioned in the previous section. It is mixed in proportion, nine (9) parts of water to one (1) part SP-3 — five gallons of concentrate with forty-five gallons of water. This produces fifty (50) gallons of roadway spray. The inexpensive tank supplied is coated internally to prevent alteration of the chemical composition of the material. **The mixing tank should be filled approximately half-full of water** (in the proportions above) **before pouring in the SP-3 concentrate.** Then the remainder of the water should be poured in, assuring a uniform mixture.

The spray bar attachment supplied dispenses the diluted mixture in the proper amount onto the roadway surface, through gravity flow. **For maximum coverage,** the spray bar is situated **18 inches from the surface,** and sprays an area 10 feet wide when the vehicle carrying the tank travels from 3 to 5 miles per hour. The spray holes are 3/16″ in diameter, and spaced 1 inch apart on center.

SP-3 should be applied so as to only uniformly wet the surface. The speed of the carrying vehicle should be adjusted to produce the desired results. The liquid is absorbed almost immediately by the roadway surface, and as soon as no excess material remains on the surface, the treated area can be re-opened to traffic.

Square-foot coverage for SP-3 in diluted form is 10,000 square feet per 5-gallon unit diluted.

Ease and Swiftness of Application

Question: "What Equipment Is Needed?"

The major equipment is also listed in the cost section. It is as follows:

A truck — ranging from a flat-bed to a dump truck.

A tank — the 500 gallon tank supplied is usually sufficient for normal use. The larger 1,000 or 5,000 gallon sizes, of course, allow for greater coverage of additional miles of roadway surfaces. Any of the three sizes may be ordered. The inside of the tank is coated to prevent chemical alteration of the diluted concentrate, and the outside is painted light green, imprinted with the insignia of the company.

SP-3 solution — SP-3 Anti-Slip Roadway Spray is manufactured in concentrate form, to be diluted with water in the proportions of 9 to 1. One unit of concentrate (5 gallons) will, with 45 gallons of water, make 50 gallons of spray solution.

Spray-bar attachment — This item, also supplied by the spray manufacturer, allows for best possible dispensation of spray onto the roadway. The bar is designed to meet height-from-surface requirements of a minimum of 18 inches from the roadway, and to give the surface a uniform wetting.

NOTE: We supply tank and equipment of specified design, and recommend that it be used to btain maximum effective coverage. For anyone desiring to manufacture their own equipment, we will furnish specifications. **See Cost Sheet on equipment.**

Question: "Is SP-3 Safe for Maintenance Personnel To Use?"

When pouring the material in a concentrated form into the tank, rubber gloves and a full length rubber apron should be worn as a precautionary measure, due to the acidic nature of the compound. In case of spillage on the skin, wash for at least fifteen minutes with cool water. If care is taken in handling, no injury from personal contact should result. **The concentrate is packaged in plastic, disposable containers, and each is equipped with an attached flexible pouring spout,** to assure safety in handling. Rubber footwear and rubber gloves must be worn by anyone who operates the flow rate valve on the tank, or who is subjected to prolonged exposure to the treated surface.

Normal safety precautions, such as those used when handling any compound of a chemical nature, should be practiced.

Question: "How Long Does an Application Last?"

When applied to surfaces as instructed, SP-3 Anti-Slip Roadway Spray is guaranteed effective for a period of six months after application.

For ordinary surfaces, a single application once a year is sufficient, but where the traffic count is more than 20,000 vehicles per day, the surface should receive two applications every year. The spray works equally well on portland-cement concrete, asphalt, aggregate, brick and other smooth surfaces.

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Question: "Where Is SP-3 Needed?"

All roadways are hazardous when wet — and some are more so than others, depending on the smoothness of the surfaces and the amount of traffic to which they are subjected. Although there are many types of equipment which measure the skid resistance of roadway surfaces, the use of this equipment and the employment of these tests are often very costly and very time consuming, particularly over more than a few miles of a suspect roadway system. One manner which is simple, and which has been used successfully, **is to take a given area and compare the accident rates of that area during a typically dry month with the given accident rates of the same area during a typically wet month.** Accident maps and statistics are usually up-to-date, and where an area shows an increase in accidents during a wet month — THAT AREA NEEDS SP-3!

City, state and other government officials already have a pretty good idea of which streets and highways under their jurisdiction are really dangerous when wet. The comparison of the figures above is a simple — and effective — way of emphatically underscoring the need for SP-3.

Question: "Has Any Testing On Effectiveness Been Done?"

SP-3 has been tested extensively, both in the laboratory and in the field during the past two years, by cities and states. The testing mentioned in the section immediately foregoing — the simple tests that indicate where SP-3 is needed — was also conducted on a state-wide basis for the state of Louisiana in preparing a full scale de-slicking program.

Results are also available from various cities and states now using SP-3. It has been proven by users of SP-3 that it is equally effective on concrete, bituminous, brick, and roadways which have other kinds of surface treatments.

Question: "How About Performance?"

SP-3 Anti-Slip Roadway Spray has been used effectively in areas throughout the United States. Reprints of stories carried in national magazines are shown in the back of this folder. The manufacturer is currently in the process of compiling performance data where these are obtainable, and will publish a supplement to this collection of information when the compilation of data has been completed.

SP-3 has been widely publicized as the leading solution to the rising problem of slippery roads. Slip-Pruf Service Corporation wishes to extend their deepest gratitude to the following publications and their editors for their cooperation in the highway safety program, in making known the information on the problem of slippery-when-wet roadways:

AMERICAN CITY
BETTER ROADS
RURAL AND URBAN ROADS
ENGINEERING NEWS RECORD
CHEMICAL WEEK
AMERICAN ROAD BUILDER
NEWARK STAR-LEDGER
MUNICIPAL NEWS
WASHINGTON POST
HIGHWAY RESEARCH NEWS
AND MANY OTHERS.

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Question: "What Are The Effects On Paints and Joint Fillers?"

Exhaustive testing has been done on the effects of SP-3 on center stripe paints and the various types of joint fillers. Findings have shown there are no effects on either of these. Tests conducted on automobile paints exposed to SP-3 for long periods reveal no change or damage to enamel paints. Acrylic paints showed discoloration when exposed for long periods; however, under use conditions, it is highly improbable that any vehicle would be exposed for a period of more than a few moments, which would not be harmful.

Question: "Does The Application of SP-3 Require Specially Trained Personnel?"

SP-3 can be applied by unskilled maintenance personnel following simple and easy application instructions.

Question: "What About Weather Conditions During Application?"

SP-3 should not be applied when the air temperature is above 85 degrees Fahrenheit, or when the pavement temperature exceeds 90 degrees Fahrenheit, or is below 27 degrees Fahrenheit.

SP-3 should not be applied when water is present on the surface, or when the roadway surface is wet.

SP-3 should not be exposed to rain or other water sooner than 30 minutes after application.

Question: "What Cleanup Is Required After Application?"

After the application of SP-3, the container, spray bar, or other equipment used should be thoroughly flushed with water. Unused material should not be stored in the tank overnight, to avoid deterioration of the material.

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Question: "How Long After Application Can a Treated Section Be Opened to Traffic?"

All areas to which the material has been applied should be protected from traffic until surface material has penetrated. This varies with temperature and humidity conditions; however, usually only a matter of 3 or 4 minutes drying time is necessary. 20 minutes after application any SP-3 spray remaining on the surface has a neutral PH of 7 and cannot be reactivated by water.

Question: "What About SP-3 Storage for Future Applications?

SP-3 concentrate can be stored at a temperature to 90 degrees below zero, or not in excess of 135 degrees Fahrenheit. It is recommended that the material normally be stored in a cool place.

The shelf life of SP-3 concentrate is indefinite, provided the container remains sealed.

Other equipment, after cleaning, may be stored in ordinary equipment and supply storage rooms or sheds, after flushing with water.

Question: "Do You Have Any Information On Federal Laws Governing Requirements For Highway Safety?"

A reprint of Public Law 89-564, the Highway Safety Act of 1966, is attached for your information. It is felt that not too many citizens are acquainted with the provisions of this law, and sections of particular importance to city and government officials are underscored for your special attention. Please read this document carefully for fullest comprehension.

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Question: "What Does It Cost?"

SP-3 costs approximately 3 cents per square yard.

Quantity prices for SP-3 Anti-Slip Roadway Spray, in 5-gallon units (5 gallons = 1 unit), are as follows:

20 - 50 Units	$37.50	per unit
51 - 100 Units	36.25	per unit
101 - 250 Units	35.00	per unit
251 - 350 Units	32.50	per unit
351 - 500 Units	31.25	per unit
501 - up Units	30.75	per unit

TERMS:

1% — 10 days
NET — 30 days
F. O. B. Baton Rouge, Louisiana

EQUIPMENT NECESSARY AND COSTS:

Tanks: 500 gallon (12 gauge Steel, coated) Round $135.00
(52 inches diameter, 64 inches high)

1000 gallon (12 gauge Steel, coated) Round..... $256.00

Spray Bar: One spray bar attachment complete with cutoff valve and union. Sprays area 10 feet wide at 3 to 5 mph. $ 45.00

PLEASE NOTE: Five gallons of SP-3 Concentrate to be diluted in 45 gallons of water to make total of 50 gallons of roadway spray.

Question: "What Are The Specifications for Bidding On The Purchase of a Quantity of SP-3?"

GENERAL SPECIFICATIONS for de-slicking material are as follows:

A liquid material which can be sprayed onto a roadway surface which will render said surface slip-resistant when wet. Material shall be designed for use so that no prior cleaning or preparation will be necessary and no change in appearance of surface will be made after application. Material shall be such that it can be applied by regular maintenance personnel, using standard equipment. The material should have a short drying time in order that the normal flow of traffic is not to be hindered. Material shall be designed for use on all types of concrete, brick and bituminous surfaces.

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Question: "How Is It Shipped?"

SP-3 Anti-Slip Roadway Spray is shipped F.O.B. Baton Rouge, Louisiana, your designated means of transportation. The spray concentrate is packaged in 5-gallon disposable plastic containers, packaged for shipment, weighing 53 pounds. SP-3 is sold in 5-gallon containers only. The concentrate is to be mixed in the proportions: 5 gallons of SP-3 concentrate to be diluted in 45 gallons of water to make total of 50 gallons of roadway spray.

Application equipment is shipped F.O.B., Baton Rouge, also.

Question: "Where Do I Buy SP-3 and Get a Demonstration of an Application?"

SP-3 is being distributed world-wide through distributors located in most areas. For information on distributor in your area, please write us:

SLIP-PRUF SERVICE CORPORATION

P. O. Box 534, 1911 N. Fourth Street

Baton Rouge, Louisiana 70821

NOTE: For anyone who wishes assistance in preparing a de-slicking program for his town, city, county or state, the manufacturer or distributor will prepare such a program at no cost to the department.

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NOTE:

The Slip-Pruf Service Corporation specializes in the development of new products for the roadway industry.

★ ★ ★

We solicit your questions about any particular problems you may be having with any materials you may be using. We will make every effort to obtain a satisfactory solution to your problems.

★ ★ ★

Ask us about our product which **eliminates peeling and chipping of roadway paints.**

★ ★ ★

Let us also show you our new reflective roadway markers which are **mechanically installed in seconds.** These proved markers can save you over 100 per cent as compared to any other type marker.

Give us your problem . . .

We will give you a solution . . .

. . . With a smile.