COMPARATIVE PROPERTIES OF AGGREGATES FOR SURFACE TREATMENTS CONSIDERED FOR USE IN DISTRICT 1

TOM S. PATTY
GEOLOGIST II

3-20-71-022 (1)
SUPPLEMENTAL REPORT

TEXAS HIGHWAY DEPARTMENT

COMPARATIVE PROPERTIES OF AGGREGATES FOR SURFACE TREATMENTS CONSIDERED FOR USE IN DISTRICT I

by

Tom S. Patty
Geologist II

Materials and Tests Division
Texas Highway Department

3-20-71-022(1)
Supplemental Report
July 1972

Supplement to Report 3-20-71-022(1)

"Comparative Properties of Aggregates for Surface Treatments Considered for Use in District 1"

SCOPE

The following information is issued as a supplement to the report, "Comparative Properties of Surface Treatments Considered for Use in District 1," 3-20-71-022(1), by Tom S. Patty, issued August 1971. Polish Values reported in above report were found to be high due to a fault in the British Portable Tester (BPT).

The BPT mode of operation is first discussed, the repairs made described, and a calibration program is also discussed. New versions of Table I on page 12 and Figure 2 on page 13 of the above report are included and discussed. Only Polish Value information will be treated in this supplement.

BRITISH PORTABLE TESTER: OPERATION, REPAIR AND CALIBRATION.

The BPT is a portable instrument which may be used to determine a relative friction number (not a coefficient of friction). A pendulum containing a spring loaded rubber foot is allowed to swing across the test surface so that the foot skids on the specimen a specified distance. The height of swing of the pendulum past the specimen is measured on a scale of 0 to 150; where 0 is the value for no contact between the foot and the surface. Friction between the foot and the test surface cause a lower height of swing and a BPT value greater than 0. The foot is pivoted in two ball bearings and is loaded by a spring through a lever hinged on other bearings. Friction in any of these bearings will cause the BPT value to increase over that caused by the test surface alone.

A linear regression analysis between the BPT used for the above report and a new BPT using 18 sets of specimens has shown the following relation between the old and correct values.

Correct Value = 0.7(Old Value) +5.0

This correction factor consists of two parts, a constant value and a value proportional to the correct BPT number.

The older BPT was completely disassembled, three defective ball bearings were found and replaced, and the entire assembly cleaned. After reassembly and recalibration according to ASTM Designation E 303, "Measuring Surface Frictional Properties Using the British Portable Tester," and Test Method Tex 438-A, "Accelerated Polish Test for Coarse Aggregate," a regression analysis between the original BPT and the new BPT gave a correction factor that was insignificant in the range of values normally tested, i.e., from 20 to 50.

A regular periodic calibration program has been initiated to prevent a reoccurrence of this type of error. In addition, a study will be made on development of improved methods of calibration.

DISCUSSION

It should be noted that not all values reported previous to the subject report issued for District 1 are in error. Errors seem to have been gradually increasing over a period of several months. Furthermore, it is difficult to put definite limits on the accuracy of this type of test. A sample may conceivably represent only a portion of a source and the nature of the

material supplied may change in only a short distance within that source. In order to minimize the variation in testing, Test Method Tex 438-A specifies a minimum of seven specimens to be prepared and tested. In addition, the Polish Value reported for each source is an average of five to eight readings of the BPT on each of the seven specimens. The rebuilt BPT now reads more consistantly in agreement with the newer instrument than previous to the finding of the defective bearings.

Corrected versions of Table I and Figure 2 follow. Note that in a few cases, the order of rank of some of the sources is changed from the previously reported values. Although the previous values were high, since most of the error was proportional to the correct BPT value, order is not changed except for sources whose values were close to one another. This apparently reflects the statistical variation in the test and an inherent tolerance in absolute BPT Polish Values.

TABLE I

Source	Rock Type	Polish Value	L.A. Abrasion
TXI - Dallas	Expanded Shale	51	21 (7)*
Featherlite-Ranger	Expanded Shale	44	21 (8)
TXI - Eastland	Expanded Shale	44	20 (12)
Gifford-Hill - Lone Star	Blast Furnace Slag	41	36 (18)
White's - Uvalde	Limestone Rock Asphalt	38	**
Trinity - Stringtown	Cherty-Dolomite	37	20 (24)
Vulcan - Denison	Argillaceous Limestone	37	37 (14)
Dolese - Bromide	Cherty-Dolomitic Limestone	34	26 (12)
White's - Knippa	"Trap Rock" Basalt	34	14 (10)
TXI - Bridgeport	Limestone	31	28 (15)
Lone Star - Bridgeport	Limestone	31	25 (9)
Vulcan - Bridgeport	Limestone	31	26 (9)
Gifford-Hill - Durant	Dolomite	29	**
Trinity - Chico	Limestone	28	24 (18)
Gifford-Hill - Chico	Limestone	28	25 (15)
Choctaw - Hugo	Siliceous Gravel	26	21 (6)
Gifford-Hill - Texarkana	Siliceous Gravel	26	23 (15)

* Number of Abrasion Tests.
** Data Unavailable.

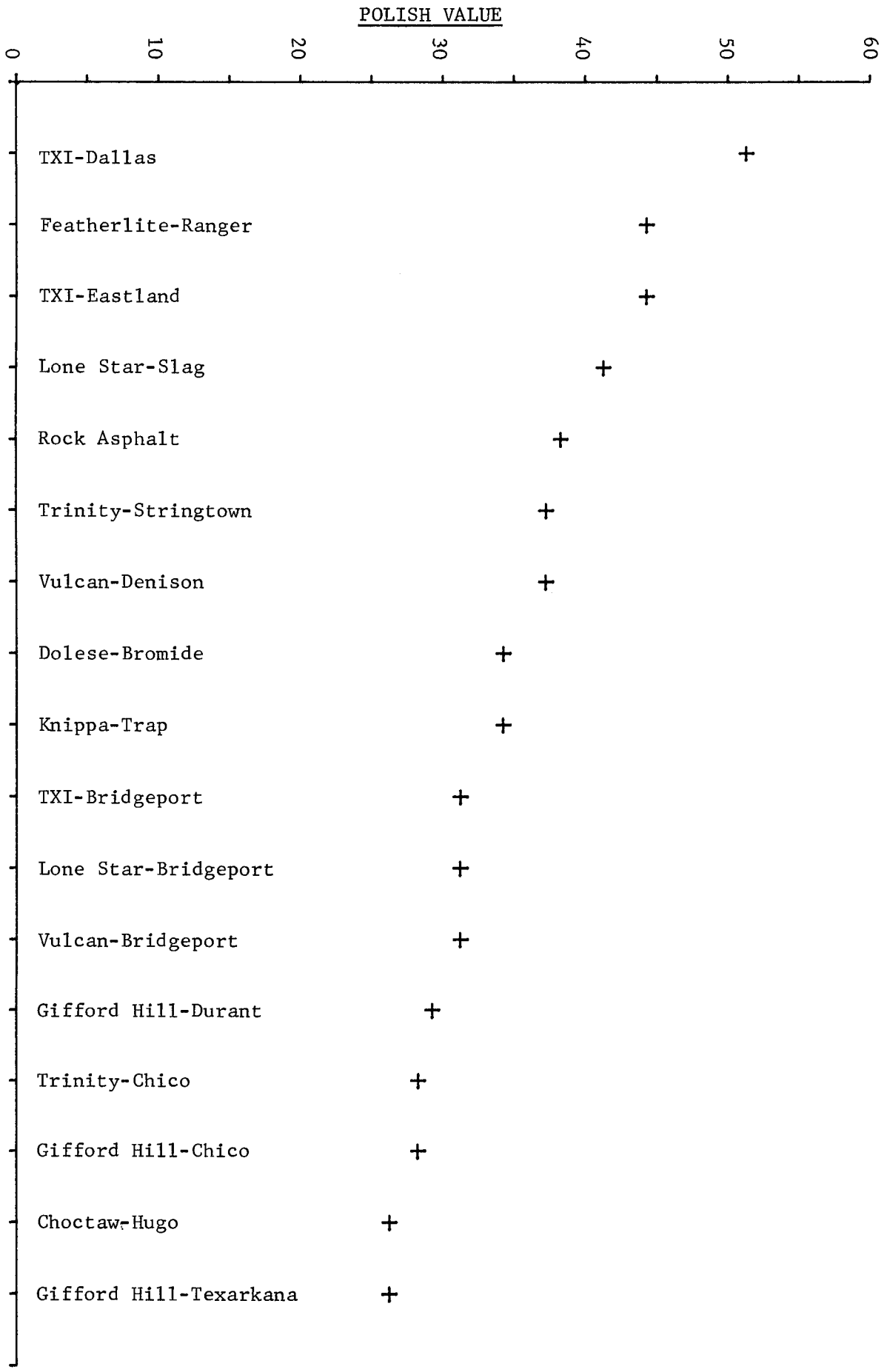
POLISH VALUE
0
10
20
30
40
50
60
SOURCE
TXI-Dallas
Featherlite-Ranger
TXI-Eastland
Lone Star-Slag
Rock Asphalt
Trinity-Stringtown
Vulcan-Denison
Dolese-Bromide
Knippa-Trap
TXI-Bridgeport
Lone Star-Bridgeport
Vulcan-Bridgeport
Gifford Hill-Durant
Trinity-Chico
Gifford Hill-Chico
Choctaw-Hugo
Gifford Hill-Texarkana

Figure 2