

NPAEN-AR

16 September 1966

SUBJECT: Report on Corrosion of Haines 8" Petroleum Pipeline from
MP 2+2500' to MP 3+3900'

TO: Commanding Officer
USARAL Support Command
ATTN: ARCL-F
APO U. S. Forces 98749

1. Reference is made to our letter dated 8 September 1966, subject as above.
2. Forwarded are corrected copies of report transmitted by referenced letter. Certain technical changes have been made to the original conclusions and recommendations.

FOR THE DISTRICT ENGINEER:

1 Incl (dupe)
ss

WJ
WARREN GEORGE
Chief, Engineering Division

Copy furnished:
Elec Sec with incl
Mech (POL) with incl
F&M with ~~incl~~
PEAR with incl

15 Sep 66
ENGR *Jess*
George

Jess
Mr. Herrle/skr/754-5214
OREC: Engr Div

REPORT ON CORROSION OF HAINES 8" PETROLEUM PIPELINE
FROM MP 2 + 2500' TO MP 3 + ~~2500'~~
3900'

2 September 1966

FOREWARD: The inspection of that portion on the main 8" petroleum pipeline adjacent to and above the City of Haines, Alaska was authorized by instructions contained in the following:

a. Telephone conversation between Mr. Mayo, PDD; Mr. Anderson, NPA; and Mr. Knoppe, NPA, dated 16 August 1966.

b. PDD requested the Alaska District to inspect uncovered sections of the mainline 8" petroleum distribution line and recommend corrective measures to insure safety of the pipeline facility and suggest corrective measures to overcome existing corrosive conditions, together with an estimate of design and construction cost.

SUMMARY: That portion of 8" pipeline contained between MP 2 + 2500' and MP 3 + 90' has corroded to the extent that replacement with new plastic coated pipe is required to prevent future line ruptures during fuel pumping operations.

FIELD INSPECTION: A field trip to Haines, Alaska was made by Mr. James Turnbull, NPA, 18 Aug 1966 to determine the extent of pipeline corrosion on the 8" mainline adjacent to and above Haines, Alaska, and to ascertain corrective measures deemed necessary to correct the present condition and to prevent future damage. Six test pits uncovering the pipe were dug in suspected corrosive areas by PDD personnel under the direction of Mr. Harry Young, Haines Terminal Superintendent. The location of each pit is shown on Plate I. Pit depths resulting from corrosion were measured in each of the six locations and on a section of the pipe exposed behind Dr. Allen's house. Soil resistances were determined at 2' and 5' depths at each test location. Test results are shown in the following table:

TEST LOCATION NUMBER	MILE POST LOCATION	*PIT DEPTHS INCHES	SOIL RESISTANCE	
			OHMS	DEPTH, FT
1	2 +4200'	.040, .057, .062, .077, .113, .117, .120	14,000	2
			9,000	5
2	2 + 3700'	.057, .075, .077, .080	57,000	2
			94,000	5
3	2 + 3200'	.050, .060, .062, .065	115,000	2
			96,000	5
4	2 + 2500'	.030, .032, .035, .040	367,000	2
			470,000	5
5	3 + 2500'	None noticeable	33,300	2
			19,000	5
6	3 + 3900'	Series of .030' on top of pipe	122,000	2
			65,000	5
7	Dr. Allen's House	.040, .050, .060, .071, .073	8,800	5
			4,980	2

*In view of the high soil resistance measured, pitting type corrosion may be attributed to corrosive soluble gasses such as oxygen and carbon dioxide contained in the surface water flowing adjacent to the pipe from approximately MP 2 to MP 3. All measurements were taken from existing pipe.

CONCLUSIONS: The 8" pipe in that section of the line inspected has a nominal wall thickness of 0.277". The maximum depth of pits measured indicates a corrosion loss of 43% of the wall thickness in areas from ½" in diameter to 1" in diameter. The design analysis for 1440 PSI operation provides maximum allowable hoop stress of 72% of the 30,000 PSI yield strength in accordance with ASA B31.4. At the present time, this hoop stress has been reduced to a point where additional corrosion could result in failure during pumping operations. Cathodic protection with small sacrificial anodes is not considered practical since the only location where the soil resistance is low enough to insure adequate current flow is at the 2' depth of Test Hole No. 7 where the measured resistance is 4,890 ohms. Multiple magnesium ribbon anodes parallel to the pipe

may provide some protection in areas having a soil resistance of 10,000 ohms or less. Since relatively low resistance values cover only 3 of the 7 areas tested, complete protection could not be assured. Imprest current utilizing graphite or proprietary type anodes could be used for pipe protection but would involve undesirable maintenance problems.

RECOMMENDATIONS:

a. Replace mainline 8" pipe from Mile Post 2 + 2500' to Mile Post 3 + 00' with new API 5L Grade A steel pipe factory coated with extruded polyethylene sheath, adhesive thickness 0.010-inches, plastic thickness 0.054-inches thick and conforming to requirements of Federal Spec. L-C-00530 (ARMY-MO.)

b. Provide drainage fill to a depth of 2' below the pipe daylighting this fill in a ditch or drainage tile structure adjacent to the road at MP 3 + 00'. Fill material should contain no corrosive chemical constituents such as the pyrites contained in the Haines Greenstone.

COST ESTIMATE:

a. Material & Labor in place		
Pipe coated, in place, 3,000' at \$11.65		\$34,950.00
Drainage fill - 1,000 cu yd at \$6.00		6,000.00
b. Contingency - 10%		4,095.00
c. S&A - 6.5%		<u>2,930.00</u>
	Total	<u>\$47,975.00</u>



DEPARTMENT OF THE ARMY
UNITED STATES ARMY, ALASKA SUPPORT COMMAND
APO SEATTLE 98749

ARCO

10 June 1966

Mr. J. B. Fitzgerald
Director, Department of Game
Federal Building
Whitehorse, Yukon Territory, Canada

Dear Mr. Fitzgerald:

This is to advise you that it is intended to start the chemical spray program for control of vegetation on the right of way of the U.S. Army pipeline.

This chemical spray application is to be started near Haines Junction on 6 June 1966.

Sincerely yours,

ALVA T. MCDANIEL
Colonel, Armor
Commanding



RECEIVED

