NATIONAL TRANSPORTATION SAFETY BOARD
Office of Railroad, Pipeline and Hazardous Materials
Washington, D.C. 20594

June 21, 2012

OPERATIONS GROUP STUDY

A. ACCIDENT INFORMATION

Place	:	Marshall, Michigan
Date	:	July 25, 2010
Vehicle	:	30-inch diameter crude oil pipeline
NTSB No.	:	DCA-10-MP-007
Investigator	:	Matt Nicholson, RPH-20

B. EXAMINATION

Line 6B Supervisory Control and Data Acquisition (SCADA) data for pressures at the Marshall and the Griffith pump stations and the volumes at the Griffith and the Marshall flow meters was examined to determine the accumulated volumes recorded on the flow meters following the rupture and during each of the two startups.

C. DETAILS OF THE STUDY

A review of the SCADA data supplied by Enbridge was conducted to examine the volume of oil measured from the flow meters on the day of the rupture and during two startups that occurred on the subsequent shift.

Enbridge provided flow meter information from the two flow meter stations on the mainline (Griffith and Marshall stations) as well as at terminal locations. Flows were examined at Marshall and Griffith and accumulated over the time interval of the SCADA sampling rate to estimate a total volume measured at Griffith (injection) and Marshall (midway along Line 6B) Pump stations. In addition, the discharge pressures at Marshall and Griffith were examined to determine at what times the pumps were started and stopped.

The volumes presented here do not represent the entirety of the oil lost from the ruptured segment but are intended to assign an order of magnitude check against the total release volume reported by Enbridge.

The results from this data analysis estimates the duration and volume of oil injected into Line 6B during the two startups on July 26, 2010. In addition a volume of oil leaving Marshall following the rupture on July 25, 2010 is quantified. This analysis does not attempt to quantify a total release from Line 6B. The analysis would have to account for losses through the rupture due to gravity or potential siphon effects. The attached plots are expressed in terms of flow rate and cumulative flows with adjacent plots showing pressures at Marshall and or Griffith pump stations. The intent is to synchronize flows on the meters with the operation of the pumps at these stations.

1. Summary of Data Sources

SCADA data was provided by Enbridge under separate information requests. These included:

- IR 1.9: Pressures, station data and set points for all of the Pump stations along Line 6B
- IR 118: All flow meter data from July 25 through July 27, 2010 for Line 6B.

Refer to the attachments for source data. The data was imported and combined into a single Excel spreadsheet. Times were adjusted to reflect Eastern daylight times. The data was plotted and accumulated volumes converted to gallons.

Flow rates are plotted as cubic meters per hour. Cumulative flows are presented in gallons. One cubic meter equals approximately 264.17 gallons. None of the data was adjusted for pressure or temperature.

D. Volumes injected into Line 6B following the rupture and during the July 26, 2010 startups

The data shows that a volume of 54,178 gallons was recorded across the Marshall flow meter following the rupture on July 25, 2010. This liquid was moving through the pump station after the loss of the Marshall Pump and line break (refer to attachment F).

The SCADA data indicates that a combined volume of over 683,000 gallons was injected into Line 6B during the two start attempts on July 26, 2010. The two tables below summarize all of the findings from the plots in attachments D, E and F:

Total volumes of oil recorded on the flow meters[a] at Griffith Terminal and Marshall PS	
Date and location of reading	**Total accumulated flow (gallons)**
July 25, following the rupture and shutdown (Marshall PS flowmeter)	54,178

Total volumes of oil recorded on the flow meters[a] at Griffith Terminal and Marshall PS	
Date and location of reading	**Total accumulated flow (gallons)**
July 26, first start attempt (Griffith Terminal injection)	439,124
July 26, second startup attempt (Griffith Terminal injection)	244,312
TOTAL	**683,436**

[a] Flow meters were installed at the injection sites and delivery sites but at only one location (Marshall Pump Station) along the mainline.

E. ATTACHMENTS

Volume injected SCADA Study – Attachment A
Information Request 1.9 Line 6B Marshall Pump Station SCADA data

Volume injected SCADA Study – Attachment B
Information Request 1.9 Line 6B Griffith Pump Station SCADA data

Volume injected SCADA Study – Attachment C
Information Request 118 Line 6B Flow meter SCADA data

Volume injected SCADA Study – Attachment D
Volume injected into Line 6B during the first startup on July 26, 2010

Volume injected SCADA Study – Attachment E
Volume injected into Line 6B during the second startup on July 26, 2010

Volume injected SCADA Study – Attachment F
Volume recorded on the Marshall flow meter following the rupture and shutdown on July 25, 2010