



James R. Cash

SCADA System



National Transportation Safety Board

Main Functions

- Acquire remote data
- Permit centralized control of pipeline
- Keep historical record of operation
- Provide automated leak detection



Olympic Hardware

- 2 host computers (primary–standby)
- 1 centralized computer control center
- 1 host running automated leak detection
- 2 controller stations (6 displays each)
- Operators/ software developers terminals



Main Menu Screen

COMGAS: 3.6-2 MENU

File Clear Alarm System Navigation Display Graphics Reports Trending

CPU VAX 13 - JUN - 1999 10:52:01
 CRT 005 005

MAIN MENU

MENU.PIC HELP

← PREV FER-20 FER-16 ANA-20 ANA-16 SEG-1 RTN-OLJ CRK-POJ MENU NEXT →

SEGMENT DISPLAYS

CPT - FER
 FER - 16
 FER - 20
 ANA - 20
 ANA - 16
 SEG - 1
 RTN - OLJ
 CRK - POJ
 BLOCK VALVE
 CONFIGURE 16/20
 API GRAVITY

STATION DISPLAYS

CPT	RT1/U4	OLJ
FER	RT1	OLY
ANA	RT2	CRK
BPT	SEA	VAJ
ANA - BPT	ST1	VAN
FER - BPT	ST2	LIN
AL1	TAJ	POR
AL2	TAC	
AL1D	TAS	
AL2D	TSSP	
WDN		

PARAMETERS

DISCRETE
 ANALOG
 ACCUMULATOR
 CALCULATED
 COMMUNICATION
 HISTORIC
 TANK
 METER FACTORS

SUMMARY 1 2

ALARM
 ALARM X 2
 DEACTIVATED POINT
 EVENT
 HISTORICAL DATA
 INHIBITED ALARM
 SILENT ALARM
 TAGGED DEVICE
 CALLOUT LOG
 COMM. % GOOD REPLY
 SCRATCH PAD
 SEATAC TANK STATUS
 STATUS1 (ML STA)
 STATUS2 (JCT - DF)
 ACC - NET BARREL

NEW BAYVIEW STATION MENU

CRT HOURLY LOG

APPLICATIONS

MAINLINE O/S
 SEGMENT I O/S
 SEATAC O/S
 TREND API
 F/C DOWNLOAD DATA
 F/C UPLOAD DATA
 F/C VECTOR NET VOL
 CHANNEL SWITCH
 TREND PRESSURE

LOG FUNCTIONS

MAINLINE - O/S
 SEATAC - O/S
 ALARM
 EVENT - ALARM
 COMMUNICATIONS
 PROVING DATA
 METER FACTOR DATA
 BATCH/DELVY DATA

SYSTEM STATS

COMMUNICATION
 CPA - COMMUNICATION

STARTUP DISPLAYS

FERNDALE 16" - ML
 FERNDALE 20" - ML
 FERNDALE 16" - SEG 1
 FERNDALE 20" - SEG 1
 C POINT 16" - ML
 C POINT 20" - ML
 C POINT 16" - SEG 1
 C POINT 20" - SEG 1
 ANACORTES 16" - ML
 ANACORTES 20" - ML
 ANACORTES 16" - SEG 1
 ANACORTES 20" - SEG 1

PBAK

CLR

ACK

RECALL

CLR

PFOR

FERNDALE BAYVIEW MILEPOST.46 MILEPOST.89 OLYMPIA.DF *OVRFLW 15*

Bayview Terminal Screen

The screenshot shows a terminal window titled "COMGAS: 3.6-2" and "BPTMENU". The menu options are listed in a central box:

- STATION OPERATING SUMMARY
- ANACORTES INCOMING
- FERNDALE INCOMING
- TERMINAL TANKAGE
- STATION SPECIFIC ALARMS
- UNIT MULTILIN ALARMS
- STATION ALARM LISTING
- STATION EVENT LISTING
- ANALOG PARAMETER POINTS
- DISCRETE PARAMETER POINTS
- COMMUNICATION STATISTIC LISTING
- NET BARREL CALCULATIONS
- DISPLACEMENT INFORMATION
- SUMPS AND TANK SPECS
- TREND POKE POINTS

At the bottom of the screen, there are several cyan buttons: PBAK, CLR, ACK, RECALL, CLR, and PFOR. Below these buttons, the following text is displayed:

BAYVIEW
BAYVIEW
FERNDALE MILEPOST.46 MILEPOST.89 OLYMPIA.DF *OVRFLW 15*

Additional information visible on the screen includes:

- File Clear Alarm System Navigation Display Graphics Reports Trending
- CPU VAX CRT 004
- 10 - JUN - 1999 13 : 15 : 45 004
- BAYVIEW TERMINAL MENU

Trend Screen

COMGAS: 3.6-2 TRENDPSI

File Clear Alarm System Navigation Display Graphics Reports Trending

CPU VAX
CRT 005

13 - JUN - 1999 10:53:14
005

PRESSURE TREND MENU

TRENDPSI.PIC

HELP

HELP

← PREV FER-20 FER-16 ANA-20 ANA-16 SEG-1 RTN-OLJ CRK-POJ MENU NEXT →

INDIVIDUAL PSI TRENDS

CHERRY POINT FERNDALE ANACORTES SH ANACORTES TX ANACORTES ML ALLEN 16"

ALLEN 20" WOODINVILLE RENTON DF RENTON SEG1 RENTON ML SEATTLE DF

SEATAC DF SEATAC TERM TACOMA JCT TACOMA DF TACOMA STA OLYMPIA JCT

OLYMPIA DF CASTLE ROCK VANCOUVR JCT VANCOUVER DF LINNTON ML PORTLAND LOC

MILEPOST .46 MILEPOST .56 MILEPOST .66 MILEPOST .87 MILEPOST .89

MILEPOST .CDR SPARE SPARE SPARE SPARE

SYSTEM 1 SYSTEM 2 SYSTEM 3 SYSTEM 4 SYS 1-2-3-4

30 MINUTE 1 HOUR 6 HOURS 12 HOURS 24 HOURS 48 HOURS

SKELETON (CUSTOM) TREND FORMATS

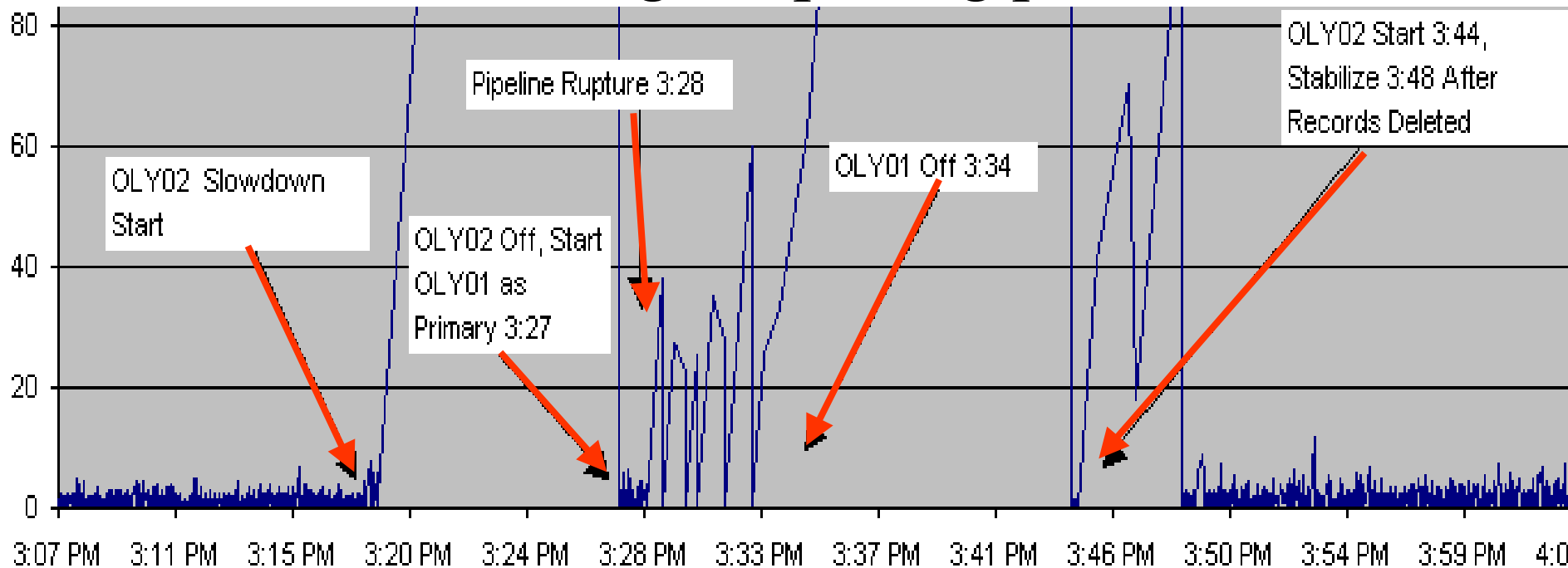
30 MIN 1 HOUR 2 HOUR 3 HOUR 6 HOUR 12 HOUR 24 HOUR 48 HOUR

PBAK CLR ACK RECALL CLR PFOR

FERNDALE BAYVIEW MILEPOST .46 MILEPOST .89 OLYMPIA.DF *OVRFLW 15*

SCADA Data Acquisition

- Polling of various pipeline/station sensors
- Controllers reported slow down near time of rupture
- Noticeable change in polling pattern



Missing Files

- SCADA and computer operating system keep maintenance, security and operating logs
- Computer logs missing from backup computer
- SCADA logs intact
- No explanation for missing files



Security/Outside Tampering

- Some security issues were found
- Common login with all system privileges
- SCADA was connected to outside network
– internet
- No evidence was found to suggest slowdown was caused by outside tampering



SCADA Changes

- Newer more capable computer system
- Multiple control sites
- Secure redundant network
- Firewalls to outside world
- Installed development network

