

Utilization of PI to track Downtime

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ADM Systems Engineering

What is 0.1 % of additional asset availability worth?

Agenda

Introductions

Company Overviews

PI Systems - Scully Mine
 - Pointe Noire

Asset Availability

Downtime Definition

The Downtime Application

Benefits

ADM Systems Engineering Ltd.

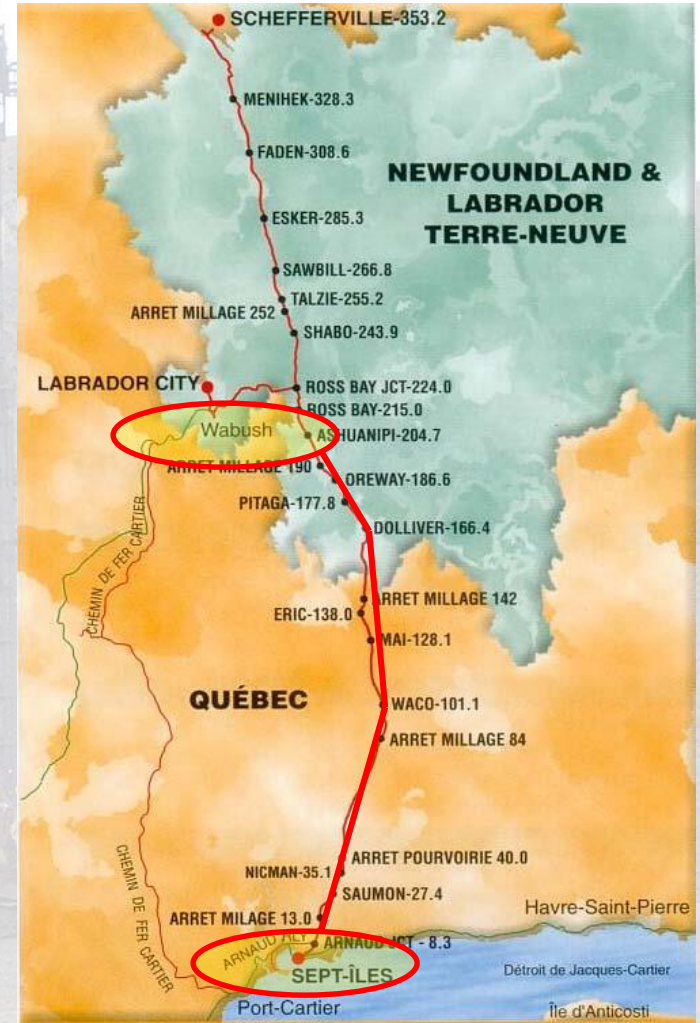
- Focused on
 - Automation
 - Data Management
 - PIMS / RtPM
 - Advanced PI applications
 - Custom Interfaces
- “ADM Downtime System”
 - Bolt on Application for PI-MDB
 - Available in VB6 or .net
 - Readily adaptable to any plant



New Brunswick - Nova Scotia
Newfoundland

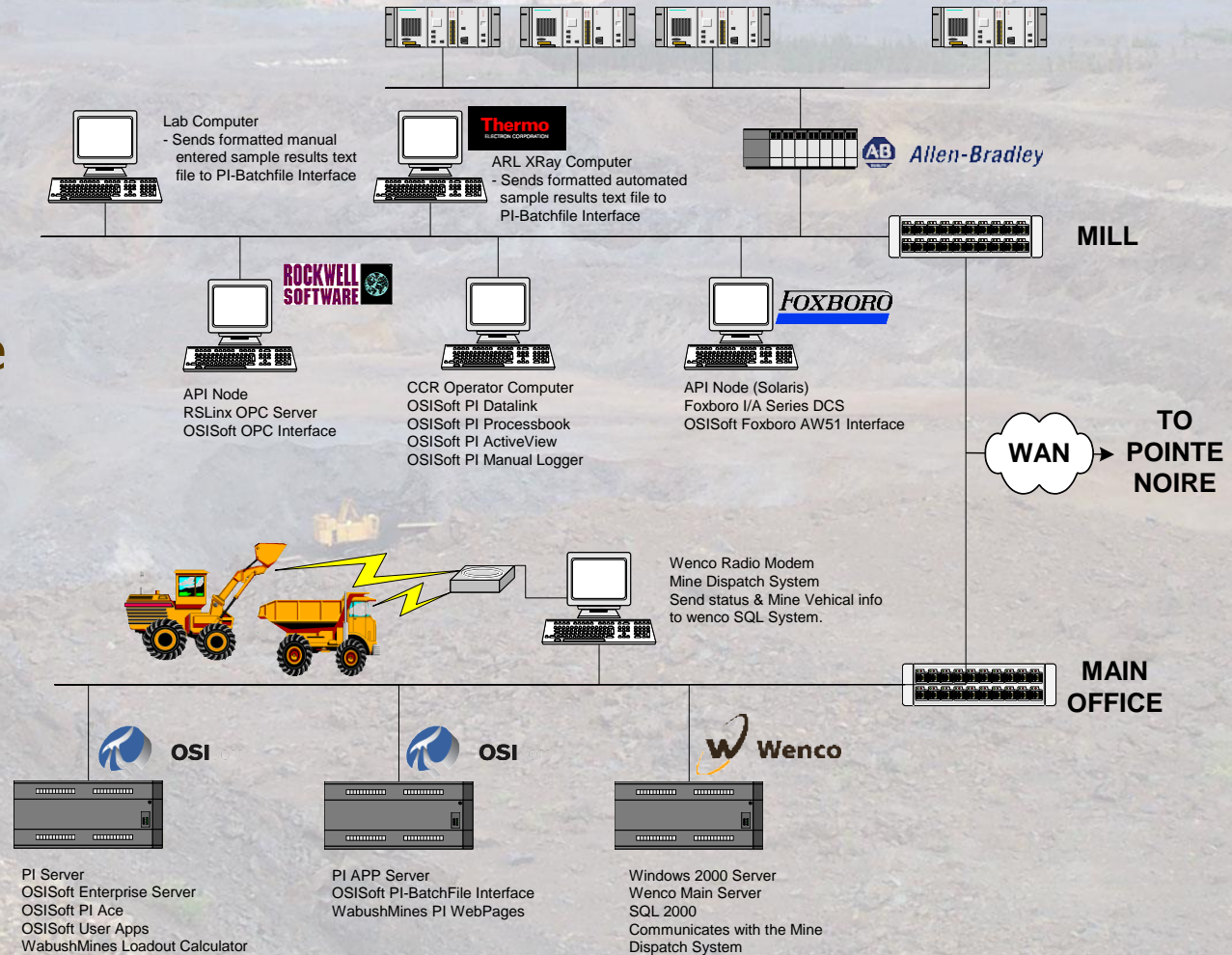
Wabush Mines

- Located in eastern Canada, has the capacity of 6 million tons of pellets annually
- Specular hematite is mined and concentrated at Wabush's Scully Mine, Labrador, Newfoundland
- The dry concentrate is shipped 275 miles in specially designed rail cars to Wabush's Pointe Noire, Quebec pelletizing plant
- At Pointe Noire, the concentrate is rolled into balls and fed to traveling grate furnaces for firing
- Both sites operate 24 hours per day, 7 days per week, except for downtime



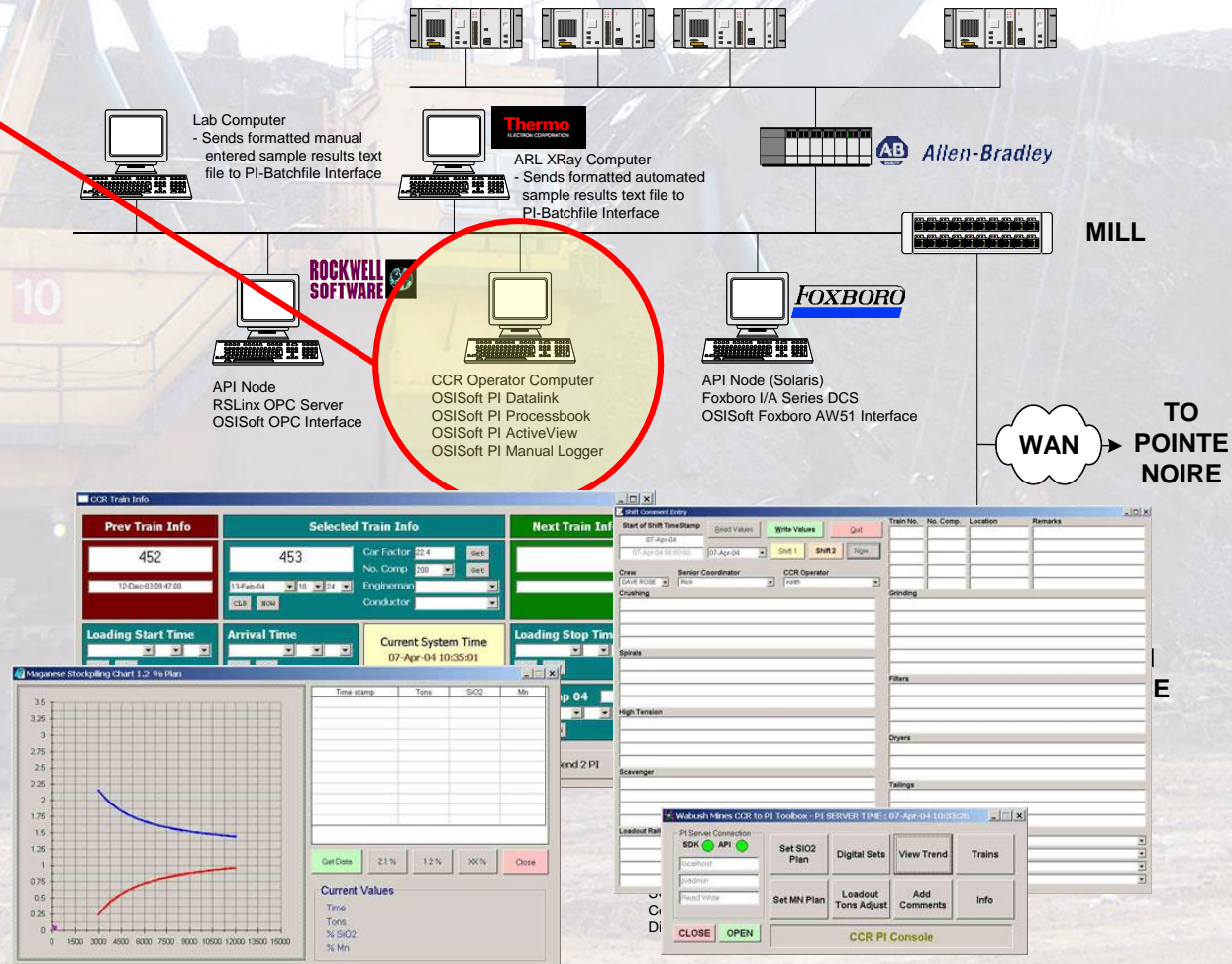
Scully Mine (2001)

- PI-Server (2k Tags)
- PI-Ace
- PI-Foxboro Interface
- PI-OPC Interface
- PI-Batchfile Interface
- PI-Processbook
- PI-Datalink
- PI-ActiveView
- PI-ODBC
- PI-Manual Logger
- PI-SQC



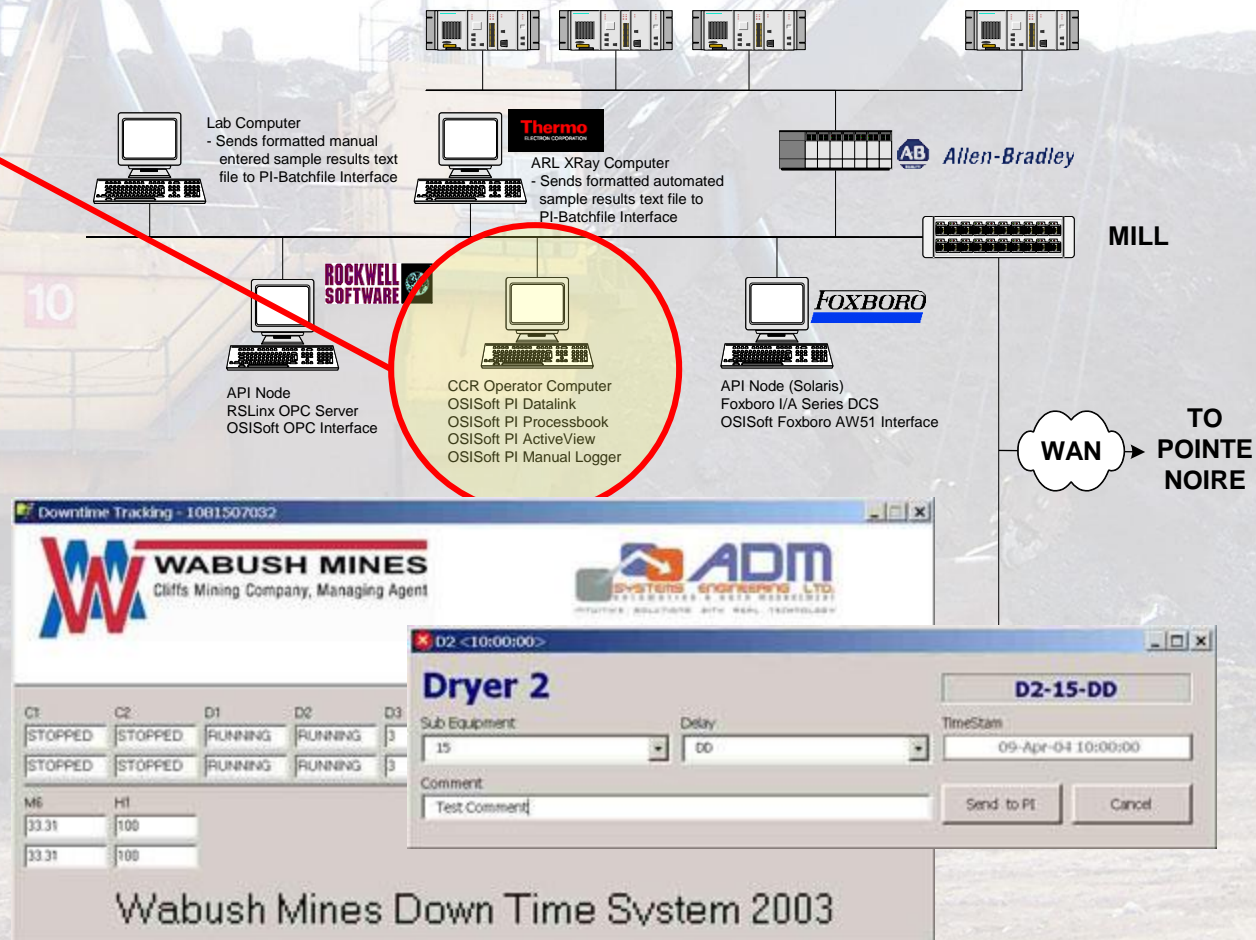
Scully Mine - Applications

- CCR Data Entry
- Downtime System
- WinXRF Lab Data
- Manual Lab Data
- Wenco SQL Link
- Loadout Calculator
- Stockpile Calculator
- Future Data Entry
- Mine Reports
- Mill Reports



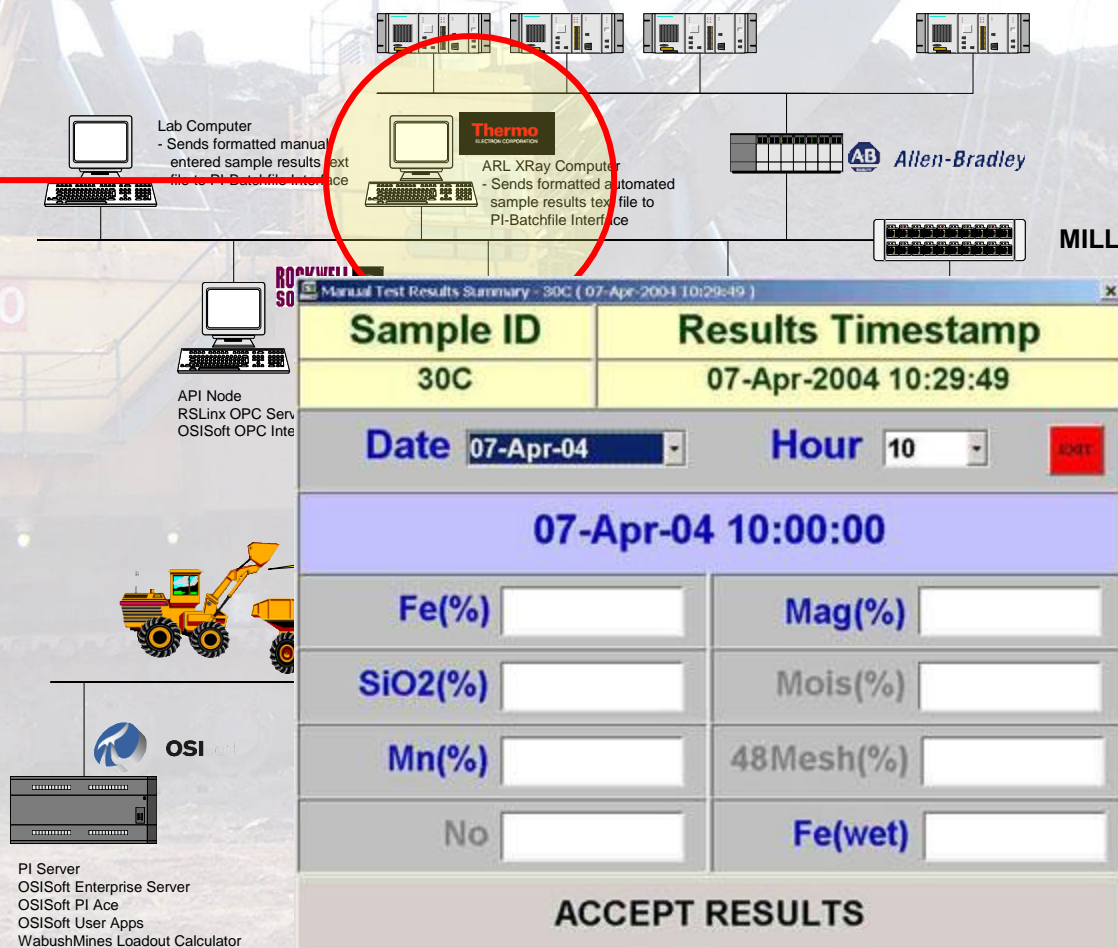
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Manual Test Results Summary - 30C (07-Apr-2004 10:29:49)

Sample ID	Results Timestamp
30C	07-Apr-2004 10:29:49

Date: 07-Apr-04 Hour: 10

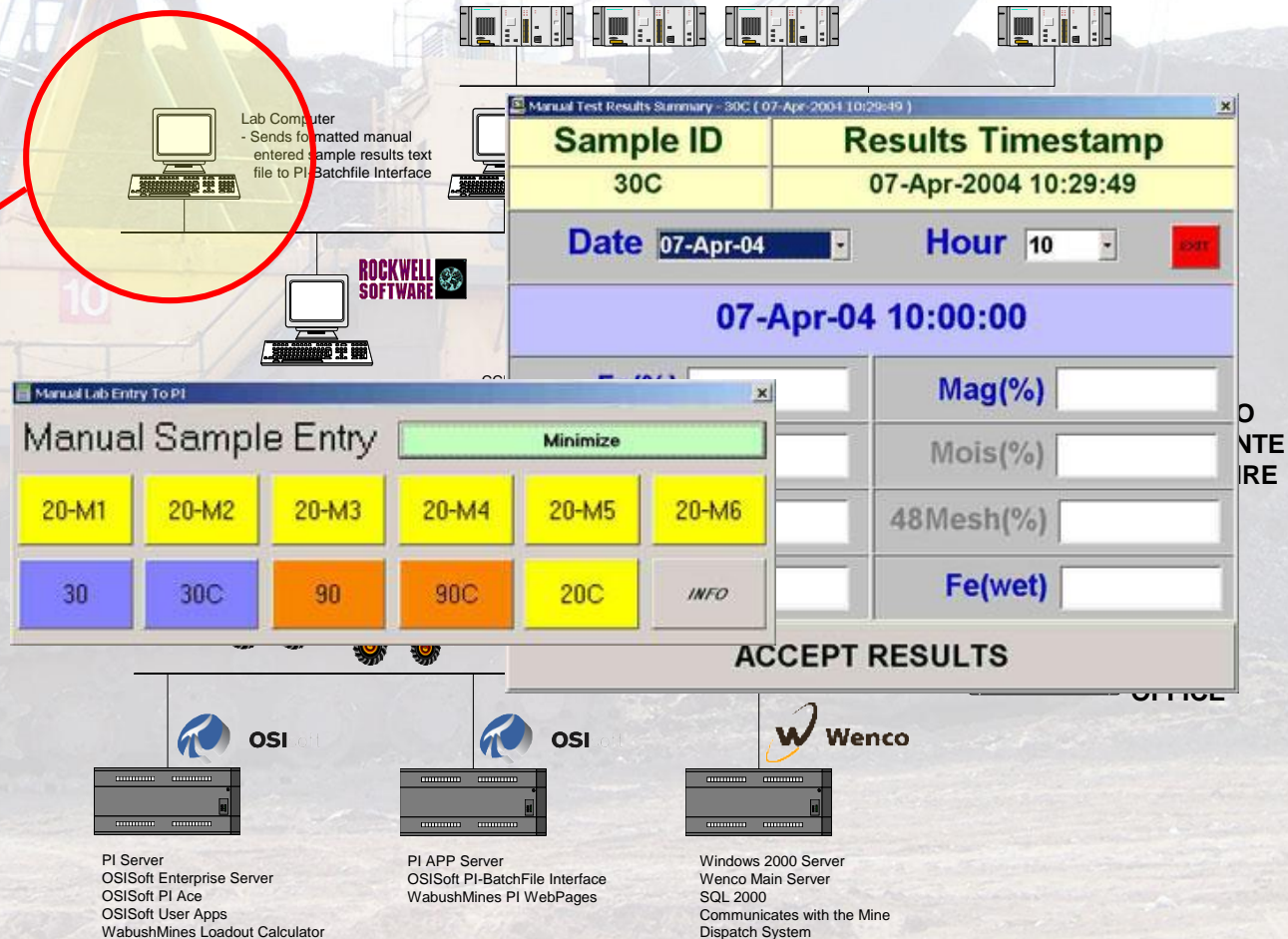
07-Apr-04 10:00:00

Fe(%)	Mag(%)
SiO2(%)	Mois(%)
Mn(%)	48Mesh(%)
No	Fe(wet)

ACCEPT RESULTS

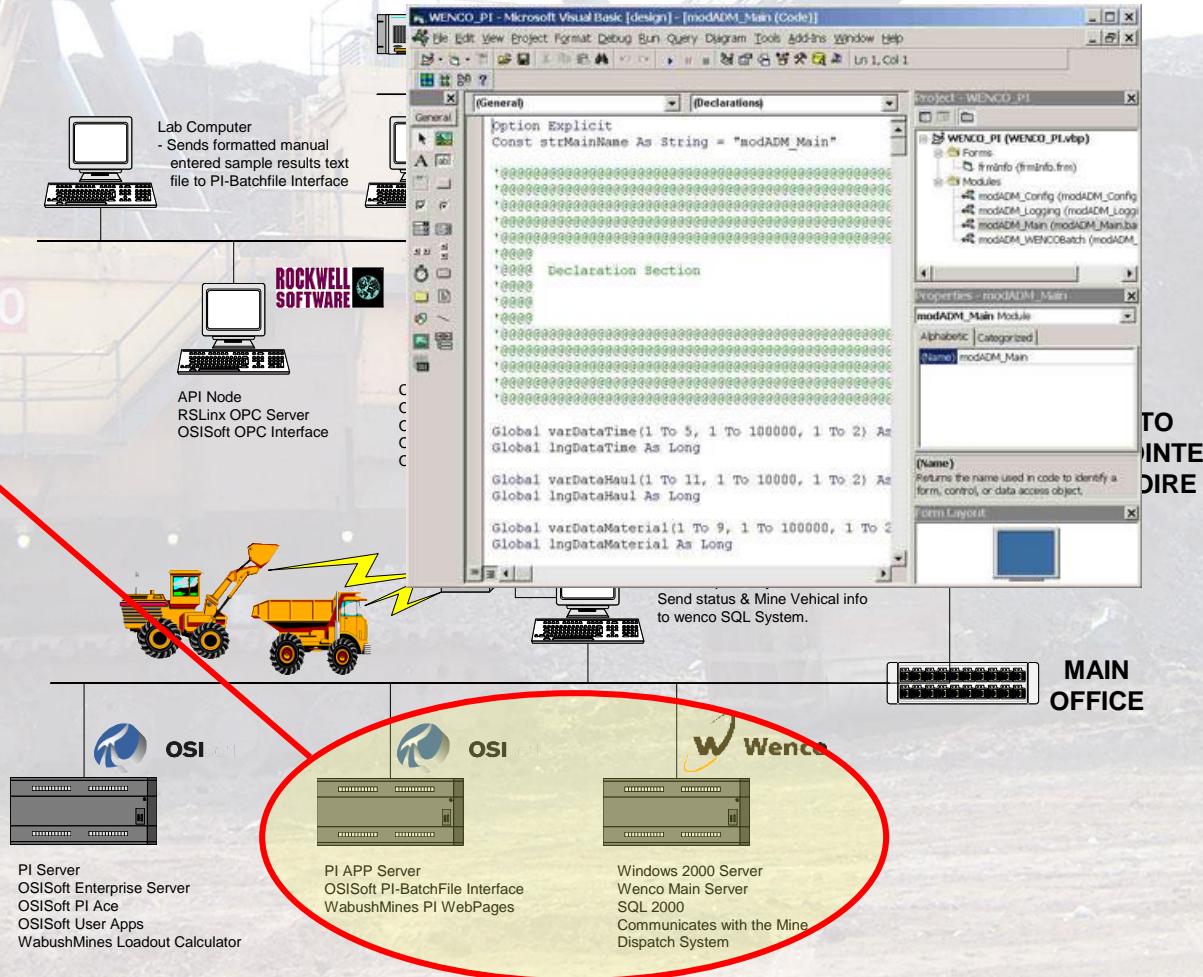
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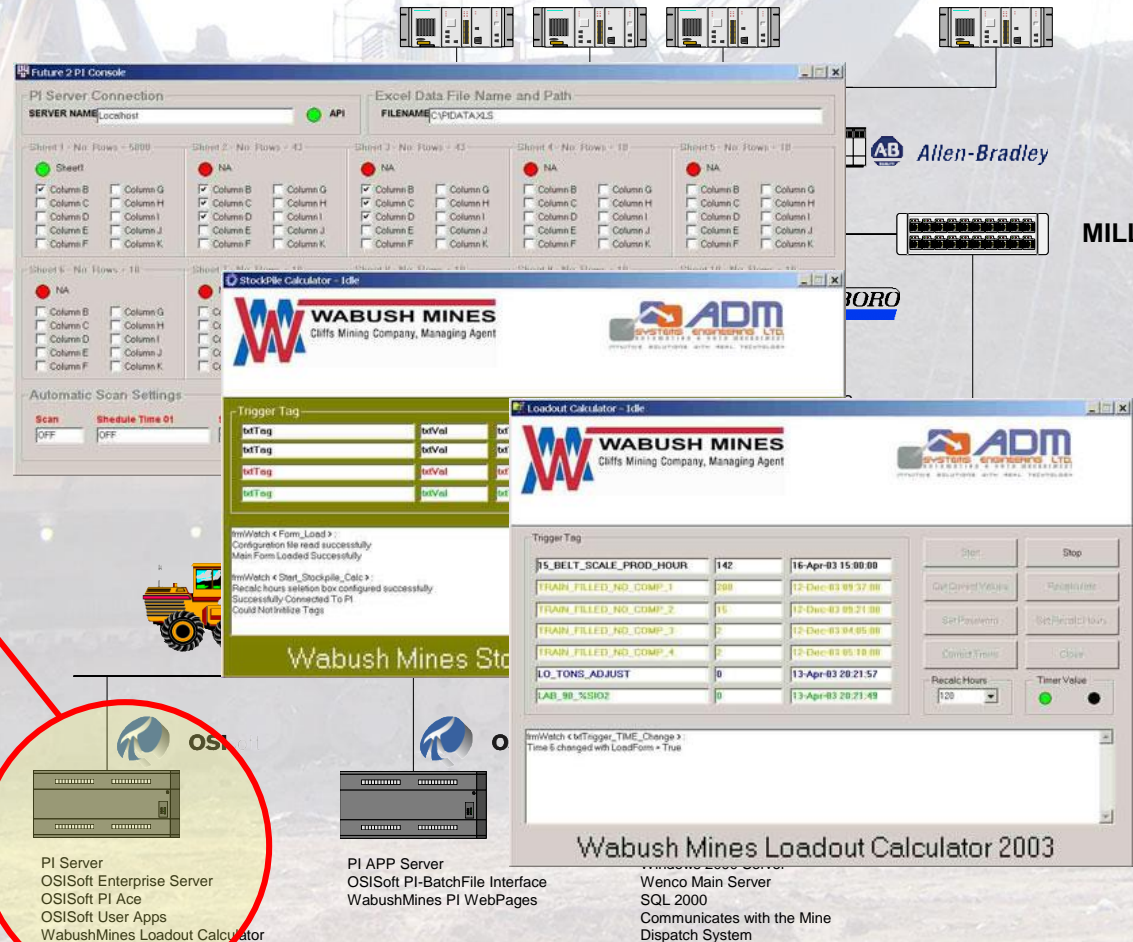
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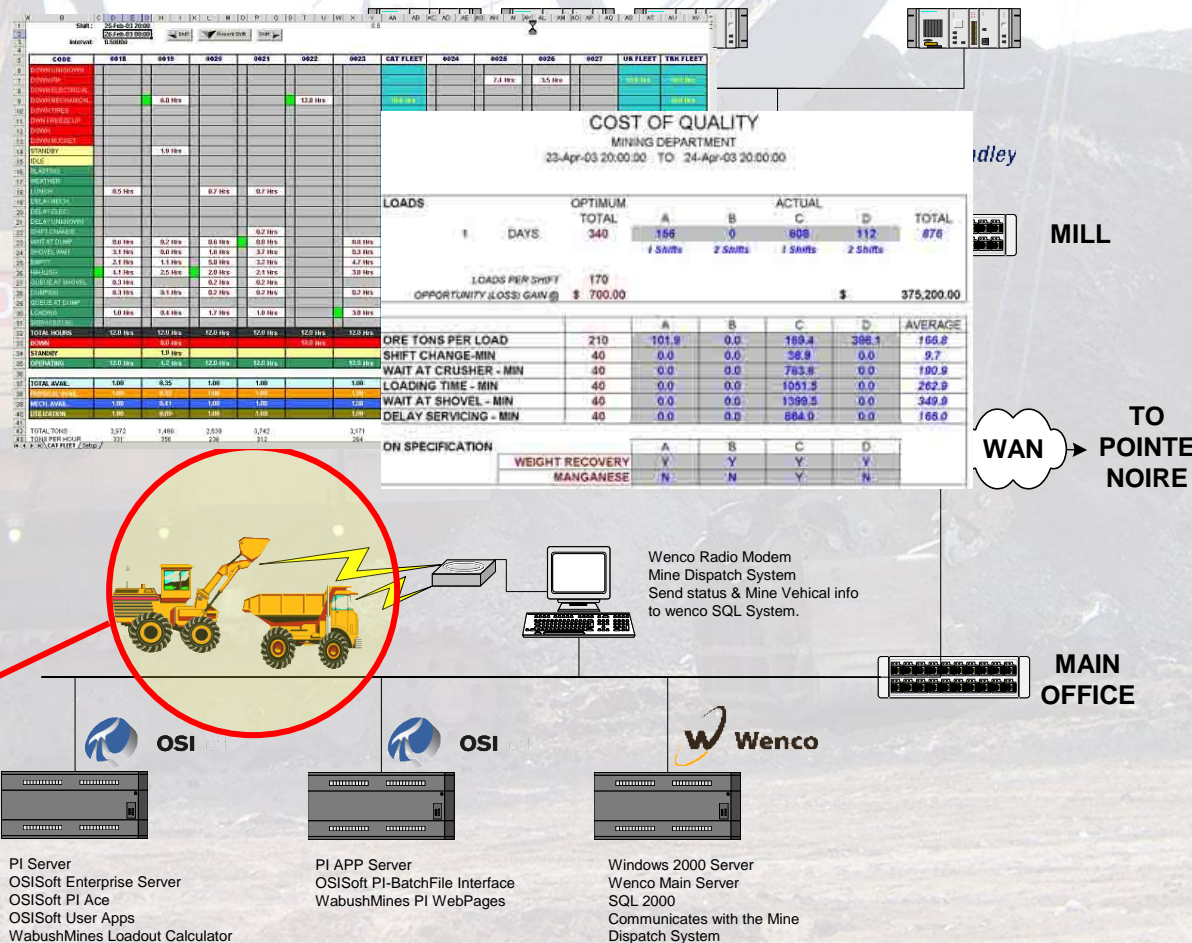
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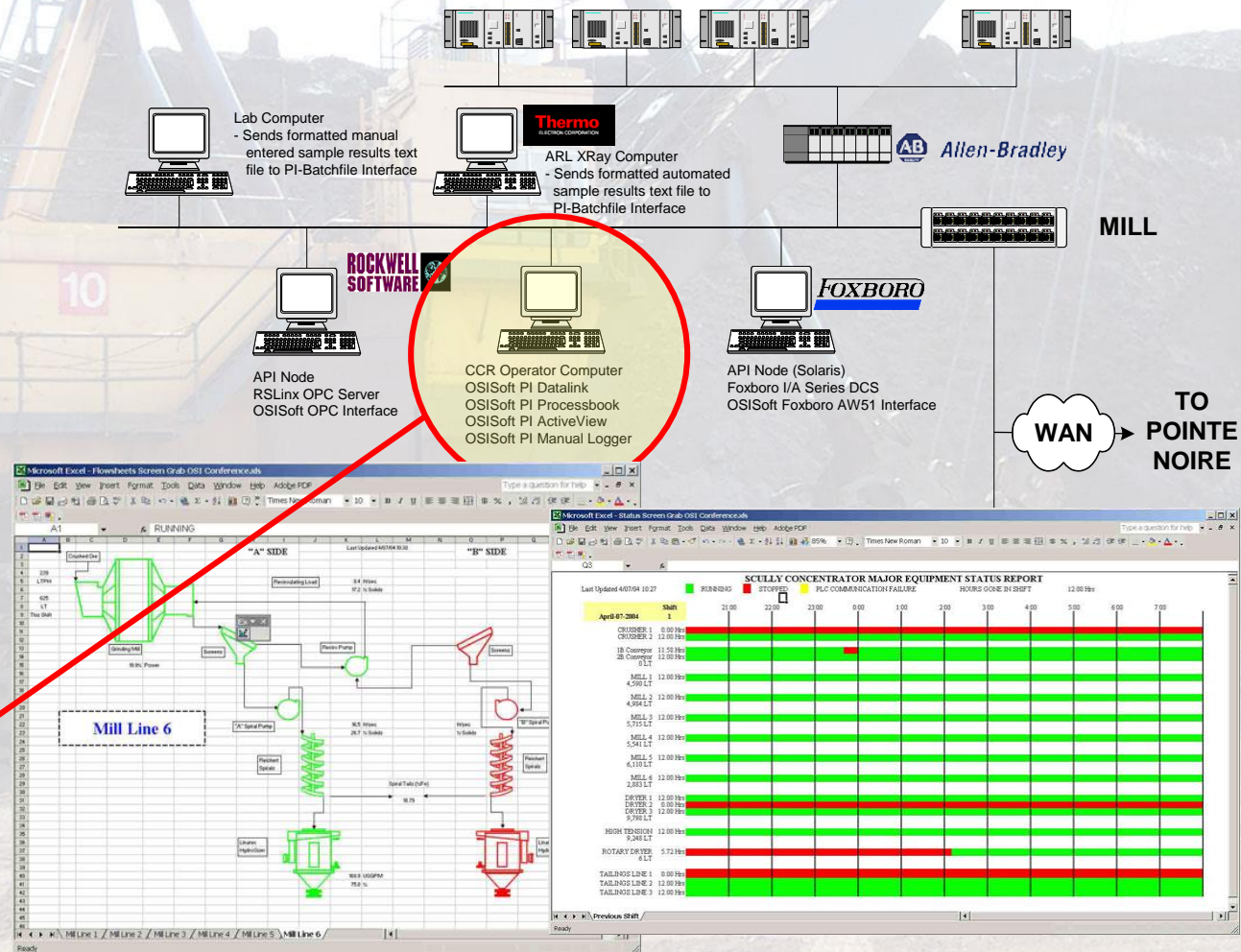
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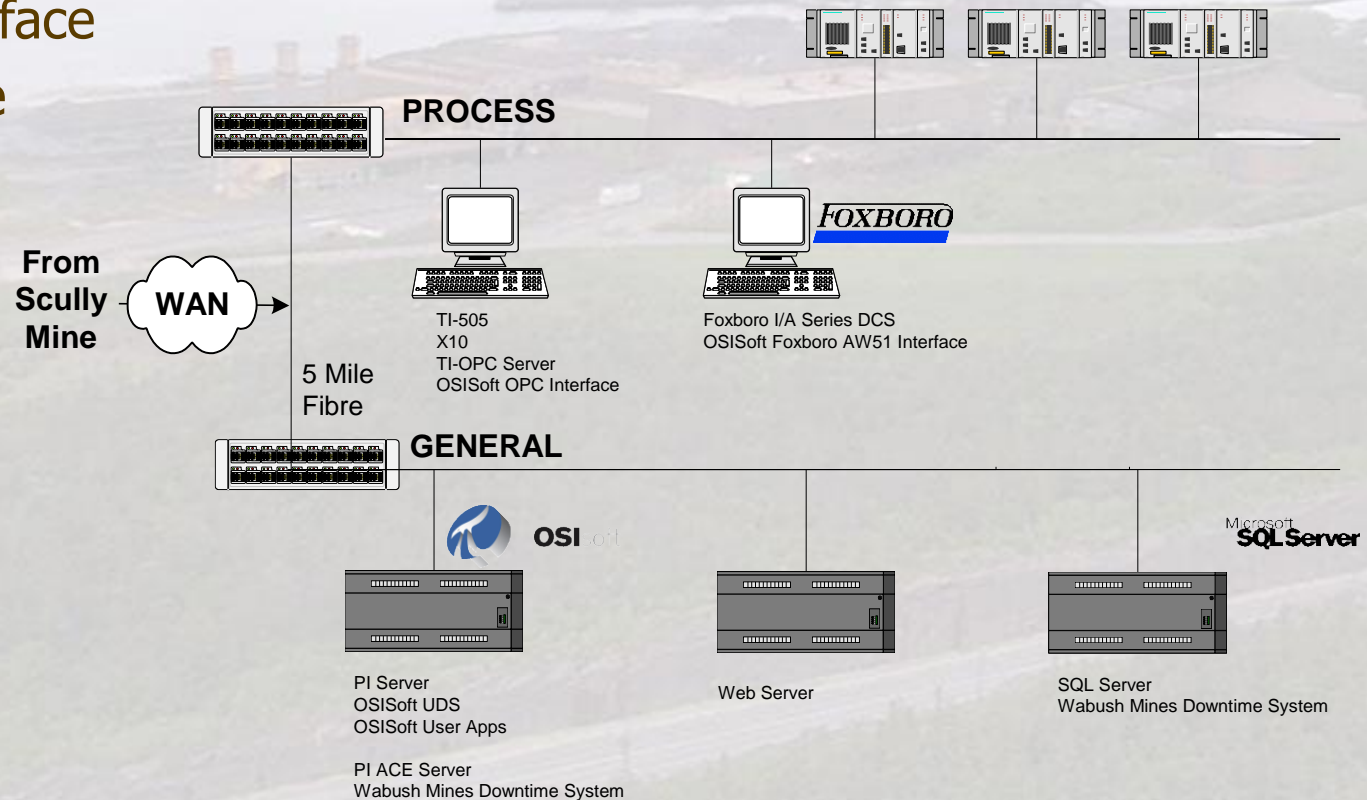
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Pointe Noire (2003)

- PI-Server (2k Tags)
- PI-Ace
- PI-Foxboro Interface
- PI-OPC Interface
- PI-DAP
- PI-Processbook
- PI-Datalink
- PI-ActiveView
- PI-SQC



Pointe Noire - Applications

➤ Downtime Tracking

➤ Plant Reports

- Intranet
- IIS
- ASP.NET
- PI-SDK

From
Scully
Mine

WAN

5 Mile
Fibre

PROCES

TI-505
X10
TI-OPC Ser
OS Soft OP

GENERAL

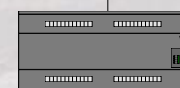
OSI



PI Server
OSISoft UDS
OSISoft User Apps

PI ACE Server
Wabush Mines Downtime System

Web Server



SQL Server
Wabush Mines Downtime System

Rapport pour la période du 24/2004 18h au 21/2004 18h

Génération d'un rapport sur les arrêts d'équipements

Page 1 sur 2

	Total	Préventif	Entretien préventif	Contrôle	Manque de	Bris	Recuit	Autre	Non documenté	Disponibilité
Br1	8.8	0	0	8.23	0.88	0	0	0.08	0	(87.91) (99.99%)
Br2	(8.76)	0	0	8.1	0	10.32	0	0.32	0	(97.36) (99.99%)
Br3	9.81	0.52	0	8.52	0.4	0.42	0	0.18	0	(90.07) (99.97%)
Br4	8.07	0	0	7.58	0	0.33	0	0.16	0	(87.41) (99.99%)
Br5	(8.76)	3.17	0	0.98	14.52	0	0	0.18	0	(90.07) (99.99%)
Br6	49.01	0	(18.11)	(19.07)	10.73	0.1	0	0	0	(60.79) (99.99%)
Br7	35.19	0	0	14.81	19.9	0	0	0.32	0	(67.78) (99.99%)
Br8	11.88	0.67	3.03	9	0	2.33	0	0.07	0	(76.51) (99.99%)
Br9	27.43	0.18	0	0.9	0	10.25	0	0.28	0	(67.31) (99.99%)
Br10	197.35	19.94	21.14	77.32	55.53	22.76	0	1.22	0	(14.53) (99.99%)

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	Total	Préventif	Entretien préventif	Contrôle	Manque de	Bris	Recuit	Autre	Non documenté	Disponibilité
Tach31	37.48	3.26	0	22.93	0	0.86	0	0.45	0	(16.47) (99.99%)
Tach32	17.33	0.02	0.03	1.32	0	0	0	0	0	(16.73) (99.99%)
Tach33	11.2	0	0	12.2	0	0	0	0	0	(11.07) (99.99%)
Tach34	11.5	0.29	0	10.89	0	33.28	0	0	0	(13.45) (99.99%)
Tach35	69.77	0.74	36	12.31	0	0	0	0.52	0	(13.74) (99.99%)
Tach36	35.47	0	0	16.77	0	0.68	0	0.18	0	(50.31) (99.99%)
Tach37	236.97	4.31	19.69	96.96	0	41.82	0	1.37	0	(86.14) (99.99%)

Page 3 sur 3

	Total	Préventif	Entretien préventif	Contrôle	Manque de	Bris	Recuit	Autre	Non documenté	Disponibilité
Tach38	10.09	3.04	0	0.8	28.76	0	0	0	0	(15.56) (99.99%)

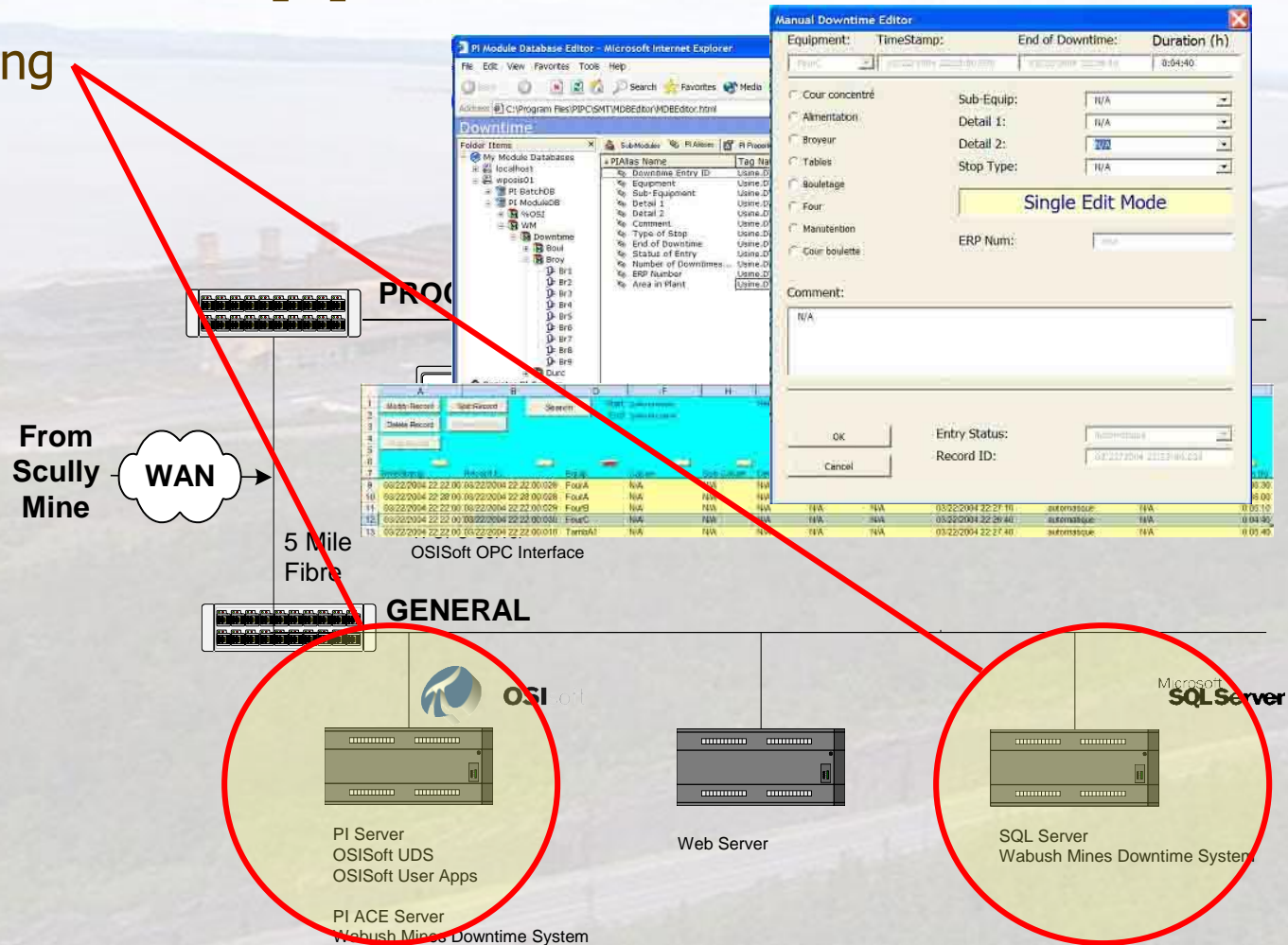
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Pointe Noire - Applications

➤ Downtime Tracking

➤ Plant Reports

- Intranet
- IIS
- ASP.NET
- PI-SDK



What is 0.1 % of additional asset availability worth?

- **Pellet Plant**
 - **Downtime Tracking (3 Production Lines)**
 - **30 Pieces of Equipment**
 - **09 Grinding Mills**
 - **18 Balling drums**
 - **03 Furnaces**



What is 0.1 % of additional asset availability worth?

- **Pellet Plant**
 - **More than 4 trips per day on a furnace can make product quality below a shipment specification.**
 - **\$\$\$\$ Penalties**



What is 0.1 % of additional asset availability worth?

- **Pellet Plant**
 - **92.6 % Availability Target/Year**
 - **6, 100, 000 Tons for 3 Lines**
 - **Pellets worth \$35/Ton**
 - **\$213.5 Million/Year**
 - **28% of Downtime is Tonnage Control**
- **Lets Add 0.1%**



What is 0.1 % of additional asset availability worth?

- **Pellet Plant at 92.7%**
 - **92.7 % Availability Target/Year**
 - **+ 6587 Tons**
 - **6, 106, 587 Tons for 3 Lines**
 - **Pellets worth \$35/Ton**
 - **+ \$230, 561/Year**
 - **\$213,730,561/Year**



What is 0.1 % of additional asset availability worth?

SUMMARY			
	OLD	NEW	DIFF
Availability Target	92.6%	92.7%	+ 0.1%
Annual Production Target (3 Lines)	6100000 Tons	6106587 Tons	+ 6587 Tons
Pellets US\$/Ton	\$ 35.00	\$ 35.00	0
Annual Forecast	\$ 213,500,000	\$ 213,730,561	+ \$ 230,561

**Cost of Downtime System \$ 75,000
(Negligible)**

What is 0.1 % of additional asset availability worth?

- **Reporting**

- **Then**

- **1 Day per week in Engineering time to prepare a report for each piece of equipment and a summary report per sector.**

- **Now**

- **1 Hour to verify data on Reports**

Are you Down ?

- **Track it**
- **Report it**
- **Analyze it**
- **Recover it**

Downtime as defined by Merriam-Webster Online Dictionary

- **Time during which production is stopped especially during setup for an operation or when making repairs**



WABUSH MINES
Cliffs Mining Company, Managing Agent



How We Define Downtime

- **Equipment failure**
- **Equipment down for maintenance**
- **Lack of product for equipment**

What We Consider Downtime

- **“Is the equipment running?”**
- **“Is it producing?”**
- **Downtime Indicators**
 - **Motor status**
 - **Power consumption**
 - **Belt Run Status**

Downtime Criteria

- **Record Downtime at start**
- **Split a downtime into two separate events**
- **Optimize use of PI tags**
- **Ease of editing downtime events**

PI-ACE with Module Database

- 
- **Scaleable**
 - **Flexible**
 - **Support**
 - **Unlimited possibility of application use**

Module Database

PI Module Database Editor - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <C:\Program Files\PIPC\SMT\MDBEditor\MDBEditor.html> Go Links Norton Antivirus

Br1

Folder Items

- My Module Databases
 - localhost
 - wposis01
 - PI BatchDB
 - PI ModuleDB
 - %OSI
 - WM
 - Downtime
 - Boul
 - Broy
 - Br1
 - Br2
 - Br3
 - Br4
 - Br5
 - Br6
 - Br7
 - Br8
 - Br9
 - Durc

Sub-Modules PI Aliases PI Properties

PI Alias Name	Tag Name	Server	Snapshot Value	Snapshot Time
Status	Broy.BR1circ.Utilisation.OnOff	wposis01	On	03/25/2004 9:10:56 AM

Common Alias

0 Objects Type: PIModule Aliases: 1 Properties: 4 Effective Date: 12/31/1969 8:00:03 PM Query Date: 03/25/2004 9:13:24 AM Creator: piadmin ParentCount: 1

Done My Computer

Module Database

PI Module Database Editor - Microsoft Internet Explorer

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Register PI Servers

PIProperty Name	Value	Datatype
Downtime Equipment Label	1	Integer
Equipment Name	Br1	String
Last Automatic Downtime Recorded	03/24/2004 17:40:40	String
Area in Plant	broyage	String

Number of states: 34

State Numbe	State Name
0	N/A
1	Br1
2	Br2
3	Br3
4	Br4
5	Br5
6	Br6
7	Br7
8	Br8
9	Br9
10	TambA1
11	TambA2
12	TambA3
13	TambA4

0 Objects Type: PIModule Aliases: 1 Properties: 4 Effective Date: 12/31/1969 8:00:03 PM Query Date: 03/25/

Done

Module Database

PI Module Database Editor - Microsoft Internet Explorer

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Downtime

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 - Br3
 - Br4
 - Br5
 - Br6
 - Br7
 - Br8
 - Br9
 - Durc
- Register PI Servers

Sub-Modules PI Aliases PI Properties

PIAlias Name	Tag Name	Server	Snapshot Value	Snapshot Time
Downtime Entry ID	Usine.DTS.ID.Nom	wposis01	03/25/2004 08:09:56...	03/25/2004 9:09:56 AM
Equipment	Usine.DTS.EQP.Nom	wposis01	FourC	03/25/2004 9:09:56 AM
Sub-Equipment	Usine.DTS.SEQP.Nom	wposis01	N/A	03/25/2004 9:09:56 AM
Detail 1	Usine.DTS.Details1.Nom	wposis01	N/A	03/25/2004 9:09:56 AM
Detail 2	Usine.DTS.Details2.Nom	wposis01	N/A	03/25/2004 9:09:56 AM
Comment	Usine.DTS.Commentai...	wposis01	N/A	03/25/2004 9:09:56 AM
Type of Stop	Usine.DTS.TypeArret...	wposis01	N/A	03/25/2004 9:09:56 AM
End of Downtime	Usine.DTS.Fin.TimeSt...	wposis01	N/A	03/25/2004 9:09:56 AM
Status of Entry	Usine.DTS.Statut.Nom	wposis01	automatique	03/25/2004 9:09:56 AM
Number of Downtimes...	Usine.DTS.NbrArret.No	wposis01	Calc Failed	11/23/2003 6:26:59 PM
ERP Number	Usine.DTS.ERP.No	wposis01	N/A	03/25/2004 9:09:56 AM
Area in Plant	Usine.DTS.Locale.Nom	wposis01	four	03/25/2004 9:09:56 AM

3 Objects Type: PIModule Aliases: 12 Properties: 0 Effective Date: 12/31/1969 8:00:01 PM Query Date: 03/25/2004 9:10:19 AM Creator: piadmin ParentCount: 1

Done My Computer









PI-ACE Structure

- **Two State Case Transaction**
 - **ON to OFF**
 - **OFF to ON**
- **Search Entry**
- **ACE Schedule Shutdown**

PI-ACE Manager

PI-ACE Manager

Server Executable Module Context Tag Help

WPOSIS01

- Test_Area
- Downtime_System
 - Recorder
 - Input Tags
 - \\WPOSIS01\WM\Downtime\End of Downtime
 - \\WPOSIS01\WM\Downtime\Number of Downtimes
 - Status
 - Output Tags
 - \\wposis01\WM\Downtime\Area in Plant
 - \\WPOSIS01\WM\Downtime\Comment
 - \\WPOSIS01\WM\Downtime\Detail 1
 - \\WPOSIS01\WM\Downtime\Detail 2
 - \\WPOSIS01\WM\Downtime\Downtime Entry ID
 - \\WPOSIS01\WM\Downtime\End of Downtime
 - \\WPOSIS01\WM\Downtime\Equipment
 - \\wposis01\WM\Downtime\ERP Number
 - \\WPOSIS01\WM\Downtime\Number of Downtimes
 - \\WPOSIS01\WM\Downtime\Status of Entry
 - \\WPOSIS01\WM\Downtime\Sub-Equipment
 - \\WPOSIS01\WM\Downtime\Type of Stop
 - Contexts
 - \\WPOSIS01\WM\Downtime\Broy\Br1
 - \\wposis01\WM\Downtime\Broy\Br2
 - \\wposis01\WM\Downtime\Broy\Br3
 - \\wposis01\WM\Downtime\Broy\Br4
 - \\wposis01\WM\Downtime\Broy\Br5
 - \\wposis01\WM\Downtime\Broy\Br6
 - \\wposis01\WM\Downtime\Broy\Br7
 - \\wposis01\WM\Downtime\Broy\Br8

Name	Status/Value
Current Status	On
Since	4/5/2004 3:...
Priority	Normal
Schedule Type	Natural
Latency	15
Trigger Tags	1
Tag 1	Status

PI-Datalink

	A	B	D	F	H	J	L	N	P	R	T	U								
1	Modify Record	Split Record	Search	Start: 22-Mar-04 19:00:00	Selections: 0			Connect to PI												
2			End: 22-Mar-04 23:00:00																	
3	Delete Record	Append Record																		
4			Admin																	
5	Add Record																			
6																				
7	TimeStamp	Record ID	Equip	Cause	Sub Cause	Detail														
9	03/22/2004 22:22:00	03/22/2004 22:22:00.028	FourA	N/A	N/A	N/A														
10	03/22/2004 22:28:00	03/22/2004 22:28:00.028	FourA	N/A	N/A	N/A														
11	03/22/2004 22:22:00	03/22/2004 22:22:00.029	FourB	N/A	N/A	N/A														
12	03/22/2004 22:22:00	03/22/2004 22:22:00.030	FourC	N/A	N/A	N/A														
13	03/22/2004 22:22:00	03/22/2004 22:22:00.010	TambA1	N/A	N/A	N/A														

Manual Downtime Editor

Equipment:

TimeStamp:

End of Downtime:

Duration (h)

FourC

03/22/2004 22:22:00.030

03/22/2004 22:26:40

0:04:40

☐ Cour concentré

Sub Equip:

N/A

Manual Downtime Editor

Equipment: FourC

TimeStamp: 03/22/2004 22:22:00.030

End of Downtime: 03/22/2004 22:26:40

Duration (h): 0:04:40

☐ Cour concentré
 ☐ Alimentation
 ☐ Broyeur
 ☐ Tables
 ☐ Bouletage
 ☐ Four
 ☐ Manutention
 ☐ Cour boulette

Sub-Equip: N/A

Detail 1: N/A

Detail 2: N/A

Stop Type: N/A

Single Edit Mode

ERP Num: N/A

Comment: N/A

OK

Cancel

Entry Status: automatique

Record ID: 03/22/2004 22:22:00.030

Benefits

- **Increase in operational availability speaks for itself**
- **ROI is short at +0.1% in equipment availability**
- **System is flexible and easily expandable**
- **Maintenance planning**
- **Installs & configures on new and existing PI systems**
- **Downtime data to ERP systems using OSISoft software**

Conclusions

- **Downtime System Using OSIsoft PI Products**
 - **PI Enterprise Server and Standard Interfaces monitor equipment tags**
 - **PI-Module Database gives all equipment a common structure**
 - **PI-Ace captures and stores specific criteria for downtime reporting**
 - **PI-Datalink/PI-ODBC provides a reporting front end**
 - **Data can be automatically sent to ERP and maintenance management systems**

Questions



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