

VOYAGE2007



RtReports at PDL BioPharma

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Agenda

- PDL BioPharma
- Business Challenge
 - ▶ Drivers
- Solution
 - ▶ OSIsoft components used
 - ▶ Reports –Batch, Building Monitoring Systems, Utilities
- Benefits
- Future Plans

PDL BioPharma

- Leader in the discovery, development, manufacturing and marketing of innovative therapies for serious or life-threatening illnesses
- Emphasis in areas of
 - ▶ Acute cardiac care
 - ▶ Autoimmune diseases
 - ▶ Inflammatory conditions
 - ▶ Cancer
- Manufacturing facility – Brooklyn Park, Minnesota
- Headquarters – Fremont, California

Protein Design Labs

- Roots in Antibody humanization technology
- License technology to biotech and pharmaceutical partners
- Market biopharmaceutical products for the hospital setting
 - ▶ Cardene® I.V. for the short-term treatment of hypertension
 - ▶ Retavase® for acute myocardial infarction
 - ▶ IV Busulfex® (Black Box Warning) for conditioning prior to a bone marrow transplant .
- Leading clinical programs include
 - ▶ Nuvion® (visilizumab) , in development for intravenous steroid refractor ulcerative colitis
 - ▶ Ularitide in development for acute decompensated heart failure.

Business Challenge

- New facility was planned for construction
 - ▶ Groundbreaking Oct 2002
 - ▶ First run May 2005
- Electronic reports wanted
 - ▶ PI was specified as the data historian
 - ▶ RtReports compliance was a brand new OSIsoft product, with a release in line with the timing for the plant startup
- Based on previous experience, wanted to avoid custom components and go with off the shelf software
 - ▶ Another site had a data historian with some custom components that couldn't be validated

Business Drivers

- ▶ GMP documentation.
- ▶ Avoid installing chart recorders
 - Needed electronic signatures and permanent access to data
- ▶ Batch system reporting
 - Needed to be able to integrate data from batch execution system and generate reports that reflected what the processing equipment was actually doing
- ▶ Batch release time
 - PDL's target:
 - New product: 30 days to release for final filling.
 - Existing products: 15 days to release for final filling.

OSIsoft Components Used

- PI Server
- RtReports
- RtWebparts
- 200 ProcessBook and PI DataLink licenses
- COM Connectors
- MCN Health Monitor
- OPC Interface
- PI Batch Interface
- PI ACE
- RtAlerts
- Enterprise Agreement

Enterprise Agreement

- Motivations for Enterprise Agreement
 - ▶ Network Operations Center
 - Maximum uptime is important
 - Remote monitoring
 - ▶ Unlimited Tag Count

Solution

- Implemented RtReports version 2.2
- Worked with Rovisys
 - ▶ Integrator with extensive PI system experience
 - ▶ Installed RtReports
 - ▶ Created initial master templates and subsequent templates
- System ownership transferred to PDL BioPharma for tech support and issue resolution

Solution

- Generated 3 report classes, each with a master template.
 - ▶ Batch
 - ▶ Building monitoring systems
 - ▶ Stand alone utilities
- All reports within a class have the same look and feel
 - ▶ Same header
 - ▶ Similar trends
 - ▶ Same cover page
- Went back to system teams for individual template development
 - ▶ Minor fine tuning to the report for the each piece of equipment/functional area.

Batch Reports

- 17 Batch reports
 - ▶ Production recipe – two week duration
 - ▶ CIP, SIP, Downstream purification, Media prep, Buffer prep
- Developed a batch report skeleton, summarizes batch events
- Rockwell Software RSBatch is the batch execution system
 - ▶ .EVT file interface
 - Operations, phases, procedures, recipe parameters, phase states, recipe version information
 - ▶ Rockwell database for alarms and factory talk events
 - ▶ Shared equipment was difficult to account for in our batch implementation.
- Verifications, comment sections, overall signoffs
- Reports contain GMP information used by, managers and supervisors in the Manufacturing Quality departments

Batch Report

- Iterative Report structure allows for recipe modifications without changing or revalidating report
 - ▶ Recipe changes are picked up by the data and format engine rules and iterative report structure
 - ▶ In our old system, when the control system was modified, the custom coding didn't update the report automatically.

Batch Start Time	Batch Stop Time
04-Jul-07 10:33:25.000	05-Jul-07 10:21:31.000

Recipe Values

[illegible]

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Unit Procedure	B10_55
Equipment	B10-UF
Start Time	05-Jul-0
Stop Time	05-Jul-0
Duration	2 hours

Operation

Start Time	Stop Time
B10_5510_OP_SETUP_4:1	
05-Jul-07 07:30:12.000	05-Jul-07 07:30:12.000

Equipment Time	
Start Time	Stop Time
015 PM XP INCT CR11.0	
05:24:47 07:30 11:00	05:24:47 07:30

Operation

Start Time	Stop Time
B10_5510_OP_SET_ROUTE-1	
05-Jul-07 07:30:45.000	05-Jul-07 07:30:45.000

Equipment Name	Start Time	Stop Time
814_PL_EP_SET_ROUTE_7-1-1	15-Jul-07 07:30:51.800	15-Jul-07 07:30:51.800

Operation

Start Time	Stop Time
B10_5510_09_CLEANUP:1	
05-Jul-07 07:30:45.000	05-Jul-07 07:30:45.000

Equipment Flow	
Start Time	Stop Time
014_P6_EP_CLEANUP 1	
05-24-17 07:20:13.000	05-24-17 11

Steps for Phase	Start Time
STARTING	05:24:47-07:50:55
WORKING	05:24:47-07:50:55
ENDING	05:24:47-08:59

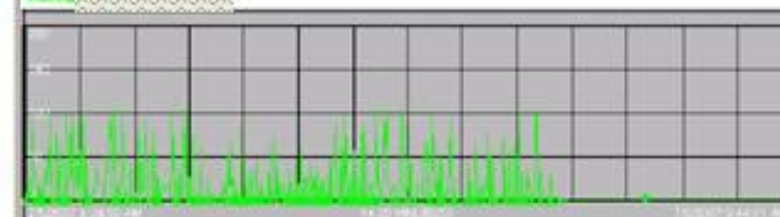
Batch Diagnostic Report

10 *Display all recipe values, batch events, alarms, and some PI tag statistics. Typical report is 10+ pages*

[illegible]

Cultural Awareness Trend 1

Movie Tag	
Track Tag	
Track Tag	



Acting prof. & director of the Institute of Management

Adressatengruppe	Termin
ACE, New York, Cops-DETS-KRO/DETOBEL, Tag-Absatz	05.04.17 08:22:28
ACE, New York, Cops-DETS-KRO/DETOBEL, Tag-Absatz	05.04.17 08:22:34
ACE, New York, Cops-DETS-KRO/DETOBEL, Tag-Absatz	05.04.17 08:20:48
ACE, New York, Cops-DETS-KRO/DETOBEL, Tag-Absatz	05.04.17 08:20:51
ACE, New York, Cops-DETS-PIELSON, Tag-Absatz-001	05.04.17 08:17:50
ACE, New York, Cops-DETS-PIELSON, Tag-Absatz-001	05.04.17 08:17:50
ACE, New York, Cops-DETS-PIELSON, Tag-Absatz-001	05.04.17 08:04:01
ACE, New York, Cops-DETS-PIELSON, Tag-Absatz-001	05.04.17 08:04:05
ACE, New York, Cops-DETS-PIELSON, Tag-Absatz-001	05.04.17 08:00:17
ACE, New York, Cops-DETS-PIELSON, Tag-Absatz-001	05.04.17 08:00:18

Quelle: Arbeitsblätter

Author(s)	Year
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Report Template Summary

- Report Name: CIP
- Report Version: 1.0
- Effective Date: 01-Jan-05 12:00:00 AM

Batch Summary

- Recipe Name: B10_P1_5510_BP_CIP_VESSEL
- Recipe Version: 20.1
- Batch ID: POST_25000016
- Batch Start Time: 04-Jul-07 10:33
- Batch End Time: 05-Jul-07 10:21
- Batch Duration: 23 hours 48 minutes 6 seconds

Report Generation and Print Summary

- Report Generated By: Anderson, Nate
- Report Last Printed By:
- Last Report Printed: 31-Dec-09 06:00:00 PM

Recipe Name: B10_P1_5510_BP_CIP_VESSEL

Equipment	B10_UFN_5
CIP Skid	B10_CIP_50

001_RR_BP_ALKALINE_WASHES 1
05-Jul-07 07:51:00.000 05-Jul-07 08:20:45

Conductivity SP	5.5	uS/cm
Flow SP	20.0	gpm
Temperature SP	70.0	DEG C
Purge Time SP	1000.0	SEC

002_RR_BP_ACID_WASHES 1
05-Jul-07 08:51:00.000 05-Jul-07 09:15:17

Conductivity SP	5.5	uS/cm
Flow SP	20.0	gpm
Temperature SP	70.0	DEG C
Purge Time SP	1000.0	SEC

003_RR_BP_CIP_WFI_RINSEWASHES 1
05-Jul-07 09:25:00.000 05-Jul-07 10:21:00.000

Stage for Phase	Start Time
STARTING	05-Jul-07 09:25:00.000
STOPPING	05-Jul-07 09:25:00.000
BOILING	05-Jul-07 09:30:30.000
HEED	05-Jul-07 09:30:37.000
STOPPING	05-Jul-07 09:40:42.000
BOILING	05-Jul-07 09:40:50.000
HEED	05-Jul-07 09:40:59.000
RESTARTING	05-Jul-07 10:30:39.000
STOPPING	05-Jul-07 10:30:43.000
BOILING	05-Jul-07 10:35:17.000
HEED	05-Jul-07 10:35:00.000
STOPPING	05-Jul-07 10:35:17.000

Cycle Pass	YES	
Resistivity SP	5.50	uS/cm

Report Name: CIP Version: 1.0 Batch Start Date:

Clean In Place Batch Report

- ⑩ The reports summarize only key operating parameters. Typical report is two pages.

Conductivity SP	5.50	uS/cm
Flow SP	20.0	gpm
Temperature SP	70.0	DEG C
Purge Time SP	1000.0	SEC

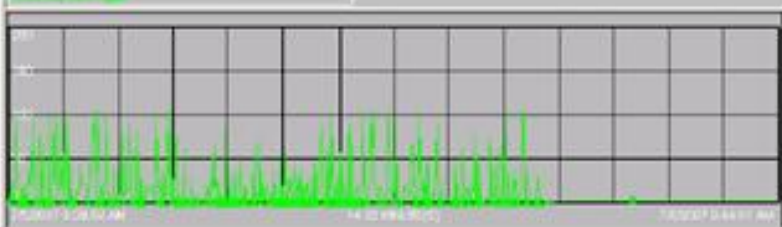
Critical Alarms

Alarm Tag: B10_P1_5510_BP_CIP_WFI_RINSEWASHES 1	05-Jul-07 09:00:00
Alarm Tag: B10_P1_5510_BP_CIP_WFI_RINSEWASHES 1	05-Jul-07 09:15:00
Alarm Tag: B10_P1_5510_BP_CIP_WFI_RINSEWASHES 1	05-Jul-07 09:15:07
Alarm Tag: B10_P1_5510_BP_CIP_WFI_RINSEWASHES 1	05-Jul-07 09:15:07
Alarm Tag: B10_P1_5510_BP_CIP_WFI_RINSEWASHES 1	05-Jul-07 09:15:07
Alarm Tag: B10_P1_5510_BP_CIP_WFI_RINSEWASHES 1	05-Jul-07 09:15:07

Critical Alarm Trend 1

Alarm Tag = B10_P1_5510_BP_CIP_WFI_RINSEWASHES 1

Conductivity SP (uS/cm) vs Time (min)



Building Monitoring / Automation

- 10 Building monitoring reports
 - ▶ Incubators, refrigerators, stability rooms, cold rooms, warehouse, waste treatment
- Basic chart recorder replacement
 - ▶ Monitoring environmental conditions, pressure, humidity, temperature
- Equipment owner signs off on reports
 - ▶ QC, Manufacturing, Materials, Safety
- Alarms
 - ▶ Queries look at alarm states, pull low and hi alarm points.
 - ▶ Trends created for alarm events
 - ▶ Red colored text if value is outside the acceptable limit

Building Monitoring / Automation

- ⑩ Exception based reporting allows reviewers to focus on abnormal conditions.



Report Name: Small Scale Inoculum
Report Version: 1.0
Effective Date: 01-Jan-05 12:00:00
Batch ID: 16-Apr-07 to 23-Apr-07

Start Time
16-Apr-07 00:00:00.000

B10-II

Value
Local Alarm Off

Low Alarm Limit
Minimum recorded value
High Alarm Limit
Maximum recorded value
Average

No Alarm Events

10-1220-AE-01/1220-AIT-01

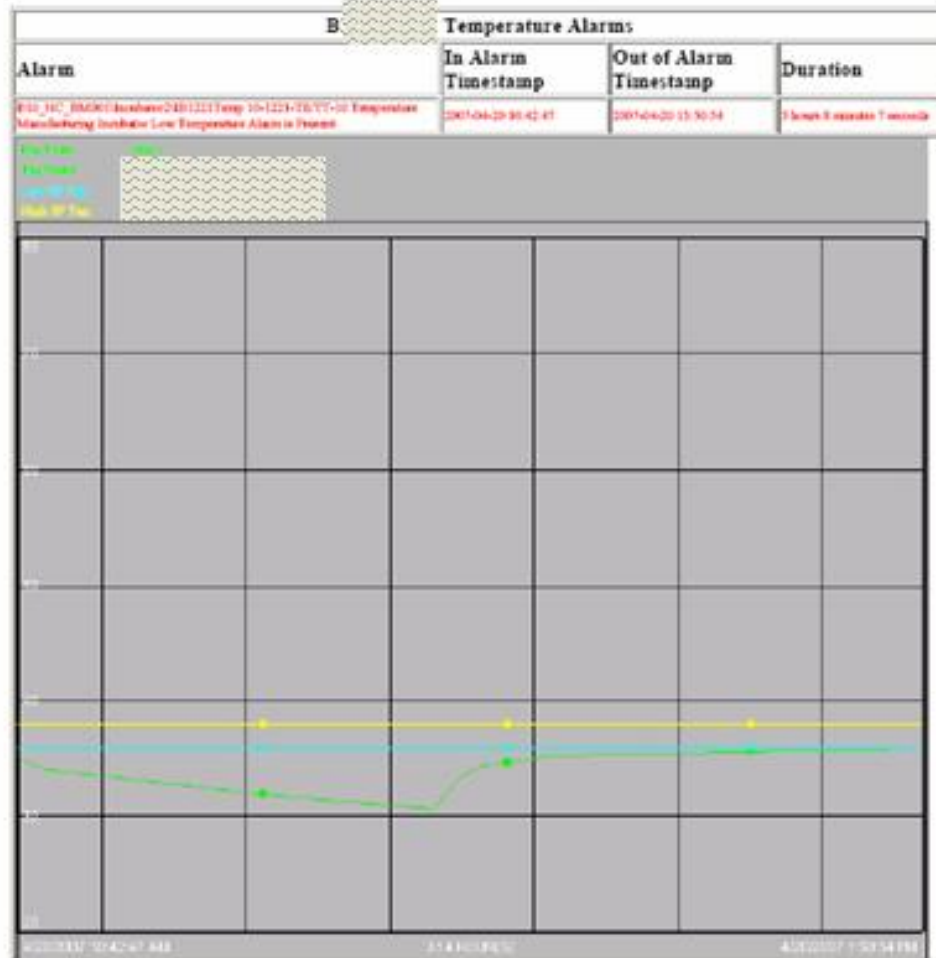
Low Alarm Limit
Minimum recorded value
High Alarm Limit
Maximum recorded value
Average

No Alarm Events

B10-I

Value
Local Alarm Off
Local Alarm On
Local Alarm Off
Local Alarm On
Local Alarm Off
Local Alarm On
Local Alarm Off
Local Alarm On
Local Alarm Off
Local Alarm On
Local Alarm Off
Local Alarm On
Local Alarm Off

10-1220-AE-01
Low Alarm Limit
Minimum recorded value
High Alarm Limit
Maximum recorded value
Average



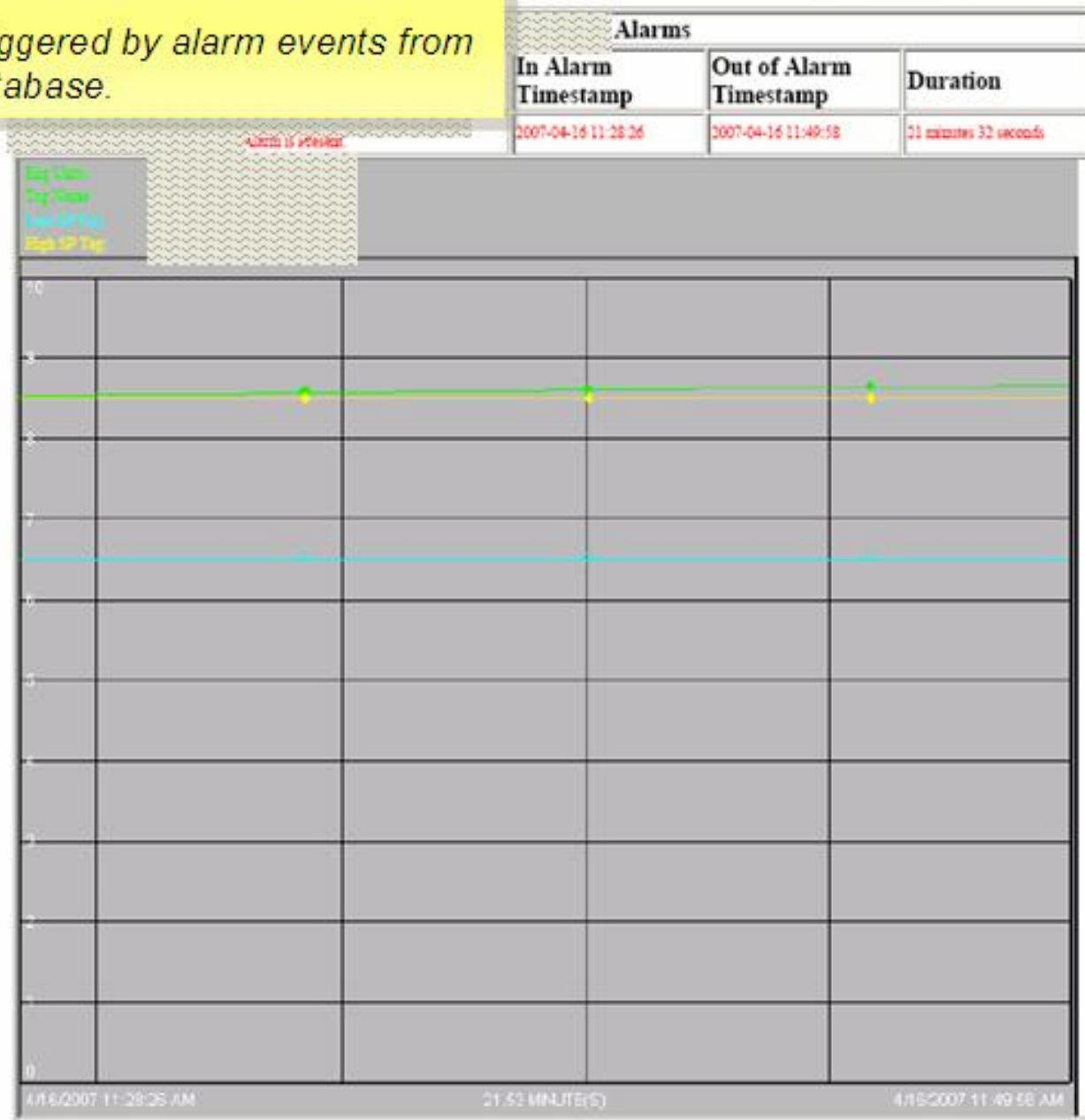
Out Of Specification (OOS) events

⑩ Reviewers are able perform rapid reviews by focusing on reviewing OOS events.

B10- [REDACTED]		
[REDACTED]	Value	Time
Low Alarm Limit	6.50	—
Minimum recorded value	0.14	20-Apr-07 02:51:18 PM
High Alarm Limit	8.50	—
Maximum recorded value	10.00	16-Apr-07 04:32:07 PM
Average	8.44	—

Conditional Trends

- ⑩ Trends are triggered by alarm events from a third party database.



Stand Alone Utilities Reports

- 7 reports
 - ▶ Autoclave, tote washers, clean steam generators
 - ▶ Small set of reports accounts for 80% of the system activity
- Equipment classes were utilized
- Manufacturing owns the reports
 - ▶ Individual areas sign off on their own reports
 - ▶ Autoclave reports generated for each cycle
 - 3 autoclaves run up to 5 cycles per day

Report Name: [REDACTED] - Version: 3.0
Report Effective Date: 01-Jan-05 06:00:00 PM

Batch ID: [REDACTED]

Equipment Identification: B10-GW-6930

Run Start Time	Run Stop Time	Duration
05-Jul-07 09:18:00.431	05-Jul-07 10:11:11.150	53 minutes 10 seconds

WFIH Rinse Conductivity (For WFI Rinse step)

Maximum Conductivity Setpoint: 1.25 mS/cm

Maximum Conductivity Recorded: 0.01 mS/cm

Result: MEETS SPECIFICATION

Cycle Status:

Cycle completed

BAS/BMS log report

- Newest reports
 - ▶ Added after initial implementation
- Reporting off SQL database
- First time-based reports for site
- Using RtReports instead of Crystal reports



Report Name: BASBMS Qualified Activity Log Version: 2.0

Effective Date: 31-Dec-69 06:00:00 PM

Start Time:01-Jun-07 12:00:00 AM

End Time:01-Jul-07 12:00:00 AM

Duration:30 days

Number of Times Printed:0

Last Printed By:

Last Printed At:31-Dec-69 06:00:00 PM

Activity Log Report

RTReports queries a view of a third party database

Qualified Activity Log Report

Time Stamp	User Name	Description	Operator Comment	Node Name
25-Jun-07 05:28:47 PM	mstaples	Saving the object 'BASBMSNet\B50_NC_BMS01\MicroLab2\ECR8330Temp2'	validation testing	B00WSBASBMS1
25-Jun-07 05:29:21 PM	mstaples	Saving the object 'BASBMSNet\B50_NC_BMS01\MicroLab2\ECR8320Temp3'	validation testing	B00WSBASBMS1
25-Jun-07 05:29:41 PM	mstaples	Saving the object 'BASBMSNet\B50_NC_BMS01\MicroLab2\ECR8320Temp4'	validation testing	B00WSBASBMS1

Benefits

- One system used and validated for reporting
 - ▶ Batch, workflow, signatures, time series, relational data
 - ▶ Only need to publish a report template - Not validate another system (i.e. Crystal or SQL)
- GMP impact
 - ▶ User can log in and do a weekly check on 20 or 30 important entries, not 5000 entries
 - ▶ Less likely to overlook important details
 - ▶ Time savings
- Electronic reporting
 - ▶ Reduction in the workflow around paper documents. Don't need to have assistants file documents, then move to different storage locations for long term storage

Challenges

- Issue: Stability issues in version 3.0
- Resolution: Software improved in version 3.1
- Issue: Initial reports longer than 30 minutes to generate
- Resolution:
 - ▶ Worked with the integrator to do benchmark testing
 - ▶ modified some stored procedures , switched interfaces to store data associated with very expensive queries in PI.
 - ▶ Report generation time is less than 2 minutes
- Issue: RTReports migration (migrating system from 1 server to another for testing) is difficult
- Resolution: Solved in RtReports Version 3.2 (server name removed from templates)

Challenges

- Issue: Problem backing up security
- Resolution: Solved in current release
- Issue: Managing security groups and people as local groups has been difficult
- Resolution: Solved with the security work that is going on in PI Server 3.5 and Analysis Framework 2.0
- Issue: Problem with cookie size and the number of security groups users are in (every report has its own security group for approving, commenting and verifying)
- Resolution: Solved in current release

Challenges

- Issue: A module is put into PI Module Database every time a report is viewed from the generator (problem with large amounts of auto-log data generated)
- Resolution: Solved in version 3.2 – moving the storage of report properties from the PI Module Database to PI Annotations
- Issue: Time based reports were not available at start-up (needed for BMS reports)
- Resolution:
 - ▶ Reports created as batch reports (daily, weekly, monthly)
 - ▶ Reports will be migrated to time based reports when version 3.2 is released
 - Looking at what PIANO will do for auto-generation, time based reports will provide more ease of use for operators
- Issue: RtReports provides more reporting and less analysis tools for tweaking of data
- Resolution: Datalink for Excel Services to be used

Conclusion

- Issues will come up with any project, but working together with OSIsoft, we have been able to resolve them.
 - ▶ PDL BioPharma can focus on the manufacturing and business issues
 - ▶ OSIsoft can focus on the software issues

Future Plans

- Batch Reports
 - ▶ To provide more value to plant operators, more process information with trends and diagnostics is being added to the initial GMP reports
 - ▶ Proposed for 2008, utilize RtReports with RTPortal for more access to plant floor operations by incorporating:
 - SAP tie ins (plant maintenance), equipment conditions, calibration data, LIMS
- PI Notifications to be installed
 - ▶ Currently a PI Notifications beta customer
 - ▶ Already contracted with integrator to migrate RtAlerts rules to PI Notifications
- RtReports 3.2 to be installed at release
 - ▶ Time based
 - ▶ Report parameters

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***Thank
You***

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VALUE NOW, VALUE OVER TIME