Honeywell

Honeywell Process Solutions

Honeywell XCEED Cirrus EIS™ at Gulf States Paper Corporation

GSPC experience using XCEED Cirrus EIS for plant-wide air compliance reporting

In today's marketplace downward pressure is constantly being applied to manufacturers from their customer base. Because manufacturers can't pass on incremental price increases for their product, and with raw material prices escalating, many mills have placed a significant interest on reducing their cost per ton of product produced. Reduction of man-hours required for non-value added tasks and services is an aspect always considered by smaller privately owned mills up to large corporations with multiple mills. One of these tasks is environmental compliance and the associated reporting. GSPC responded to the growing requirement of compliance reporting by developing a specification for a totally automated system to handle their current needs, plus the ability to grow into the future without additional software or hardware to accomplish the task.

This paper discusses the implementation of the Honeywell XCEED Cirrus EIS™ system, which GSPC has used to reduce man-hours required for compliance reporting. Those man-hours have been redirected into the process for quality and efficiency improvements.

Successful GSPC and Honeywell Partnership

Headquartered in Tuscaloosa, Alabama, Gulf States Paper Corporation is one of America's premier forest products companies. They provide wood, paperboard and packaging for use in both domestic and international markets. Privately owned since their beginnings in 1884, they hold strong to their founder's belief that "Quality Counts" in everything they do. They pride themselves in providing value-added solutions to their customers and in being fair, honest and open in all dealings. Honeywell has aided GSPC for many years in automating and optimizing their various processes, currently using the TDC 3000 DCS and PHD process data historian.

GSPC had implemented a piecemeal environmental reporting system in response to their Title V draft permit development. Specific monitoring and reporting requirements for various State and Federal programs had accumulated over the years, and now were collected within their draft Title V permit. Local resources developed an environmental events database from PHD alarm journals for several processes. But the reports from these alarms could not discount overlaps, nor discriminate startup and shutdown periods, during which exceedences are excusable for a certain percentage of overall operating time. Much manual work, referencing operator logs and process data, was needed to properly qualify and explain exceedences. Data collection and reporting needs vary widely depending on the process – NCG venting, parametric deviations, CEMS for TRS/O2 and opacity, and air emissions from waste water treatment.   GSPC engineers developed complex Excel spreadsheets, via the Uniformance Desktop, for the different process areas to partially automate the reporting process.

A new direction was needed to eliminate reliance on local programming resources and establish a platform for future growth. Honeywell introduced GSPC to its new XCEED division, which offers process automation delivery and environmental systems and services. The Honeywell XCEED Cirrus EIS™ software solution had grown over many years from reporting CEMS data, to encompassing the full suite of terms and conditions found in a typical Title V permit. Honeywell XCEED had recently implemented facility-wide Title V solutions at several chemical plants, clearly demonstrating the value of strong engineering design and information system expertise in delivering a successful Title V compliance management system.

GSPC developed a specification in early 2002 to replace NCG Venting alarm reporting, along with implementing their anticipated final Title V permit. In early 2003, Honeywell XCEED proposed and implemented its system over the next several months. Concurrent with the development, GSPC added enhanced reporting opportunities to the scope of work. The system was efficiently deployed, then GSPC identified areas to enhance control room operator input. Honeywell XCEED provided enhanced reason code entry and prototyped event questionnaires, currently being rolled out to all the control rooms. GSPC now has a single plant wide air compliance database for alerting and reporting, with the capability to easily integrate other monitoring areas in the future. Honeywell XCEED will be there every step of the way!

Using XCEED Cirrus EIS™

XCEED Cirrus EIS™ provides a base application and underlying source code configurable for the regulatory air emission requirements of utility and industry sites small and large, with a huge mix of potentially applicable regulations and reports. The Windows 2000 platform includes an HMI product with

a large library of PLC and DCS interfaces and OPC drivers, along with an industry standard Oracle database. This approach provides a great deal of flexibility for tailoring features to solve Gulf State's specific needs in a complex regulatory and operational environment. Base application upgrades apply to all XCEED Cirrus EIS users, and are backward compatible with earlier versions.

Integrating Cirrus EIS into GSPC's network. It was important for XCEED Cirrus EIS™ to reside in the existing network architecture (Figure 1). TDC 3000 DCS LCN nodes, PHD buffers and servers, and GUS operator stations share the Process LAN. A mill LAN is connected to the process LAN via a firewall. The Cirrus EIS server was added to this network for OPC access to the PHD server and Oracle calls to the Master Alarm Table. Cirrus desktops and view nodes can exist on either network. The Cirrus view node software was added to existing PCs on the network. Dedicated Cirrus desktops were added in each control room, for display of environmental trends and alarms, with operator responses logged into the environmental database. Honeywell XCEED has VPN Internet access from its Lakewood, CO offices for effective maintenance and upgrade support.

XCEED Cirrus EIS encompasses air emissions from the following processes:

- Bleach Plants
- Brown Stock Washers
- Chlorine Dioxide Plant
- Three Power Boilers
- Two Recovery Furnaces
- Lime Kiln
- Smelt Dissolving Tank
- Non-Condensable Gases system
- Wastewater Condensate Collection ponds

The PHD servers provide Cirrus EIS real time and historical data for all environmentally related parameters and status. If communication with the PHD archival process database is interrupted, Cirrus can automatically restore its databases from the PHD archives, should real time data collection be interrupted.

The installation at GSPC faced several unique problems in their Title V permit. Honeywell XCEED tailored the XCEED Cirrus EIS system to overcome those problems. These features included:

Title V Periodic Monitoring. GSPC has installed Continuous Emission Monitoring Systems (CEMS) on all boiler and lime kiln stacks for TRS under the Federal New Source Performance Standards. However, it is not practical to monitor various other hazardous emissions directly. Emission points are tested for expected emissions, or standard emission factors are applied to estimate annual emission totals. Production data may require daily or monthly entry. From this emissions inventory, Alabama Dept. of Environmental Management (ADEM) sets appropriate emission limits. Some limits are instantaneous, others short term minute, hourly, or daily rolling averages, and still others long term annual or twelve month rolling averages. Typically, one or more surrogate process parameters are designated for operating within set limits on the same averaging interval as the inferred emission.

For example, on the Bleach Plants, the scrubber overflow pH is monitored on a 5-minute rolling average of 1-minute data points. An exceedence occurs if the pH is lower than the average value during emissions performance testing for that source. Similarly on Bleach Plants, the 3-hr rolling average from 1-minute recirculation flow in gpm must exceed a minimum set point. Any minute these parameters' rolling average is lower than the set point constitutes a Title V deviation. Corrective action by operators is immediately required, and a "prompt" deviation report is sent to ADEM. The event is reported in the Title V semiannual deviation summary, and the annual compliance certification. The Cirrus EIS report interface screen and various Title V functions on the Title V Compliance Utilities screen are shown on Figure 4.

Cirrus EIS Data Flow Charts. Honeywell XCEED engineers responded to this and many other permit terms by preparing a Cirrus Data Flow Chart (Figure 2). The chart graphically represents the reduction of data from PHD signal tags to compliance averages. Function blocks in Cirrus range from simple block averages, algebraic calculations, a scripting language capable of combining analog and logical functions, to rolling averages or totals. As these blocks calculate their real time result at the end of the averaging interval, the results are stored to the database, and are available for trending, alarming, e-mail alerts, and reporting. Twenty four charts were developed to establish the basis for configuring XCEED Cirrus EIS™. These charts are standard procedure on every Cirrus EIS project. They ensure that Honeywell XCEED engineers thoroughly understand permit and specification requirements, and obtain client concurrence, before actually configuring the product.

Deviation Reporting from Alarm Journals. Each process unit has non-condensable gas (NCG) venting systems for low volume high concentration (LVHC), and high volume low concentration (HVLC) hazardous air pollutants. Normally, vent gases are routed to either of two boilers for combustion. But during process upsets and boiler unavailability, venting to atmosphere is required. These events must be logged and reported as deviations. A permit exceedence occurs when a certain percentage of venting time over process time is exceeded over a six month period. Refer to Figure 3 for a typical daily report. This report interface was provided for so that anyone at GSPC can use their Internet Explorer browser to for various total mill and process daily snapshots.

This information was derived from system alarm logs rather than conventional tag monitoring. A PHD shadow server (Figure 1) stored all plant alarms in an Oracle database – point ID, start time, end time. An existing application filtered for just the NCG alarms by key event and associated causative alarms, and provided reporting. Cirrus was deployed to replace this application and address many deficiencies. Cirrus discounts NCG alarms for overlap and SSM. A single alarm bridging boiler switchover or a daily boundary is split into separate alarms. This provides true reportable venting counts and times. These qualifications had previously been accomplished by spreadsheets.

Startup, Shutdown, Malfunction States. The Federal MACT standards encompassed in the permit allow excess emissions during process transitions and malfunctions. Excursions during these times are exempt from prompt reporting to ADEM and from the Title V deviations report. However, operators must document that they followed the SSM Plan, with an explanation if they could not follow it. SSM events must be identified to separate any parameter excursions from reporting, and to prompt operators for SSM plan documentation.

SSM states are automatically derived from PHD process data. For the Bleach Plant (Figure 2), the state is "running," if all three flow meters are greater than a threshold, "down" if all three flows are less than the

threshold, and in SSM for any other combination of flows greater than the threshold. During the "running" state, there can be reportable excursions of overflow pH, recirculation flow rate, and scrubber fan rpm.

Reason Codes and Questionnaires. Reportable excursions and exceedences require an explanation of cause and corrective action. Operators are prompted to enter a reason code from a predefined list, or to enter their own explanation of an excursion when it occurs. The reason codes and associated text are included in Excess Emission and deviation reports.

SSM events and Pollution Control Device Downtime events require the operator to fill in a questionnaire, affirming that the SSM Plan was followed. The operator fills out one section of the checklist – process startup, process shutdown, and control device malfunction. For startup, "yes" or "no" is checked for the question "Were the operating procedures followed?". If "no," the operator describes what action was taken and why the procedure was not followed. ADEM must be notified within two working days, followed by a formal letter within seven days, and the startup procedure must be amended within forty five days.

This capability was modeled last year on one process. Currently Honeywell XCEED is developing dedicated screens for each control room operator. The number of outstanding exceedences, SSM Events, Initial/Final PCD requiring a reason code or questionnaire response is displayed. The operator selects SSM, Initial and Final PCD, and Reason Code Selector buttons to work through outstanding events.

Wastewater HAPS from real time and laboratory inputs. Condensate Collection and Treatment hazardous air emissions from aeration ponds were calculated by a custom Excel Spreadsheet that pulled process data from PHD and manual inputs. It calculated the "Total Regulated HAP Collected & Treated" daily numbers to produce 3-day rolling averages to determine exceedences. Cirrus was configured to replace this system, plus provide Condensate Collection SSM states based on the number of running blower and agitator motors.

Cirrus monitors sixteen PHD parameter or status tags every minute to form 8-hour block averages. Thirty three zone surface agitators are inspected via PHD every eight hours, and the number of agitators running are then summed by zone. The operating time of four large air blowers is summed each day. These are coupled with daily manual inputs to calculate the total HAP treated 3-day rolling average. Manual inputs include laboratory results, zone geometries, and blower/gas flow items not in PHD. Nine sheets of data flow charting of similar complexity to Figure 2 developed the result. Since the illustrated data flow blocks are saved, it is easy to troubleshoot data reduction issues.

Benefits of XCEED Cirrus EIS

Consolidating plant wide environmental information and reporting into one application is a great convenience, but cost savings must be justified. It turns out that efficiency and convenience really do translate to on-going cost savings. Cirrus EIS eliminated a tremendous paper trail for deviation and SSM event tracking by operations and technical department management. They had to ensure that each event had been documented, with the questionnaire verified and filed properly.

Maximized Role for Control Room Operators. All environmental monitoring is now consolidated to one location within each control room. An operator responds only to alarms and events within his sphere of responsibility. Cirrus provides an electronic questionnaire triggered by a deviation or SSM event. The

operator must complete the questionnaire within 12 hours of deviation, otherwise operations management is alerted via email.

Prior to Cirrus EIS, the management chain for paper documents commenced with the operator, then continued with the shift supervisor, operations management supervisor, Pulp/Power Superintendent, Technical Department management person for area responsibility, and finally the Technical Department Clerk for filing. The new electronic questionnaires start with the operator and end with Cirrus EIS storing the questionnaire for future reference, thus eliminating the need to manually track environmental events and ensure accountability of the paper questionnaire.

Reduced Man-Hours for Compliance Reporting. Over two years ago, environmental reporting was accomplished by customized Excel spreadsheets for scrubber compliance & condensate collection, and a custom developed software program for tracking NCG venting via TDC Alarm Journals. Newer and more complex regulations loomed on the horizon for existing reporting efforts. Title V would be added along with requirements for more process systems. A decision had to be made to consolidate and automate the reporting process, or increase the Technical department staff. Cirrus EIS was justified by man-hour savings for current reporting, and the ability to handle future monitoring requirements. Different assigned engineers were used each day for the various process areas. Old methods of deviation tracking included,

- **Scrubber Compliance.** An assigned Technical Dept. engineer had to query for daily PHD data, run the spreadsheet, inspect the data, interpolate results, relate erroneous results with process upsets, and then publish results for management. This effort consumed 1.5 to 3 hours per day. Cirrus now produces these results automatically.

- **Wastewater Condensate Collection.** Some process data was available electronically, but an associate had to make aeration basin rounds by truck three times per day and record information on a log sheet. An engineer entered this data into a spreadsheet, evaluated, and published – 2.5 hours per day. Now all this information is electronically collected and processed by Cirrus EIS once every 24 hours.

- **NCG Venting.** Although NCG venting was automated to provide a summary of venting time per source and a detailed accounting of each event, several discounting rules were applied manually which allowed for certain venting events to be excluded from the mill's periodic venting limits. The need for discounting methods occurred after the NCG Venting Program was developed. GSPC elected not to continue development of a custom software program if another tracking means was being considered. An engineer needed 2 hours per day for these tasks. With Cirrus EIS, manual application of discounting methods is no longer required.

- **Title V Reporting.** Although no previous means was utilized to track draft Title V permit deviations, the new system would have to track them. GSPC anticipated hiring another full time engineer for this activity. With the installation of Cirrus EIS the additional manpower was not needed.

Redirected efforts to improve the process. Process improvements and lower environmental compliance costs both greatly benefit the bottom line. By redirecting existing staff to concentrate more on process monitoring and quality improvements, direct environmental cost savings are realized, but the

value of process quality improvements may be worth the environmental savings many times over. At GSPC, the Technical Department is completely responsible for environmental tracking and reporting.

At 14 man-hours/day, assuming seven days per week at a conservative $27/hr rate and 30% benefits, the annual savings is approximately $180,000.

Compliance Assurance from Complete and Accurate Reporting. Cirrus EIS provides tighter monitoring of environmental related process systems compared to previous means. This has resulted in streamlined operating procedures and reporting methods. Since data is collected virtually in real-time, immediate notification of possible deviations and actual deviations lead to a quick response for corrective action. GSPC engineers can adjust alert levels, so operators have a fighting chance to avoid deviations and exceedences. With e-mail capability, management can react to critical events in cooperation with their operators. Corporate-wide daily web browser deviation snapshots, brings all levels of management into the environmental data evaluation loop.

Real time accountability motivates individual performance and enhances GSPC corporate goals for outstanding, proactive environmental compliance. GSPC Title V permit is now final and its many terms and conditions require continuous compliance. If the plant were ever audited, engineers can direct visiting regulatory agents to XCEED Cirrus EIS™, the single source for any monitoring data they may want to review. The Plant Manager can confidently sign the plant's Title V annual certification of compliance, supported by accurate, complete, and defensible data.
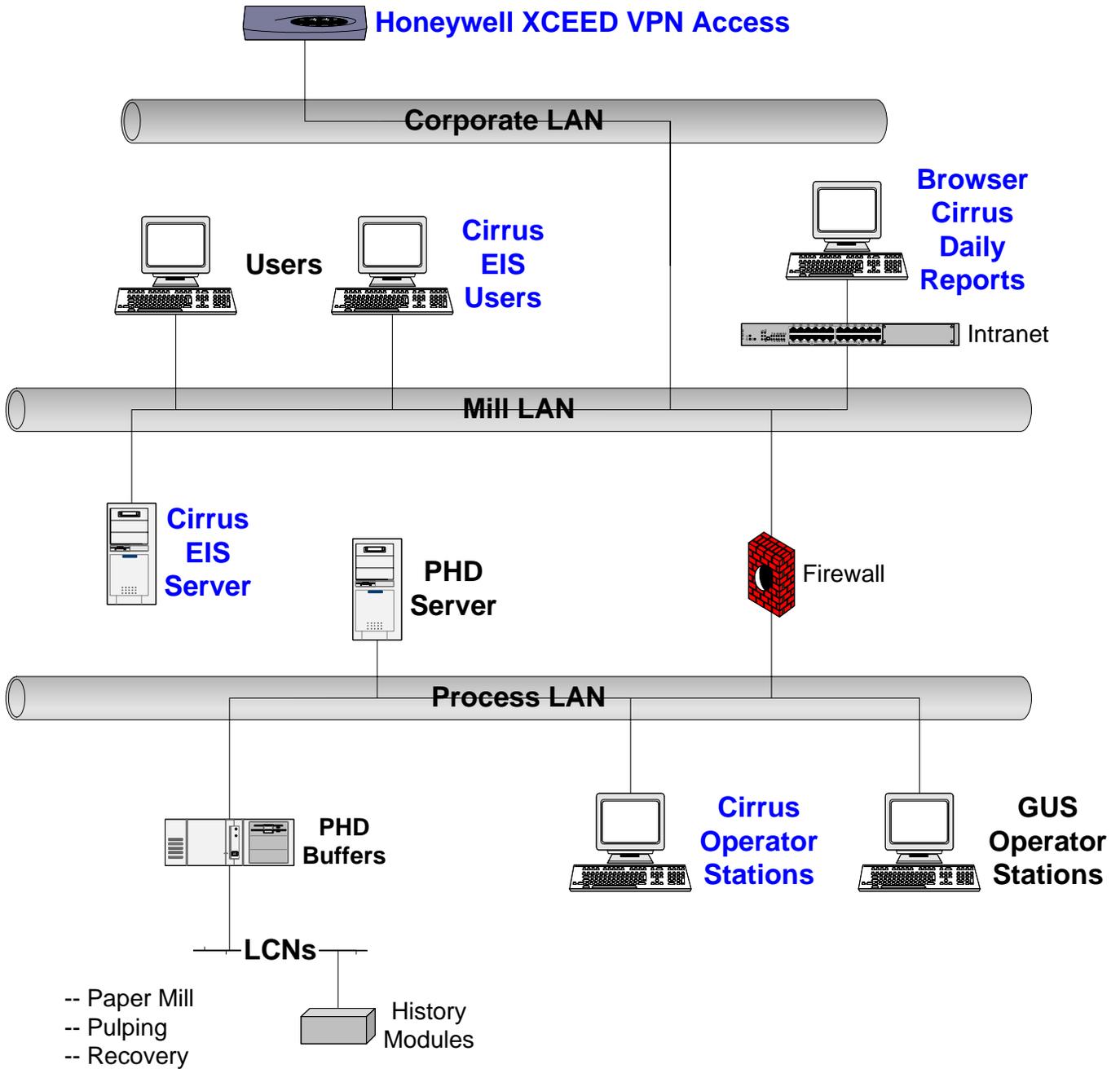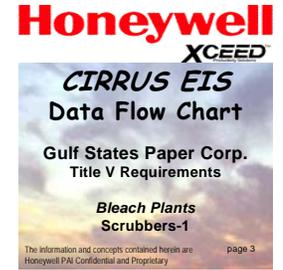
Figure 1: Gulf States Network Topology

Honeywell
XCEED
CIRRUS EIS
Data Flow Chart
Gulf States Paper Corp.
Title V Requirements
Bleach Plants
Scrubbers-1
The information and concepts contained herein are Honeywell PAI Confidential and Proprietary.   page 3

Permit Condition (XXX)	Bleach Plant	Scrubber Overflow pH Signal Tag	Recirculation Flow Signal Tag	Recirculation Flow Range (gpm)	MPGEE Arg (Y)
450	1	LCN2.47AC2218.PV	LCN2.47FC2217.PV	0 - 2000	1
500	2	LCN2.47AC1021.PV	LCN2.47FC1003.PV	0 - 1500	2

Condition XXXa
The emission of the Total Chlorinated HAPs shall not exceed 10 ppmv.

Condition XXXb
The emission of the Total Chlorinated HAPs shall not exceed 10 ppmv.

Compliance Technique
Record the scrubber overflow pH as a 5-minute rolling average. If the actual rate is < the set point, investigate cause and take corrective action.

Compliance Technique
Record the recirc. flow rate as a 180-minute rolling average. If the actual rate is < the set point, investigate cause and take corrective action.

Permit
Condition Ref = XXX0011
Process = Bleach Plant No. (See Table)
Emission Unit = Stack
Deviation Class = prompt

Permit
Condition Ref = XXX0013
Process = Bleach Plant No. (See Table)
Emission Unit = Stack
Deviation Class = prompt

Scrubber Overflow pH Alarm LimitLT
RAW: LimitLT * Factor

Note: User Constant feeds the Limit Block

Scrubber Overflow pH LimitLT
From Stack Test : 90% of tested value
MAX_VALUE sample 1min, avg 1min

Bleach Plant Running

Scrubber Overflow pH Signal
2-14 pH
Signal Tag: See Table
Confidence Level 0 or 100

Scrubber Overflow pH 1-minute
THRESHOLD
sample 1min, avg 1min

Running Scrubber Overflow pH 1-minute
CUSTOM: If (BP Running = 1) ,then Srcup = 1, else Srcup = 0

Scrubber Overflow pH 5-minute Rolling Avgerage, Running
ROLL
LIMITLT LOWLIMITLT LASTINVAL
Mval=1, Msrc=1

GEE | MPGEE-S Arg1 | MPGEE-P Arg(Y+44)

Alert Definitions			
CondRef	Property	E-mail	Dev
XXX0012	LOWLIMITLT	Alarm List	No
XXX0011	LIM ITLT	Deviation List	Yes
XXX0013	LASTINVAL	Deviation List	Yes

Alert Definitions			
CondRef	Property	E-mail	Dev
XXX0016	APPLFLAG1	Alarm List	No

Bleach Plant in SSM

In SSM Scrubber Overflow pH 1-minute
CUSTOM: If (BP in SSM = 1) ,then Srcup = 1, else Srcup = 0

Scrubber Overflow pH 5-minute Rolling Avgerage, in SSM
ROLL
LIMITLT LOWLIMITLT
Mval=1, Msrc=1

GEE

Alert Definitions			
CondRef	Property	E-mail	Dev
XXX0015	LOWLIMITLT	Alarm List	No
XXX0014	LIM ITLT	Alarm List	No

Bleach Plant Source Up

Source Up Scrubber Overflow pH 1-minute
CUSTOM: If (BP Srcup = 1) ,then Srcup = 1, else Srcup = 0

Scrubber Overflow pH 5-minute Rolling Avgerage, Source Up
ROLL
Mval=1, Msrc=1

Note: User Constant feeds the Limit Block

Recirc. Flow gpm LimitLT
From Stack Test : 90% of tested value
MAX_VALUE sample 1min, avg 1min

Recirc. Flow gpm Alarm LimitLT
RAW: LimitLT * Factor

Bleach Plant Running

Recirc. Flow Signal
See Table gpm
Signal Tag: See Table
Confidence Level 0 or 100

Recirc. Flow gpm 1-minute
THRESHOLD
sample 1min, avg 1min

Running Recirc. Flow gpm 1-minute
CUSTOM: If (BP Running = 1) ,then Srcup = 1, else Srcup = 0

Recirc. Flow gpm 3-hr Rolling Average, Running
ROLL
sample 1m average 1m
LIMITLT LOWLIMITLT LASTINVAL
Mval=1, Msrc=1

GEE | MPGEE-S Arg2 | MPGEE-P Arg(2*Y+44)

Alert Definitions			
CondRef	Property	E-mail	Dev
XXX0018	LOWLIMITLT	Alarm List	No
XXX0017	LIM ITLT	Deviation List	Yes
XXX0019	LASTINVAL	Deviation List	Yes

Alert Definitions			
CondRef	Property	E-mail	Dev
XXX0112	APPLFLAG1	Alarm List	No

Bleach Plant in SSM

In SSM Recirc. Flow gpm 1-minute
CUSTOM: If (BP in SSM = 1) ,then Srcup = 1, else Srcup = 0

Recirc. Flow gpm 3-hr Rolling Average, in SSM
ROLL
sample 1m average 1m
LIMITLT LOWLIMITLT
Mval=1, Msrc=1

GEE

Alert Definitions			
CondRef	Property	E-mail	Dev
XXX0111	LOWLIMITLT	Alarm List	No
XXX0110	LIM ITLT	Alarm List	No

Bleach Plant Source Up

Source UP Recirc. Flow gpm 1-minute
CUSTOM: If (BP Srcup = 1) ,then Srcup = 1, else Srcup = 0

Recirc. Flow gpm 3-hr Rolling Average, Source Up
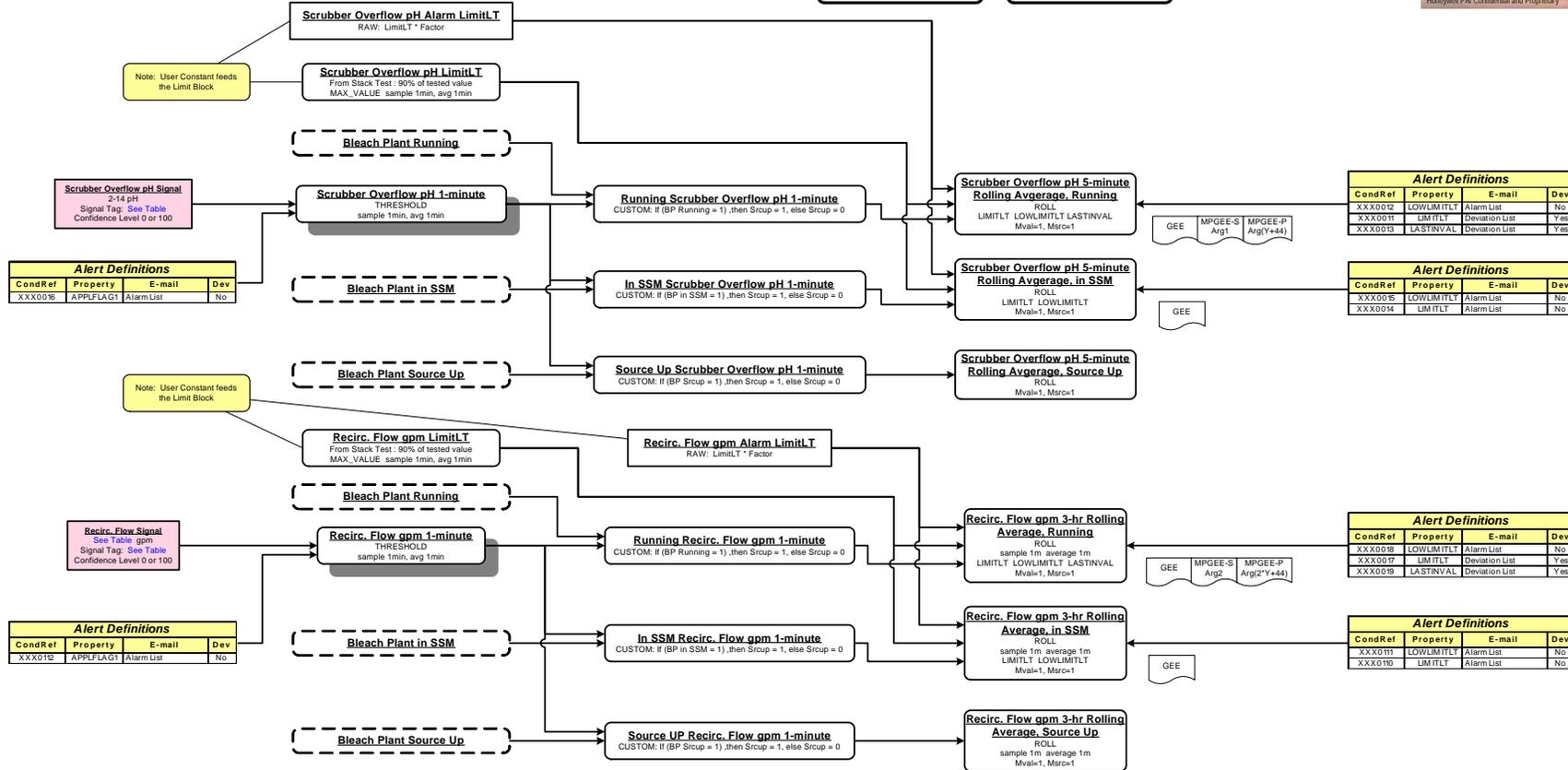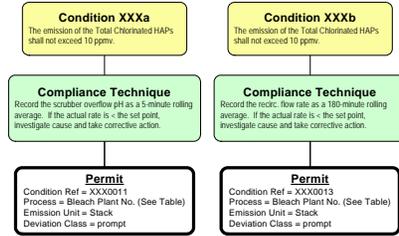ROLL
sample 1m average 1m
Mval=1, Msrc=1

Figure 2: Typical Cirrus Data Flow Chart

Honeywell Process Solutions

Environmental Reporting

NCG System Deviation Summary Report

Honeywell XCEED

Gulf States PAPER CORPORATION

Via the Demopolis Intranet

Main Menu | Select Date | View Reports

Date: Dec 10 2003
Time: 13:50

Honeywell XCEED

Begin: Dec 09, 2003 00:00
End: Dec 09, 2003 23:59

ENVIRONMENTAL EVENTS SUMMARY

NCG Event	Process Uptime (min)	Number of Events	Duration (min)
# 3 HVLC VENTING	1440.00	0	0.00
K1 CHIP BIN HVLC	1440.00	0	0.00
K2 BLOW TANK HVLC	1440.00	0	0.00
K2 CHIP BIN HVLC	1440.00	0	0.00
PB #1 HVLC VENTING	1440.00	0	0.00
PB #1 SCRN RM HVLC	1440.00	0	0.00
PB #3 SCRN RM HVLC	1440.00	0	0.00

Process Up (min) (pct)		Number of Events	Duration (min)	Report Limit(pct)	6 Mth Process Up (min) (pct)		6 Mth Limit(pct)
1440.0	100.0	0	0.0	0.0	264960.0	100.0	17.4

Report produced by Cirrus

DAS S/N (00000001)

Figure 3: Internet Explorer Browser Daily Report Example.

Figure 4: Typical XCEED Cirrus EIS Screens

More Information

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Products, Services, or Solutions, visit our
website www.honeywell.com/ps, or contact
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