

Engineering Procedure

SAEP-135

30 July, 2003

Saudi Aramco Process Automation System (PAS) Obsolescence Program

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1 Scope

This SAEP describes the implementation and administration of the Saudi Aramco Process Automation Systems (PAS) Obsolescence program. The purpose of this program is to continuously measure and report on the obsolescence state of all Saudi Aramco PAS.

The PAS obsolescence condition, as measured through this SAEP, is one of the inputs to developing the business case justification for PAS migration, upgrade or replacement projects. In itself, the result of the obsolescence measurement does not constitute justification, inclusion or approval of a project in the Capital Program.

2 Applicable Documents

2.1 Saudi Aramco References

None.

2.2 Other References

None.

3 PAS Obsolescence Glossary of Terms

3.1 Abbreviations

APC	Advance Control System
BOE	Board of Engineers
FPD	Facilities Planning Department
HMI	Human Machine Interface
MSO	Material Supply Organization
OTS	Operator Training Simulator
PAS	Process Automation System
P&CSD	Process and Control Systems Department
PMT	Project Management Team
SAEP	Saudi Aramco Engineering Procedures
SAP	Systems, Applications, and Products in Data Processing
TMR	Triple-Modular-Redundant ESD System
VQG	Vendor Questioner General
VQS	Vendor Questioner Specific

3.2 Definitions

Active Product: An Active Product is one that has been released for volume sales and is aggressively marketed for either new or existing installations and/or projects.

Active Phase (see Product Life Cycle graph): The Active Phase represents the time period in a product's life cycle during which it is considered an Active Product.

Active Technology: An Active Technology is a technology on which Active Products are based. As manufactures embrace new technologies, the products based on older technologies become superceded and eventually are no longer supported.

Active Vendor: An Active Vendor is a product manufacturer or component integrator who maintains a viable business and actively markets a product. The Process Automation Industry is like any other industry and is subject to business dynamics including; technology changes, business consolidations and outright failure. As a vendor's business changes, products can become superceded, replaced by product consolidation or no longer manufactured.

Classic Product: A product becomes Classic when the Vendor makes the decision to stop actively marketing a product for sales for either new installations and/or projects. During this period the vendor continues to support product maintenance through the sale of replace in kind product and/or spare parts.

Classic Phase (see Product Life Cycle graph): The Classic Phase represents the period of time in a product's life cycle during which is considered Classic.

Conventional Control System: A Conventional Control System is comprised of a single instrument or a group of instruments whose function include single loop control, indication, or recording. Technologies include electronics or pneumatics and the instruments can be either field mounted or panel mounted in a local control area or the main control room.

Field Measurement Devices: Field Measurement Devices measure physical parameters such as process composition, flow, level, pressure, differential pressure and temperature. Measurement devices signal outputs can be pneumatic or electronic, discrete or continuous, individually wired or addressable devices on a network.

Firmware: Firmware is a combination of both hardware and software. Hardware such as ROMs (Read Only Memory) or EPROMs that have software programs or data recorded on them is considered firmware.

Hardware: Instrumentation and Control System Hardware consists of physical devices like transmitters, I/O cards, power supplies, control processors, disk drives, display screens, keyboards, printers, integrated circuit boards, and silicon chips.

Limited Product: A product becomes Limited when the Vendor makes the decision to stop the manufacture of the product. See 'Notice of Withdrawal from Sale' on Product Life Cycle graph. At this point the Vendor support is typically limited to field service, workshop repair and the sale of refurbished spare parts.

Life Cycle (see Product Life Cycle graph): Life Cycle refers to a time based cycle, in which a product, after being introduced into a market, goes through the various phases such as Active to Limited, as market conditions change and time elapses.

Limited Phase (see Product Life Cycle graph): The Limited Phase represents the period of time in a product's life cycle after which the product has been withdrawn from sales. A product enters the Limited phase after its manufacturing ends. See 'Notice of Withdrawal from Sale' on Product Life Cycle graph. The support in this phase is typically limited to field service, workshop repair and the sale of refurbished spare parts.

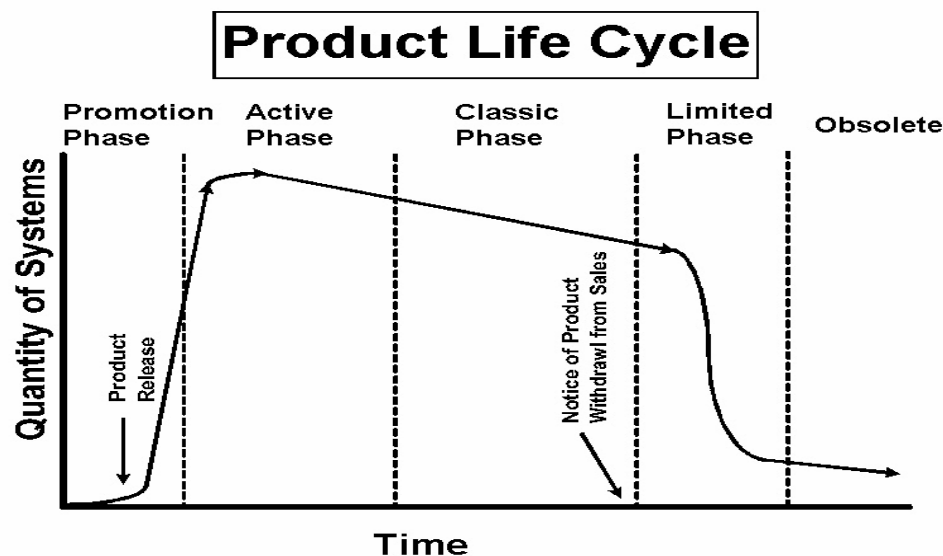
Migration: Migration is a stepwise or incremental process of upgrading technologies or products to a newer technology or more current product design.

Migration Path: The process of implementing a product Migration shall be considered a Migration Path. A Migration path may be horizontal or vertical. Horizontal migration incorporates the use of new products that coexist as part of an older system. Vertical migration involves the integration of an older system either directly, or as a result of an upgrade, into a new and/or higher level control system.

Obsolescence: Obsolescence is defined as the process of becoming obsolete. Obsolescence can be used to describe the process through which Process Automation equipment (technology/system/component) transitions during its life cycle from the 'original state' (design/installation) towards a state of being obsolete. The circumstances and parameters contributing to obsolescence have been identified in the 18 Obsolescence Criteria contained in Attachment II of this procedure.

Obsolete: No longer useful, i.e., when the function(s) performed by the equipment or system is physically or economically unsupportable.

Operating Life: Operating Life is the functional life of a control system. Life cycles are bounded by the Product Life Cycle with the typical cycle extending for 10-15 years.



Process Automation System (PAS): The system consisting of all four layers of complete process automation: instrumentation, control, plant information, and enterprise.

Product: Product refers to a manufactured item, hardware/firmware/software, that has been assembled into an instrument or control system component.

Product Life Cycle (see Product Life Cycle graph): Product Life Cycle refers to the phases that a product moves through as it progresses from product promotion through to obsolete.

Promotion Phase (see Product Life Cycle graph): The Promotion Phase represents the phase of a product during which testing and market place introductions take place prior to release for volume sales.

Software: Software shall be considered programming code, computer instructions or data that can be stored electronically. The storage devices and display devices are hardware. Software is often divided into two categories:

- **Systems Software:** Includes the operating system and all the utilities that enable the computer to function.

- **Applications Software:** Includes programs that do real work for users. For example, word processors, spreadsheets, and database management systems fall under the category of applications software.

System: System refers to the functional group of equipment that has been designated for Obsolescence Criteria evaluation. System equipment can be made up of different products from various manufacturers.

Technology: Technology refers to a specific scientific principle or set of principles which have been applied to a process or method inherent to the functionality of a product or device. Examples include: pneumatics, electronics, analog circuitry, digital circuitry, proprietary networks and open architecture.

4 Program Components

The PAS Obsolescence Program was developed in 2002 in response to a BOE request to measure and track the obsolescence of Saudi Aramco PAS systems. The Obsolescence Program currently consists of the following components:

- **Database:** A Company-Wide database of PAS information, accessible to all Business Lines, Admin. Areas and Departments that will be maintained in an up-to-date manner as prescribed by this document.
- **Criteria:** An eighteen point Obsolescence Criteria and scoring system with guidelines that are intended to provide an objective measure of obsolescence for existing Process Automation system or equipment. The Criteria will be periodically applied using the database to determine and track PAS equipment obsolescence.
- **Reports:** Upon completion of the Criteria evaluation, the results will be archived and obsolescence reports will be generated with flags highlighting specific areas of obsolescence risks and concerns.
- **FPD Planning:** PAS Obsolescence Reports shall be provided to Facilities Planning Department (FPD) as an input to the development of the business case analysis for new project submittals by Proponents, and shall be used for future updates of the Process Automation Master Plan.

5 Program Description

This section provides an overview of the management requirements of the PAS Obsolescence Database, Obsolescence Criteria, Scoring, and Reporting Systems.

5.1 PAS Database

5.1.1 PAS Description

The PAS database contains detailed information on the PAS hardware and software on each Saudi Aramco facility. The database tracks the following System types:

- Analyzers
- Automatic Tank Gauging System (ATG)
- Burner Management Systems (BMS)
- Combustion Gas Turbine Controller (CGTC)
- Compressor Control System (CCS)
- Conventional Control Systems
- Distributed Control System (DCS)
- Emergency Shutdown Systems (ESD, i.e., relay, solid-state, TMR)
- Field Devices
- Flow Metering Systems
- Programmable Logic Controller (PLC)
- Remote Terminal Unit (RTU)
- Rotating Machinery Protection Systems (RMPS)
- Supervisory Control and Data Acquisition (SCADA systems)
- Terminal Management System (TMS)

Commentary Note:

The above details Systems types, additional equipment that are associated with these Control System types, such as OTS or APC, etc., should be considered when an evaluation of a PAS is conducted.

Database will be updated on a periodic time schedule and is intended to allow obsolescence scores to be generated for each facility's PAS system. The details of all database fields are included in *Attachment I: Obsolescence Database*.

5.1.2 Database Information Gathering

Database contains fields of data originating from the Proponent, P&CSD, FPD, MSO, and the Vendor. Each organization will be responsible for performing its own information gathering, as defined in *Attachment I: Obsolescence Database*.

Commentary Note:

There will be no request or 'reminder' from P&CSD to initiate the database information gathering or input.

5.1.3 Database Access

The Obsolescence Database will be shared over the Company intranet to the assigned Proponent, P&CSD, MSO, and FPD representatives with password access.

5.1.4 Database Update

See section 6.

5.2 PAS Obsolescence Criteria

5.2.1 PAS Obsolescence Criteria Description

The PAS Obsolescence Criteria consists of 18 individual criteria which are questions selected to fully cover all aspects of PAS obsolescence. When scored and summed, they produce an objective measure of that System's obsolescence. Additionally, threshold values for each of the criteria have been established, significance level labeling set for each and those criteria that are at or below the threshold value will be flagged. These measurements provide for a more in-depth indication of the condition of the products, systems and facilities. *See Attachment II: Obsolescence Criteria and Scoring Procedure* for a detailed list of the Obsolescence Criteria and instructions for their use.

5.2.2 PAS Obsolescence Criteria Application and Scoring

5.2.2.1 The PAS Obsolescence Criteria are to be scored utilizing the information retained in the database. The Criteria require careful and deliberate evaluation using the best information and data available, therefore application of the Criteria will not be automatic and will require specific individual scoring for each plant. All current and historical Criteria scoring, along with all supporting narrative discussion, are contained within the Database, for access and reference. *See Attachment II: Obsolescence Criteria and Scoring Procedure*

5.2.2.2 The PAS Criteria are to be applied and scored for each PAS System type within each plant. Each of the Criteria has a 0-10 scoring, with 0 being the lowest score. Each of the Criteria currently has a fixed weighting (5.56), which gives each one an even scoring value across all eighteen. The score multiplied by the weight produces the composite criteria score. All 18 criteria summed make the System Obsolescence rating.

- 5.2.2.3 Additionally, each criteria question is assigned a Flag Significance, which is an indicator of the impact of the question to the obsolescence of the PAS. The "Flag Significance" can be High, Medium or Low. Further, for each of the Criteria questions the "Flag Significance" is assigned a "Flag Threshold Value" for the numeric evaluation score. If the numeric evaluation score is equal to or below the threshold value a "Flag" is set for that criteria question. This provides additional indicators as to the condition of the PAS.
- 5.2.2.4 Any of the three evaluators, the Proponent, FPD, and P&CSD, are able to enter their scores and comments for each evaluation. For the composite scoring, this team will come together and enter their agreed upon score. This composite score will be deemed as valid for all technical and business considerations.

5.3 PAS Obsolescence Alert and Reporting

5.3.1 PAS Obsolescence Global Alert

PAS Obsolescence Report will be generated and effected users will be notified when Global Criteria scoring falls below the normalized score.

The notification will contain specifics on the control system or sub-systems score trend-chart, and flags. For more details, see *Attachment III: Obsolescence Reporting*.

5.3.2 PAS Obsolescence Report

The PAS Obsolescence Reports, Global and Site specific Criteria scoring, are distributed to the Plant's Department and Business Line as well as to FPD. Additional distributions are made on an as-needed basis.

Commentary Note

PAS Obsolescence Reports are accessible via the Intranet.

5.4 Business Case Analysis

The PAS obsolescence condition, as measured through this SAEP, is one of the inputs to developing the business case justification for PAS migration, upgrade or replacement projects. In itself, the result of the obsolescence measurement does not constitute justification, inclusion or approval of a project in the Capital Program.

6 Program Responsibilities and Timing

6.1 Process & Control Systems Department (P&CSD)

6.1.1 P&CSD Obsolescence Coordinator

P&CSD is responsible for the overall administration, coordination, and execution of the PAS Obsolescence program, including ownership of this SAEP. The PAS Obsolescence Coordinator will be appointed by the Manager of P&CSD to carry out these day-to-day tasks.

6.1.2 P&CSD Database Access and Security

Each Proponent Department representing plant(s) as well as FPD and MSO Departments, shall identify a Department PAS Obsolescence Coordinator to P&CSD. P&CSD will maintain the list of Department Coordinators and is responsible to provide each with PAS Database security access. Department Coordinators will be the single point contact for all interdepartmental Obsolescence communications.

6.1.3 Database Input and Timing

P&CSD is responsible to obtain and input vendor specific Database information.

P&CSD shall coordinate the overall completion of the yearly update of the PAS Obsolescence Database by January 31 of each year. Proponent or MSO input received after this date will be included in the next-year database.

6.1.4 Criteria Application - Scoring and Timing

P&CSD is responsible for the application of the Obsolescence Criteria against the Database, and in the generation of the final Team (proponent/FPD/P&CSD) Obsolescence scores, which will be used with all proponent project proposal submittals. Criteria application and scoring shall be considered on a yearly basis.

Detailed instructions for applying the Criteria against the database, and in scoring obsolescence, is defined in Attachment II: Obsolescence Criteria and Scoring Procedure.

6.1.5 Obsolescence Scoring Reports - Distribution and Timing

P&CSD is responsible to generate and distribute the Obsolescence Reports for each plant PAS where criteria scoring indicates significant

system changes. Distribution shall correspond to no later than four weeks from the completion of the scoring activity and be sent to all Department PAS Obsolescence Coordinators.

Detailed instructions for report format, content, and the distribution list is defined in Attachment III: Obsolescence Reporting.

6.2 Proponent, FPD, MSO and PMT

6.2.1 Proponent Responsibilities

The Proponent Departments shall assure that the PAS data exists, for the various systems at their facilities. To this end, each Proponent shall identify their coordinator. This Coordinator is responsible for security access to the PAS Database within his organization. The Proponent will provide a member, who will represent their organization in a Team (Proponent/FPD/P&CSD) Obsolescence Scoring evaluation. He is also responsible to update the PAS Database with his Department data to coincide with the completion of any Obsolescence Scoring activity. Proponent Coordinators will receive PAS Obsolescence Reports from P&CSD and are responsible for its internal distribution. Coordinators will also be the single point contact for all interdepartmental Obsolescence communications.

6.2.2 MSO Responsibilities

The MSO Department will be required to enter PAS parts cost and supply data to the PAS Obsolescence Database. To this end, the MSO Department shall identify a Department PAS Obsolescence Coordinator. This Coordinator is responsible for security access to the PAS Database within his department. He is also responsible to update the PAS Database with his Department data to coincide with the completion of the yearly scoring activity. Department Coordinators will receive yearly PAS Obsolescence Reports from P&CSD and are responsible for its internal Department distribution. Department Coordinators will also be the single point contact for all interdepartmental Obsolescence communications.

6.2.3 FPD Responsibilities

FPD will be responsible to use the PAS Obsolescence Database as one input to a business case analysis on new project submittals from proponents, and for future updates to the Process Automation Master Plan. To this end, FPD shall identify a Department PAS Obsolescence Coordinator who is responsible for security access to the PAS Database

and will be the single point contact for all interdepartmental Obsolescence communications.

FPD maintains its traditional role of business case and project alternative analysis and the development of project justifications consistent with the Capital Programs investment policies and requirements of Corporate Planning and Finance.

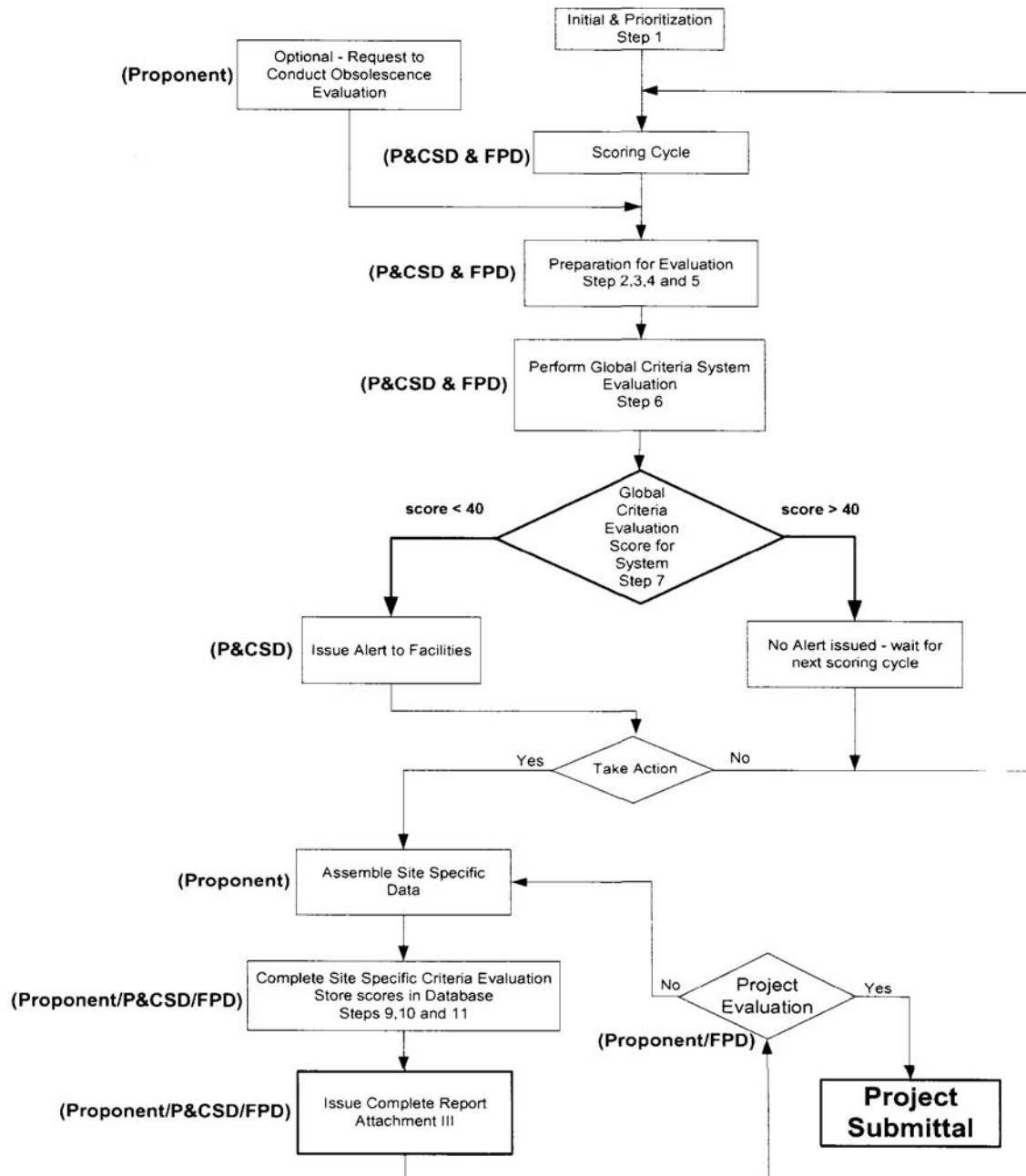
FPD will utilize Obsolescence criteria evaluations to identify business opportunities and assist in the development of migration, upgrade and replacement Programs and Planning Strategies via updates of the Process Automation Master Plan.

6.2.4 PMT Responsibilities

It is required by all new PAS projects that they deliver to P&CSD, a complete data set, in a format that can be quickly and easily imported into the database. The data set shall cover all products within the systems defined by this standard. Detailed instructions for the input of data are included in *Attachment I: Obsolescence Database*.

7 PAS Obsolescence Flow Chart

See attachment II for more details of steps.



8 Attachments

Attachment I : Obsolescence Database

PAS database Hierarchy Structure is shown in the attachment.

Access Control and privileges for the database are also shown in Attachment I.

Attachment II : Obsolescence Criteria and Scoring Procedure

Attachment III : Obsolescence Report

Two reports are presently available. These are the Graph of the Criteria Score and the detailed Criteria score with comments. See Attachment III.

Other reports and automatic delivery can be provided and are expected to be developed as more use of the database and customer requirements become known and are implemented.

30 July, 2003

Revision Summary
New Saudi Aramco Procedure.

Attachment I

Obsolescence Database

The Obsolescence database has the following Hierarchy Structure: For **Bold and underlined words** see 'Product Evaluation' screen from the menu bar.

Department (example: East/West Pipelines. **EW**)

Plant (example: Pump Station **PS** 1 - 11 and Pressure Reducing Station **PRS**-1)

System Name (example: EW PUMP STATIONS & PRS CONTROL SYSTEM) Note - each plant should have System Names assigned by the Department/Plant that are accepted as their common nomenclature.

System Type [example: PROGRAMMABLE LOGIC CONTROLLER (PLC)] Note – this System Type comes from the company wide list of Process Automation System Types as listed below:

- Analyzers
- Burner Management Systems (BMS)
- Combustion Gas Turbine Controller (CGTC)
- Compressor Control System (CCS)
- Conventional Control System
- Distributed Control System (DCS) Product
- Emergency Shutdown Systems (ESD, .i.e. TMR, Solid state, relay)
- Field Devices
- Flow Metering Systems
- Programmable Logic Controller (PLC)
- Remote Terminal Unit (RTU)
- Rotating Machinery Protection Systems (RMPS)
- SCADA Systems
- Tank Gauging System
- Terminal Management System (TMS)

System Product (example for PLC: Base Model) Note - this System Product comes from the company wide list that is a sub set of the System Type listed above, as listed below for Programmable Logic Controller (PLC) only:

- Base Model

- HMI/Console
- Software
- Power Supplies
- Miscellaneous

At this next level there are two possibilities that the **Manufacturer** *may* have a **Manufacturer Product Name** that has been assigned, for example TDC2000 or TDC3000 for Honeywell DCS. Manufacturer and the Manufacturer Product Name lists are set by the program Administrator.

Access Control and privileges for the database are as follows		
Capabilities Edit = Update/Add/Delete View = Read only		
Menu Selection	Proponent: Administrator only	Proponent: Valid login only
Department	View	View
Plant	Edit	View
System Type	Edit	View
System Product	Edit	View
Product System Name	Edit	View
Manufacture	Edit	View
Weight	View	View
User	View	View
User Access	View	View
Product	Edit	Edit
Product Evaluation	Edit	View
System	Edit	View
Report	Edit	View
Economic Data	Edit	Edit
Menu Selection	FPD: Administrator only	FPD: Valid login only
Economic Data	Edit	See Proponents list above
Product Evaluation	Edit	
Menu Selection	MSO: Administrator only	MSO & PMT: Valid login only
Product Evaluation	Edit	See Proponents list above
Menu Selection	P&CSD: Administrator only	P&CSD: Valid login only
Department	Edit	See Proponents list above
Plant	Edit	
System Type	Edit	
System Product	Edit	
Product System Name	Edit	
Manufacture	Edit	
User	Edit	
User Access	Edit	
Weight	Edit	
Product	Edit	
Product Evaluation	Edit	
System	Edit	
Report	Edit	
Others:	-none-	

Table: Database Access control listing

Attachment II – Obsolescence Criteria and Scoring Procedure

The obsolescence evaluation criteria are listed below and described in more detail later

- Criterion 1.** Rate the support for the technologies utilized in this system.
- Criterion 2.** Rate the migration path of the technologies utilized in this system.
- Criterion 3.** Rate the current state of the engineering technical support, available from any acceptable source, for the products utilized in this system.
- Criterion 4.** What is the support life for the products utilized in this system?
- Criterion 5.** Rate the migration path of the products utilized in this system.
- Criterion 6.** Rate the installed base growth, within Saudi Aramco, for the products utilized in this system.
- Criterion 7.** Rate the installed base growth, on a world wide basis, for the products utilized in this system.
- Criterion 8.** Rate the 'engineering' expertise available, within the proponent department/plant/facilities, for the products utilized in this system.
- Criterion 9.** Rate the engineering expertise available, from resources outside Saudi Aramco, for the products utilized in this system.
- Criterion 10.** Rate the recent replacement parts delivery time, from any source to the Saudi Aramco supply system, for the products utilized in this system.
- Criterion 11.** Rate the 'maintenance' expertise, available within the proponent department/plant/facilities, for the products utilized in this system.
- Criterion 12.** Rate your access to training, inside Saudi Aramco, for the products utilized in this system.
- Criterion 13.** Rate your access to training, outside of Saudi Aramco, for the products utilized in this system.
- Criterion 14.** Rate the annual failure rate of the products utilized in this system in your installed base.
- Criterion 15.** Rate the vendor's maintenance support, within the Middle Eastern region, for the products utilized in this system.

Criterion 16. Rate the percentage of system functionality that remains available from the products utilized in this system?

Criterion 17. Rate the ability to expand, enhance or upgrade this system to incorporate additional functionality.

Criterion 18. Quantify the system failures, caused by product failures, which have caused plant shut downs or operational/equipment upsets for the system being evaluated.

The following procedure has been developed for the purpose of objectively evaluating Process Automation Systems with respect to their individual state of Obsolescence as measured by the Criteria. The procedure incorporates the use of a representative team of individuals from Proponent organizations, P&CSD and FPD. The team shall meet, review the system, visit the site, review relevant data, and confirm the agreement between system boundary definitions and the database. Individual scoring shall be developed by each team member in advance of the team scoring.

The evaluation team shall utilize the Criteria clarifications, guidelines and scoring matrices/tables to determine the composite score for the particular system being evaluated. The team shall utilize the detailed steps outlined below:

1. P&CSD and FPD will prioritize the facilities for System boundary definition and the reduced scope database population across Aramco facilities.
2. Determine the members for the representative team that will be evaluating the particular facility system(s). Include the Technical Steering Committee Chairman for the particular hardware when it is appropriate (not all control system equipment have a Steering Committee Chairman).
3. Setup a coordination meeting for the members of the evaluation team. Select a team evaluation coordinator for the purpose of communication and expediting the process. Confirm that the proponent has populated the database to the control processor level for the control systems as their facilities.
4. The Team shall obtain, or develop when not available, topology (system architecture) drawings and control system descriptions for the systems to be evaluated. The team coordinator should verify that all the members have the drawings and access to the database including vendor, proponent, and MSO data as well as any appropriate reference material.
5. Reconvene the evaluation team after the site visit. The team shall verify or develop the boundaries of the control system equipment to be evaluated. The team shall verify that the system boundaries are consistent with the system data existing in the PAS database for each specific control system. The team shall

coordinate any modifications to the database to maintain consistency between the database and the system boundaries. As a minimum, this data should be complete to the control processor level.

6. P&CSD and FPD will utilize the System boundary definitions and reduced database to perform Global Criteria Evaluation (questions 1-7, 9, 12, 13, and 17) and Scoring. The target for completion of all Global Criteria Scoring will be 06/30/04 for all Aramco facilities.
7. When the Global Criteria Score falls below an initial, normalized threshold value of 40, the proponent will be responsible for compiling the remaining data. The remaining data collection shall be completed no later than six (6) months after the initial notification that the system has fallen below the threshold value.
8. No more than six (6) months after the Global Criteria Score has fallen below the threshold value, P&CSD, FPD and the Proponent representatives will be responsible for completing the Site Specific Criteria Evaluation (questions 8, 10, 11, 14, 15, 16, and 18) and Scoring for the system.
9. Assemble the evaluation team, review the topology drawings and any available system descriptions and perform a site visit. The following activities should be performed during the site visit:
 - Physically inspect the control system hardware that will be evaluated.
 - Investigate spare parts storage and warehousing, the use of cannibalized or salvaged spare parts, frequency of failures and the type of system problems that are occurring.
 - Inspect the training facilities, training system and hardware troubleshooting and testing facilities.
 - Talk to representatives from Engineering, Maintenance and Operations in order to develop an understanding of their perspective of the control system equipment.
 - Review the functional location code control system equipment structure in SAP.
10. Notify each team member that they are responsible for individually scoring the Site Specific Criteria (supply comments supporting scoring rational). The individual scores shall be input into the system and archived. The individual scores will be used as the basis for the team scoring and subsequent discussions.

11. The evaluation team shall develop the composite score for the system being evaluated. P&CSD shall login and input the composite scores as well as all commentary.

Commentary Note:

Develop a list of follow-up activities or clarifications as necessary to complete the Criteria Scoring. It is anticipated that all eighteen criteria may not be able to be scored based on incomplete or unclear data. A reasonable attempt shall be made to obtain the data. If the data can not be obtained within two weeks of the scoring activity, all available data shall be used to develop the score. The intention here is to expedite the process and not leave the scoring activity open pending additional data. A time limit must be imposed to close the activity.

The scoring results for the Global Criteria Evaluation Questions; 1, 2, 3, 4, 5, 6, 7, 9, 12, 13 and 17, universally apply to all Saudi Aramco facilities with similar system equipment. Note: Vendor Questions (both General and Specific) have been attached for reference.

The scoring results for the Site Specific Criteria Evaluation Questions; 8, 10, 11, 14, 15, 16 and 18, are site specific and dependent on the specific site conditions and circumstances.

The Obsolescence Scoring Criteria are listed below, which include the Criteria Questions, appropriate data sources, clarifications and guidelines for scoring the questions.

Criterion 1

Rate the support for the technologies utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to provide a score that is based upon many considerations such as; the number of years that the original vendor or third party sources will continue to support the technologies as an active business application, with consideration given to the type of technology utilized and the system compliance to international standards.

Data Sources for this Criterion:

Vendor Questionnaire General (VQG) #10 and #12,
Vendor Questionnaire Specific (VQS) #15 and #23,
Technical Steering Committee Chairman input.

Guideline for Scoring:

The score should be based on the years of stated support available. Other factors to consider in the scoring are the technologies applicable to the installation. Technology comparisons include; pneumatics vs. electronics, analog circuitry vs. digital, proprietary networks vs. open systems, and technology conformance to international standards. Utilize the matrix below to determine the score.

		Technologies Incorporated				
	Years	Pneumatic	Analog & Relay	Solid-state, Proprietary Networks	Digital	Open Architecture
	2	0	1	2	3	4
	3-4	1	2	3	4	5
	5-6	2	3	4	5	6
	7	3	4	5	6	7
	8-9	4	5	6	7	8
	10-11	5	6	7	8	9
	12	6	7	8	9	10

Flag Significance: Medium
Flag Threshold Value: 2

Criterion 2

Rate the migration path of the technologies utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to rate the activeness of the technology and its ability to be migrated to newer technologies. Considerations should include comparisons of utilized technologies versus what is considered current technology and the hurdles involved in affecting the migration such as the resources and expertise.

Data Sources for this Criterion:

VQS #1, #2 and #24

Technical Steering Committee Chairman input

Guideline for Scoring:

Examples include no migration path where pneumatic technology has been utilized and there is no path to open architecture information sharing type system. Wholesale replacement does not constitute migration. Utilize the matrix below to determine the score.

		Technologies Incorporated				
Migration	Path Description	Pneumatic	Analog & Relay	Solid-state, Proprietary Networks	Digital	Open Architecture
	No technology migration available	0	1	2	3	4
	Minimal migration available	1	2	3	4	5
	Complex migration available	2	3	4	5	6
	Difficult migration available	3	4	5	6	7
	Moderately involved migration available	4	5	6	7	8
	Partial yet simple migration available	5	6	7	8	9
	Complete and simple technology migration available	6	7	8	9	10

Flag Significance: Low

Flag Threshold Value: 2

Criterion 3

Rate the current state of the engineering technical support, available from any acceptable source, for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to rate the quality and current availability of known sources (original vendor or third party) of engineering technical support for the products utilized in this system. Support can include such services as: engineering, design, testing, installation, commissioning, maintenance, and troubleshooting.

Data Sources for this Criterion:

VQS #8

Technical Steering Committee Chairman input.

Guideline for Scoring:

Limited availability or short time horizon is indicative of a lower score. Knowledge levels, resource base and the logistics of attaining of engineering technical support should also be considered. Utilize the matrix below to determine the score.

		Resource Availability and Support Logistics		
Years	Years	Limited Quality/Quantity Difficult Logistics	Moderate Quality/Quantity And Logistics	Exceptional Quality/Quantity Simple Logistics
	2	0	2	4
	3-4	1	3	5
	5-6	2	4	6
	7	3	5	7
	8-9	4	6	8
	10-11	5	7	9
	12	6	8	10

Flag Significance: High

Flag Threshold Value: 2

Criterion 4

What is the support life for the products utilized in this system?

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to provide a score that is based upon many considerations such as; the number of years that the known sources (original vendor or third party) will continue to support the product. Other considerations include the type of technologies utilized in the product and compliance to international standards.

Data Sources for this Criterion:

VQG #11, #13, #14, #15, #16, #17 and #20,
VQS #16, #20 and #21,
Steering Committee Chairman input.

Guideline for Scoring:

Limited support or a short time horizon indicates a lower score. Product phase out and discontinuation of products utilizing the technology should be considered. Utilize the matrix below to determine the score.

		Technologies Incorporated				
Years of	Years	Pneumatic	Analog & Relay	Solid-state, Proprietary Networks	Digital	Open Architecture
	2	0	1	2	3	4
	3-4	1	2	3	4	5
	5-6	2	3	4	5	6
	7	3	4	5	6	7
	8-9	4	5	6	7	8
	10-11	5	6	7	8	9
	12	6	7	8	9	10

Flag Significance: High

Flag Threshold Value: 2

Criterion 5

Rate the migration path of the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to rate the ability to upgrade the product to a more current or active product. Considerations should include the extent of migration possible and the utility, purpose or benefit derived from such a migration. The rating should take into consideration the hurdles involved in accomplishing the migration such as the resources and expertise required.

Data Sources for this Criterion:

VQS #2, #3 and #26,
Technical Steering Committee Chairman input.

Guideline for Scoring:

Examples include no migration path where pneumatic technology has been utilized and there is no path to an electronic, open architecture information sharing type system. Complete system replacement does not constitute migration. Utilize the matrix below to determine the score.

		Technologies Incorporated				
Migration Path	Path Description	Pneumatic	Analog & Relay	Solid-state, Proprietary Network	Digital	Open Architecture
	No technology migration available	0	1	2	3	4
	Minimal migration available	1	2	3	4	5
	Complex migration available		3	4	5	6
	Difficult migration available	3	4	5	6	7
	Moderately involved migration available	4	5	6	7	8
	Partial yet simple migration available	5	6	7	8	9
	Complete and simple technology migration available	6	7	8	9	10

Flag Significance: Medium
Flag Threshold Value: 5

Criterion 6

Rate the installed base growth, within Saudi Aramco, for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to quantify the changes that are occurring in the use of this product within Saudi Aramco.

Data Sources for this Criterion:

Obsolescence Database product counts,
Technical Steering Committee Chairman input.

Guideline for Scoring:

Utilize the Obsolescence Database to identify other locations or facilities where this product is used. Quantify the change in the number of systems on a percentage basis. If there has been 'no growth or change' from the previous year then use the previous years score. If this is the first year of evaluation and there has been no change from the previous year, give it a score of ten. If there is only one of the particular system products in use or the product is unique within Aramco, give it a score of ten. Otherwise, utilize the table below to determine the score.

Score	Product Usage Change
0	Greater than 50% decrease in the user base since last year
1	Greater than 45% decrease in the user base since last year
2	Greater than 40% decrease in the user base since last year
3	Greater than 35% decrease in the user base since last year
4	Greater than 30% decrease in the user base since last year
5	Greater than 25% decrease in the user base since last year
6	Greater than 20% decrease in the user base since last year
7	Greater than 15% decrease in the user base since last year
8	Greater than 10% decrease in the user base since last year
9	Greater than 5% decrease in the user base since last year
10	Any increase in product usage since last year

Flag Significance: Low
Flag Threshold Value: 5

Criterion 7

Rate the installed base growth, on a world wide basis, for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to quantify the changes that are occurring in the installed base of this product on a world wide basis.

Data Sources for this Criterion:

VQS #12.

Guideline for Scoring:

Utilize vendor information about other companies and industry groups where this product is used. If there has been 'no growth or change' from the previous year then use the previous year's score. If specific data is NOT available from the vendor, every effort should be made to obtain data from alternate sources. Alternate sources should include various agencies like ARC Advisory or Gartner Group for marketing reports or industry surveys. Utilize the table below to determine the score.

Score	Product Usage Change
0	Greater than 50% decrease in the installed base since last year
1	Greater than 45% decrease in the installed base since last year
2	Greater than 40% decrease in the installed base since last year
3	Greater than 35% decrease in the installed base since last year
4	Greater than 30% decrease in the installed base since last year
5	Greater than 25% decrease in the installed base since last year
6	Greater than 20% decrease in the installed base since last year
7	Greater than 15% decrease in the installed base since last year
8	Greater than 10% decrease in the installed base since last year
9	Greater than 5% decrease in the installed base since last year
10	Any increase in product installed base since last year

Flag Significance: Low
Flag Threshold Value: 3

Criterion 8

Rate the 'engineering' expertise available, within the proponent department/plant/facilities, for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to evaluate the quality of engineering knowledge that applies to this product. Those who supervise these resources will be responsible for evaluating expertise levels such as problem solving, trouble shooting, and product knowledge.

Data Sources for this Criterion:

The Proponent Technical Supervisor or Site Representative.

Guideline for Scoring:

Knowledge level shall be based on the engineering supervisor's technical evaluations. Technical evaluations shall be based on everyday engineering requirements. Proponent input shall be utilized to evaluate engineering resource availability. If no engineering expertise is required for the product, i.e., routers/modems, then use a score of 10. Knowledge and technical expertise have been weighted heavier in the scoring matrix than resources available. Utilize the matrix below to determine the score.

		Engineering Resources Available		
Knowledge level		Low	Medium	Large
	Low	0	2	4
	Medium	3	5	7
	Expert	6	8	10

Flag Significance: High
Flag Threshold Value: 3

Criterion 9

Rate the engineering expertise available, from resources outside Saudi Aramco, for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to evaluate the quality of engineering expertise and its availability from either the original equipment manufacturer or third party sources that apply to the products utilized in this system. Those who deal directly with the outside resources will be responsible for evaluating expertise levels such as problem solving, trouble shooting, and product knowledge.

Data Sources for this Criterion:

The Proponent or Site representative.

Guideline for Scoring:

The scoring shall be based on the Proponent's and/or P&CSD's knowledge of the engineering resources and their availability. Technical evaluations shall be based on everyday engineering requirements. Proponent input shall also be utilized to evaluate resource availability. If no engineering expertise is required for the product, i.e., routers/modems then use a score of 10. Knowledge and technical expertise have been weighted heavier in the scoring matrix than resources available. Utilize the matrix below to determine the score.

		Engineering Resources Available		
Knowledge level		Small	Medium	Large
	Low	0	2	4
	Medium	3	5	7
	Expert	6	8	10

Flag Significance: Medium

Flag Threshold Value: 3

Criterion 10

Rate the recent replacement parts delivery time from any source to the Saudi Aramco supply system for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to measure the performance of any source, either original equipment manufacturer or third party vendor to deliver product replacement parts within the time frame dictated by operational demands. This scoring is independent of delivery carrier or method and the Saudi Aramco material cycle.

Data Sources for this Criterion:

VQS #17, #18, #19 and #30,
The Proponent or Site representative,
MSO representative.

Guideline for Scoring:

Utilize the table below to determine the score.

Score	Delivery Period
0	Vendor is unable to deliver parts
1	Greater than six weeks
2	Within six weeks
3	Within four weeks
4	Within three weeks
5	Within two weeks
6	Within ten days
7	Within one week
8	Within four days
9	Within two days
10	Within twenty-four hours

Flag Significance: High
Flag Threshold Value: 5

Criterion 11

Rate the 'maintenance' expertise, available within the proponent department/plant/facilities, for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to evaluate the quality of maintenance expertise and the availability of resources from within the proponent department/plant/facilities that applies to the products utilized in this system. Those who supervise these resources will be responsible for evaluating expertise levels such as problem solving, trouble shooting, and product knowledge.

Data Sources for this Criterion:

The Proponent Maintenance Supervisor or Site Representative.

Guideline for Scoring:

Knowledge level shall be based on the engineering supervisor's technical evaluations. Technical evaluations shall be based on everyday maintenance requirements. Proponent input shall be utilized to evaluate resource availability. If no maintenance expertise is required for the product, i.e. routers/modems, then use a score of 10. Knowledge and maintenance expertise have been weighted heavier in the scoring matrix than resources available. Utilize the matrix below to determine the score.

		Maintenance Resources Available		
Knowledge level		Small	Medium	Large
	Low	0	2	4
	Medium	3	5	7
	Expert	6	8	10

Flag Significance: High

Flag Threshold Value: 3

Criterion 12

Rate your access to training, inside Saudi Aramco, for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to evaluate the access to training and the availability of training resources within Saudi Aramco. The objective is to determine to what degree the company has the ability to train new personnel for this product.

Data Sources for this Criterion:

Proponent and Training organizations.

Guideline for Scoring:

Consider the availability of system equipment and qualified trainers for providing training to Saudi Aramco personnel. Utilize the table below to determine the score.

Score	Training Level
0	No system available or qualified trainers available
1	Cannibalized system and no qualified trainers available
2	Complete system and no qualified trainers available
3	Cannibalized system and qualified trainers reassigned
4	Complete system and with qualified trainers reassigned outside the Proponent Department
5	Complete system and qualified personnel within the Proponent Department
6-7	Ad hoc training
8-9	Routine training course provided
10	Company approved training courses

Flag Significance: Medium
Flag Threshold Value: 4

Criterion 13

Rate your access to training, outside of Saudi Aramco, for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to evaluate the access to training and the availability of the training resources outside Saudi Aramco. The objective is to determine to what degree the company has the ability to train new personnel with outside resources for the products utilized in this system.

Data Sources for this Criterion:

VQS #4, #5, #7, and #27.

Guideline for Scoring:

Consider the comprehensiveness of the system product curriculum, the frequency and location of training courses, and the availability of system equipment and qualified trainers for providing training to Saudi Aramco personnel. Utilize the table below to determine the score.

Score	Training Access and Availability
0	No system training available
1	Vendor will develop Special training on an ad hoc basis outside the Middle East regions
2	Ad hoc training can be arranged with vendor outside the Middle East regions
3	Ad hoc training can be arranged with vendor within the Middle East regions
4	Ad hoc training can be arranged with vendor within Saudi Arabia
5	Partial product line training available outside the Middle East region
6	Partial product line training available within the Middle East region
7	Partial product line training available within Saudi Arabia
8	Routine and Complete product line training available outside the Middle East region
9	Routine and Complete product line training available within the Middle East region
10	Routine and Complete product line training available within Saudi Arabia.

Flag Significance: Medium
Flag Threshold Value: 3

Criterion 14

Rate the annual failure rate of the products utilized in this system in your installed base.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

Any event within the system hardware or software, that reduces the availability of the equipment/system being evaluated to perform its function, constitutes a failure. Failure counts will be normalized to the total count for all the equipment within the system being evaluated, i.e., total failures/total count. High failure rate products should be noted within the Criteria comment section.

Data Sources for this Criterion:

VQS #10,
The Proponent or Site representative,
MSO representative.

Guideline for Scoring:

Utilize the table below to determine the score.

Calculation Example:

If the Department has 36 failures (total) over a three year period = 12 failures per year.
Then if there are 12 complete systems within the Department = 1 failure per system per year then 1 failure/12 systems = 8%

Score	Failure Rates
0	Greater than 20% of installed product fail on a yearly basis
1	Greater than 18% of installed product fail on a yearly basis
2	Greater than 16% of installed product fail on a yearly basis
3	Greater than 14% of installed product fail on a yearly basis
4	Greater than 12% of installed product fail on a yearly basis
5	Greater than 10% of installed product fail on a yearly basis
6	Greater than 8% of installed product fail on a yearly basis
7	Greater than 6% of installed product fail on a yearly basis
8	Greater than 4% of installed product fail on a yearly basis
9	Greater than 2% of installed product fail on a yearly basis
10	No failures within the last year

Flag Significance: High
Flag Threshold Value: 5

Criterion 15

Rate the vendor's maintenance support, within the Middle Eastern region, for the products utilized in this system.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to rate the quality and availability of known sources (original vendor or third party) of maintenance support for the system within the Middle Eastern region. This criterion is also intended to rate the level of hands-on maintenance support that the vendor will supply.

Data Sources for this Criterion:

VQS #9, #11, #13, #22, #28, and #31,
The Proponent or Site representative.

Guideline for Scoring:

Limited availability or short time horizon is indicative of a lower score. The ability to secure maintenance contracts on a full time or part time basis is also important. Utilize the table below to determine the score.

Score	Maintenance Support
0	No maintenance support available from any source
1	Limited ad hoc maintenance support as requested
2	Partially available ad hoc maintenance support as requested
3	Complete ad hoc maintenance support as requested
4	Partial contract maintenance support available on a cost plus (parts) basis
5- 6	Partial contract maintenance support available (limited parts and labor during normal working hours)
7 - 8	Full maintenance support contract available (all parts and labor during normal working hours)
9 - 10	Full 24/7 maintenance support contract available (all parts and labor)

Flag Significance: Medium
Flag Threshold Value: 2

Criterion 16

Rate the percentage of system functionality that remains available from the products utilized in this system?

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to measure the percentage of original system functionality or enhancements that were made that are still available. System functions include features related to operations, engineering or maintenance. Loss of functionality is typically attributable to degradation of system components, lack of spare parts, lack of technical support or expertise or discontinuation of product subsystems.

Data Sources for this Criterion:

The Proponent or Site representative.

Guideline for Scoring:

Review the systems functions that have been lost as you know the system today. Each lost function shall arbitrarily constitute 5% of the system. The System Functional Specifications documents can be used as a reference document. Both hardware and software functions shall be considered in this evaluation. Utilize the table below to determine the score.

Example: inability to do online backup of the system shall be considered the loss of a function or 5% of the system, leaving 95% available.

Score	System Functionality
0	50% Available
1	55% Available
2	60% Available
3	65% Available
4	70% Available
5	75% Available
6	80% Available
7	85% Available
8	90% Available
9	95% Available
10	All system functionality Available

Flag Significance: High
Flag Threshold Value: 6

Criterion 17

Rate the ability to expand, enhance or upgrade this system to incorporate additional functionality.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to evaluate the ability of the system to be modified to incorporate additional functionality. Applicability of the expansion, enhancement, or upgrade must be considered in the evaluation. Consider corporate driving factors or requirements. Advanced Process control, alarm management, statistical quality control, external interface inclusion, additional nodes are examples of functionality.

Data Sources for this Criterion:

System Evaluation Team.

Guideline for Scoring:

For systems in which expansion or upgrade do not apply, score the Criteria with a 10. Utilize the table below to determine the score.

Score	Ability to Expand, Enhance or Upgrade the System
0	Complete inability to incorporate expansion, enhancements or upgrade the system.
1-4	Minimal ability to incorporate expansion, enhancements or upgrades to the system.
5	Limited ability to incorporate expansion, enhancements or upgrades to the system.
6-9	Broad ability to incorporate expansion, enhancements or upgrades to the system.
10	Complete ability to incorporate expansion, enhancements, or upgrades to the system.

Flag Significance: Low

Flag Threshold Value: 2

Criterion 18

Quantify the system or component failures, which have caused plant shut downs or operational/equipment upsets for the system being evaluated.

Scoring: 0 to 10 WF = 5.56/100

Clarification:

This criterion is intended to evaluate the number of control system failures that effected equipment operations. More than likely the failure required engineering or maintenance work to return the equipment to operational status, however, this is not a requirement. Operational/equipment upsets can include rate reductions, product losses, or shutdowns necessary to institute repairs.

Data Sources for this Criterion:

The Proponent or Site representative.

Guideline for Scoring:

Utilize the table below to determine the score.

Score	Number of Control System Failures per Year
0	10 or more shut downs/equipment upsets per year
1	9 shut downs/equipment upsets per year
2	8 shut downs/equipment upsets per year
3	7 shut downs/equipment upsets per year
4	6 shut downs/equipment upsets per year
5	5 shut downs/equipment upsets per year
6	4 shut downs/equipment upsets per year
7	3 shut downs/equipment upsets per year
8	2 shut downs/equipment upsets per year
9	1 shut down/equipment upset per year
10	No failures that effected operations

Flag Significance: High

Flag Threshold Value: 8

Vendor Question - General questions:

Question Number	Manufacturer/Representative Question	Category	Field Type	Data Base Field Number
VQG1	Representative Name	General	Character	48
VQG3	Representative Address	General	Character	70
VQG4	Representative Contact Person	General	Character	49
VQG5	Representative Contact Position (or Title)	General	Character	116
VQG6	Representative Contact Telephone Number	General	Character	50
VQG7	Representative Contact Fax Number	General	Character	51
VQG8	Representative Contact email Address	General	Character	52
VQG9	Manufacturer's Web Site Address	General	Character	117
VQG10	How does your company define technical obsolescence?	General	Text	118
VQG11	How does your company define product obsolescence?	General	Text	119
VQG12	Describe the program(s) that your company has in place to manage technical obsolescence.	General	Text	120
VQG13	Describe the program(s) that your company has in place to manage product obsolescence.	General	Text	121
VQG14	Provide a document that describes your company's product lifecycle policy?	General	Text	122
VQG15	Describe the procedure that your company has in place to notify your customers about product lifecycle issues?	General	Text	123
VQG16	How much notice do you give your customers about product status changes?	General	Text	124
VQG17	Who do you contact within Saudi Aramco with respect to product status changes?	General	Text	125
VQG18	Describe the engineering tools and standards that your company has in place to protect customers and ensure the viability of product software?	General	Text	126
VQG19	Describe alternative procurement options for Process Automation Systems and associated external devices, i.e. lease with option to purchase?	General	Text	127
VQG20	Describe your "alliance/partnership" capabilities and experiences. Include provisions of existing plans, contacts, current clients and benefits and disadvantages of the program.	General	Text	128

Note: VQG2 has been removed (10/2002)

Vendor Question – Specific (to products) questions (Cont'd):

Question Number	Manufacturer/Representative Question	Category	Field Type	Data Base Field Number
VQS1	Describe the procedure for the migration of process applications to next generation hardware?	Specific	Text	59
VQS2	Describe the policies and procedures that your company has in place to ensure that Saudi Aramco's investment in application software is retained, now and in the future?	Specific	Text	129
VQS3	Describe the policies, plans and commitments that your company has to industry standards and interoperability?	Specific	Text	130
VQS4	Describe your training program and facilities for this product?	Specific	Text	65
VQS5	Do you have training facilities located in Saudi Arabia or the Gulf Region to support this product?	Specific	Logical	66
VQS7	How often do you run training courses at your training facilities?	Specific	Text	131
VQS8	Describe your engineering technical support capabilities?	Specific	Text	61
VQS9	Describe your maintenance program that provides hardware, software and technical support services for this product.	Specific	Text	68
VQS10	Describe your program for QA/QC failure analysis reporting for returned/failed parts?	Specific	Text	132
VQS11	Does your maintenance program include the use of third party products?	Specific	Logical	133
VQS12	Are there other major users in industry that continue to utilize this control system equipment?	Specific	Text	134
VQS13	Describe your software upgrade plan?	Specific	Text	56
VQS14	Have product alerts been issued on this control system equipment?	Specific	Text	135
VQS15	How many more years will you provide technical support for this product?	Specific	Text	57
VQS16	How many more years will you provide product support?	Specific	Text	62
VQS17	How many more years will you support the sale of spare parts?	Specific	Text	136
VQS18	Can large numbers of spare parts be purchased prior to the spare parts support cutoff date?	Specific	Logical	137
VQS19	What percentage of the hardware is still supported by the sale of spare parts?	Specific	Text	138

Vendor Question – Specific (to products) questions (Cont'd):

Question Number	Manufacturer/Representative Question	Category	Field Type	Data Base Field Number
VQS20	What is the product lifecycle in years?	Specific	Text	53
VQS21	At what point in the product lifecycle is the product?	Specific	Text	54
VQS22	Do you have an existing spare parts agreement with Aramco for this product?	Specific	Text	55
VQS23	Describe your strategy to support the technical life of this product?	Specific	Text	58
VQS24	Qualify the cost of the technology migration path relative to the cost of the installed product base at Aramco?	Specific	Text	60
VQS25	Describe your product migration path?	Specific	Text	63
VQS26	Qualify the cost of the technology migration path relative to the cost of the installed product base at Aramco?	Specific	Text	64
VQS27	Provide training course descriptions with location and cost information?	Specific	Text	67
VQS28	From what location do you provide maintenance support for this product?	Specific	Text	69
VQS29	Describe which system parts or major components are currently out of production and what is the alternative?	Specific	Text	139
VQS30	Describe your policy towards the supply of refurbished spare parts including relative cost and the warranty period?	Specific	Text	140
VQS31	What percentage of your customers utilize your maintenance support program for this product?	Specific	Text	141
VQS32	Please provide a model number breakdown for the major components of your system?	Specific	Text	142

Note: VQS6 has been removed (10/2002)

Attachment III - Obsolescence Report

Process Automation System Obsolescence Evaluation Summary

Department: East-West Pipelines
Plant: Pump Stations #1 through #11 and Pressure Reducing Station #1
System Name: EW Pump Stations and PRS Control System

Table One – Summary of Global and Site Specific Obsolescence Evaluation Results for the specified Process Automation Systems

System Type Evaluated	Criteria Score			Significance Flag Level Counts			
	Global Score (1,2)	Site Specific Score (2)	Composite Score (3)	High Flags (4)	Medium Flags (5)	Low Flags (6)	Total Flags (7)
PLC	24	40	30	7	6	2	15
SCADA	23	53	34	5	4	3	12
HMI	25	54	36	3	4	3	10
Network and Communications	28	57	39	4	4	2	10
CGT	67	71	69	1	2	1	4

Notes:

1. A Global Criteria score below the threshold of 40 triggers Proponent action to compile data and initiates Site Specific System Obsolescence Evaluations.
2. Normalized to 100.
3. Summation of Global and Site Specific scores normalized to 100.
4. Maximum of 8 flags possible.
5. Maximum of 6 flags possible.
6. Maximum of 4 flags possible.
7. Maximum of 18 total flags possible.

Based on the Obsolescence Evaluations and the concerns identified and documented during the evaluation, the Obsolescence Evaluation Team agrees to the following recommendations:

Table Two – Summary of Obsolescence Evaluation Recommendations

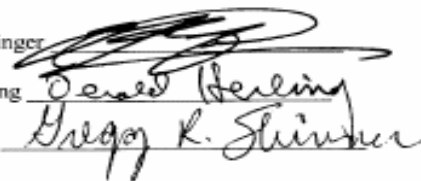
PAS	Recommendation
PLC	Collect Data to support a project Business Case Justification
SCADA	Collect Data to support a project Business Case Justification
HMI	Collect Data to support a project Business Case Justification
Network and Communications	Collect Data to support a project Business Case Justification
CGT	Continue Operation As-Is

Evaluation Team Signatures:

Proponent: J.F. Grainger

P&CSD: D.E. Herling

FPD: G. R. Skinner



System Specific PAS Obsolescence Evaluation Results

Global Criteria Evaluation Section

Evaluation Date (MM/YY): 11/11/2002

System Evaluated:

Department: East-West Pipelines
Plant: Pump Station 1-11 & PPS-1/1A
System: Pump Station Control System
System Type: PLC

Evaluation Team:

Proponent: J.F. Grainger
P&CSD: D. E. Herling
FPD: G. R. Skinner

Criteria #	Score (0-10)	Significance	Threshold	Flagged	Comments	Concerns
Criteria Question 1. Rate the support for the technologies utilized in this system.						
1	2	Medium	2	Y	The technologies employed for configuration and communication are all proprietary. However, the basic PLC technology will continue as an automation solution.	The proprietary technologies employed in these PLC systems limit compatibility to newer network and communications hardware.
Criteria Question 2. Rate the migration path of the technologies utilized in this system.						
2	0	Low	2	Y	There is no migration path for the upgrade of these PLC's.	The lack of migration path requires the replacement of this equipment to facilitate an equipment upgrade.
Criteria Question 3. Rate the current state of the engineering technical support, available from any acceptable source, for the products utilized in this system.						
3	2	High	2	Y	These legacy systems have minimal engineering support from Siemens. There are less than 4 years support remaining. These PLC's will be phased out per the Siemens life cycle policy in 2006.	The normal Aramco project cycle takes at least four years. The project cycle exceeds the remaining support life provided by the manufacturer. Plans need to be initiated now to deal with this issue prior to loss of manufacturer's support.
Criteria Question 4. What is the support life for the products utilized in this system?						
4	2	High	2	Y	As stated in 3 above, the vendor, Siemens, product support is 4 years based upon their life cycle policy.	Lack of vendor support for this equipment will make system maintenance more difficult and costly.
Criteria Question 5. Rate the migration path of the products utilized in this system.						
5	0	Medium	5	Y	There is no migration path for the upgrade of these PLC's.	The lack of migration path requires the replacement of this equipment to facilitate an equipment upgrade.
Criteria Question 6. Rate the installed base growth, within Saudi Aramco, for the products utilized in this system.						
6	8	Low	5	N	This product is no longer sold and hence it is impossible to have product growth. EWPD and Yanbu Terminal are the only users of these 560/565 PLC's in Saudi Aramco. BI-3536 plan to replace the 2 PLC's under Yanbu Terminal's responsibility, hence product decline.	Even though the Score is above the Flag threshold, diminishing user base in Saudi Aramco negatively impacts the vendor's incentive to provide support within the kingdom.
Criteria Question 7. Rate the installed base growth, on a world wide basis, for the products utilized in this system.						
7	5	Low	3	N	Insufficient data available to make a determination. However, this product is no longer sold and hence it is impossible to have product growth.	None
Criteria Question 8. Rate the engineering expertise available, from resources outside Saudi Aramco, for the products utilized in this system.						
8	1	Medium	3	Y	The vendor does not actively provide engineering support for these legacy PLC systems. Siemens would not provide a quotation for a support contract when asked in 2001. The Vendor stated, they did not have control over the supply of spare parts.	Without support from the vendor, maintenance of this equipment will be very difficult and continued reliable operation less probable.
Criteria Question 12. Rate your access to training, inside Saudi Aramco, for the products utilized in this system.						
12	1	Medium	4	Y	The training system at P&C has been cannibalized to provide vital spares for this system. No qualified personnel are available to provide the necessary training.	Without continued training of new personnel, the ability to maintain the system grows more difficult and increases reliance upon a diminishing pool of Aramco personnel.
Criteria Question 13. Rate your access to training, outside of Saudi Aramco, for the products utilized in this system.						
13	3	Medium	3	Y	In-Kingdom ad-hoc training can be provided by Siemens for the generic PLC systems. Specific product training cannot be provided as there is no complete system available in KSA.	Without continued training of new personnel, the ability to maintain the system grows more difficult and reliant upon a diminishing pool of Aramco personnel.
Criteria Question 17. Rate the ability to expand, enhance or upgrade this system to incorporate additional functionality.						
17	2	Low	2	Y	This product is no longer actively sold and hence it's expansion or enhancement would be minimal. The CPU firmware upgrade offered during Y2K is not compatible with the existing CPU modules or the CPU rack components. The TINA configuration software, version 3.1, is no longer available. Siemens offer version 5 only.	There is almost no ability to enhance or upgrade this system other than through replacement.
Global Evaluation Score out of 100	24	Number of Flags out of 11		9		

Global

TOTAL HIGH FLAGS	2
TOTAL MEDIUM FLAGS	5
TOTAL LOW FLAGS	2

System Specific PAS Obsolescence Evaluation Results

Site Specific Criteria Evaluation Section

Evaluation Date (M/D/Y): 11/11/2002

System Evaluated

Department: East-West Pipelines
Plant: Pump Station 1-11 & PRC-1/1A
System: Pump Station Control System
System Type: PLC

Criteria #	Score (0-10)	Significance	Threshold	Flagged	Comments	Concerns
Criteria Question 8. Rate the "engineering" expertise available, within the proponent department/plant/facilities, for the products utilized in this system.						
8	2	High	3	Y	The available Proponent resources are medium and knowledge level low.	There are limited proponent resources available to provide the required support for these systems.
Criteria Question 10. Rate the recent replacement parts delivery time, from any source to the Saudi Aramco supply system, for the products utilized in this system.						
10	3	High	5	Y	Parts delivery is 4 weeks or more. Specific components i.e. the AO module are no longer available. Siemens has indicated that they can supply spare parts on an "As-Available" basis only.	Limited parts availability impedes the ability to maintain the control system equipment and ensure operability. This is not a desirable situation.
Criteria Question 11. Rate the "maintenance" expertise, available within the proponent department/plant/facilities, for the products utilized in this system.						
11	2	High	3	Y	The available Proponent resources are medium and knowledge level low.	There are limited proponent resources available to provide the required support for these systems.
Criteria Question 14. Rate the annual failure rate of the products utilized in this system in your installed base.						
14	3	High	5	Y	Over the last three years there has been a 15% failure rate.	The failure history for these PLC systems show a high failure rate for the RBC & UHA modules. This is an unacceptable annual failure rate.
Criteria Question 15. Rate the vendor's maintenance support, within the Middle Eastern region, for the products utilized in this system.						
15	0	Medium	2	Y	When a request was made to Siemens to quote a service contract, they declined to make an offer stating that they had no control over the availability (supply) of system spare parts.	Without support from the vendor, maintenance of this equipment will be very difficult and continued reliable operation less probable.
Criteria Question 16. Rate the percentage of system functionality that remains available from the products utilized in this system?						
16	10	High	6	N	All original functionality is still provided by the system.	None
Criteria Question 18. Quantify the system failures, caused by product failures, which have caused plant shut downs or operational/equipment upsets for the system being evaluated						
18	8	High	5	Y	Shutdowns related to the PLC have been for repair purposes. The PLC redundancy prevents station shutdown.	Pump station shutdowns are required to make system repairs.
Site Specific Evaluation Score out of 100	40	Number of Flags out of 7		6		

Site Specific

TOTAL HIGH FLAGS	5
TOTAL MEDIUM FLAGS	1
TOTAL LOW FLAGS	0

System Specific PAS Obsolescence Evaluation Results

Criteria Evaluation Trend Section

Evaluation Date (MM/YY) 11/11/2002

System Evaluated

Department: East-West Pipelines
Post: Pump Station 1-11 & PRS-1/1A
System: Pump Station Control System
System Type: PLC

SUMMARY SECTION

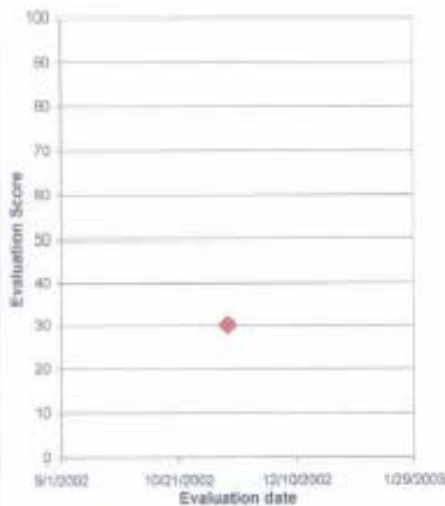
Global and Site Specific Criteria Evaluation Questions Flags

TOTAL HIGH FLAGS	7
TOTAL MEDIUM FLAGS	6
TOTAL LOW FLAGS	2

Global and Site Specific Criteria Evaluation Score

Global and Site Specific Evaluation Score out of 100	38
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Global and Site Specific Evaluation Score for - East-West Pipelines Pump Station Control System at PS-1 to 11 and PRS-1: PLC



Global and Site Specific Flags for - East-West Pipelines Pump Station Control System at PS-1 to 11 and PRS-1: PLC

