

# Engineering Procedure

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SAEP-20

28 September 2005

Equipment Inspection Schedule

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Document Responsibility: Inspection Dept.

## Saudi Aramco DeskTop Standards

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## 1 Scope

This SAEP establishes requirements for preparing original and revision of Equipment Inspection Schedules (EIS's).

This procedure covers requirements for inspection and testing of static equipment and external inspection of general equipment as described in Section 5.

This procedure does not cover requirements for preventive maintenance programs of rotating, electrical, instrumentation, and digital equipment.

## 2 Applicable Documents

### 2.1 Saudi Aramco References

#### Saudi Aramco General Instructions

|                    |                                                                         |
|--------------------|-------------------------------------------------------------------------|
| <i>GI-0002.600</i> | <i>Plant Unit Acceptance after T&amp;I Shutdown</i>                     |
| <i>GI-0002.710</i> | <i>Mechanical Completion and Performance Acceptance of Facilities</i>   |
| <i>GI-1781.001</i> | <i>Inspection, Testing and Maintenance of Fire Protection Equipment</i> |

#### Saudi Aramco Engineering Procedures

|                  |                                                                                          |
|------------------|------------------------------------------------------------------------------------------|
| <i>SAEP-122</i>  | <i>Project Records</i>                                                                   |
| <i>SAEP-308</i>  | <i>Operation Inspection Unit Reviews</i>                                                 |
| <i>SAEP-309</i>  | <i>Inspection of Community and Operations Support Facilities</i>                         |
| <i>SAEP-317</i>  | <i>Testing and Inspection of Shell and Tube Heat Exchangers</i>                          |
| <i>SAEP-319</i>  | <i>Pressure Relief Valves-Routine Test, Inspection, Quality Assurance and Regulation</i> |
| <i>SAEP-325</i>  | <i>Inspection Requirements for Pressurized Equipment</i>                                 |
| <i>SAEP-334</i>  | <i>Certification and Submittal of Saudi Aramco Engineering Drawings</i>                  |
| <i>SAEP-335</i>  | <i>Boiler Condition Assessment</i>                                                       |
| <i>SAEP-343</i>  | <i>Risk-Based Assessment for In-Plant Static Equipment</i>                               |
| <i>SAEP-1135</i> | <i>On-Stream Inspection Administration</i>                                               |

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Saudi Aramco Engineering Report

*SAER-2365                      Saudi Aramco Mothball Manual*

Saudi Aramco Engineering Standards

*SAES-A-004                      General Requirements for Pressure Testing*  
*SAES-A-005                      Preparation of Safety Instruction Sheets*  
*SAES-D-008                      Repairs, Alterations, and Rerating of Pressured Equipment*  
*SAES-D-108                      Storage Tank Integrity*  
*SAES-J-600                      Pressure Relief Devices*  
*SAES-L-001                      Basic Criteria for Piping Systems*  
*SAES-H-001                      Selection Requirements for Industrial Coatings*

Saudi Aramco Inspection Procedure

*00-SAIP-51                      Electrical Inspection*

Saudi Aramco Forms and Data Sheets

*SA 2601-ENG                      Equipment Inspection Schedule*  
*SA 2760-ENG                      Approval Request to Deviate from Equipment Inspection Schedule*

Saudi Aramco Drafting Manual

Inspection document "Schedule Q"

2.2 Industry Codes and Standards

American Society of Mechanical Engineers

*ASME B31.1                      Power Piping*  
*ASME B31.3                      Process Piping*  
*ASME B31.4                      Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids*  
*ASME B31.8                      Gas Transmission and Distribution Piping Systems*  
*ASME SEC I                      Power Boilers*  
*ASME SEC VIII D1                      Pressure Vessels*  
*ASME SEC VIII D2                      Pressure Vessels, Alternative Design*

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National Board of Boiler and Pressure Vessel Inspectors

*NB 23 National Board of Inspection Code*

American Petroleum Institute

*API STD 510 Pressure Vessel Inspection Code: Maintenance, Inspection, Rating, and Alteration*

*API STD 530 Calculation of Heater Tube Thickness in Petroleum Refineries*

*API STD 570 Piping Inspection Code*

*API STD 653 Tank Inspection, Repair, Alteration, and Reconstruction*

*API RP 573 Inspection of Fired Boilers and Heaters*

*API RP 574 Inspection of Piping, Tubing, Valves, and Fittings*

*API RP 580 Risk Based Inspection*

*API RP 581 Risk Based Inspection Resource Document*

### **3 Definitions**

#### **3.1 Equipment Inspection Schedule (EIS)**

EIS is a record that documents inspection intervals and inspection procedures of initial and subsequent T&I's and OSI for equipment within Saudi Aramco facilities.

#### **3.2 Corrosion Allowance**

Corrosion allowance is equal to the actual wall thickness minus the retirement or minimum wall thickness. This measurement may be different than the 'specified corrosion allowance' found on the SIS prepared in accordance with SAES-A-005 or other equipment drawings, prepared during the original design.

#### **3.3 T&I Interval**

The T&I interval is the time between scheduled T&I equipment downtimes. "Month" is the unit of time used for "intervals" in this document. The T&I interval will start upon completion of the T&I Acceptance Report per GI-0002.600 (Plant/Unit Acceptance After T&I Shutdown).

#### **3.4 I-T&I Interval**

The "I-T&I" interval is the initial interval between new or rebuilt equipment

commissioning and the first T&I overhaul.

### 3.5 Performance Alert

Performance Alert, Class 0, is the service class of equipment that requires more attention and intense monitoring than the next service class, Class 1, which is based on corrosion rate only. Examples are equipment with known history of problems that require special monitoring such as cracking, blistering severe corrosion, and severe fouling.

### 3.6 Static Equipment

Equipment that is not designed with rotating parts to propel process fluids, but rather is designed to contain, process, transport, and control fluids. Examples are columns, drums, vessels, boilers, heat exchangers, furnaces, flares, reactors, regenerators, tanks, scraper traps, piping, etc.

### 3.7 Parallel Equipment

Equipment units of identical construction that see the same process fluid conditions (i.e., if the flow branches out equally and is thereby shared proportionately by each unit) are referred to as parallel equipment.

### 3.8 T&I

The main purpose of the T&I (Test & Inspection) is to ensure the mechanical integrity, operation and safety of the plant/structure. This is primarily accomplished by thorough inspection and testing by plant inspection personnel.

### 3.9 Major Pieces of Equipment

For purposes of External Inspection, major pieces of equipment shall be interpreted as all equipment listed on the EIS drawings including interconnecting piping and items listed under the General Section.

### 3.10 General Equipment

General Equipment is equipment other than static equipment which include rotating equipment, electrical equipment, instrumentation, digital, building, structure, civil, etc.

### 3.11 Standard Equipment

Standard equipment is equipment that has a known material performance history due to similar applications documented in the industry.

### 3.12 New-Technology Equipment

New Technology Equipment refers to equipment used for new processes or that for other reasons lack material performance confidence.

## 4 Responsibilities

### 4.1 Project Management shall:

- a) Prepare the original EIS for equipment built by project management.
- b) Assign I-T&I and T&I intervals for new or rebuilt equipment built by project management. Project Management should determine intervals by knowledge of materials and process, based on designer or vendor advice, and by known inspection interval of similar equipment (See Sections 5.4 and 5.5).
- c) Ensure that original EIS is approved and distributed according to all requirements in sections 5.1.1 and 5.7 of this SAEP.

### 4.2 Operations/Proponent

#### 4.2.1 The Operations Inspection Unit shall:

- a) Prepare the original EIS for equipment built by maintenance and/or for equipment operating without original EIS.
- b) Review and adjust T&I intervals as needed (See Sections 5.5 and 5.8). The Operations Inspection Supervisor shall obtain assistance from the facility's corrosion and operations Engineers.
- c) Concur with the original EIS prepared by Project Management.
- d) Provide support documentation, review and concur with EIS deviation requests (See Section 5.8).
- e) Initiate / prepare EIS revision (See Section 5.9.1).
- f) Follow-up and expedite EIS revision and/ or EIS deviation requests.
- g) Maintain files for the original EIS's, EIS revisions, and EIS deviations.
- h) Monitor compliance with the approved EIS's and issue monthly non-compliance report to the plant management.
- i) Prepare and submit the annual T&I summary report to the Inspection Department (See Section 5.10).

4.2.2 Operations Engineering shall:

- a) Review & concur with the original and revisions of all EIS's.
- b) Initiate, review, and concur with EIS deviation requests.

4.2.3 T&I Planning Group

- a) Initiate / review and concur the form for using discretionary T&I extension (See section 5.8.1).
- b) Prepare annual T&I schedule based on approved EIS's and update on monthly basis.

4.2.4 Operations/ Proponent Management

- a) Shall review and approve the original and revisions of all EIS's.
- b) Shall review, concur and approve all deviation requests.
- c) Initiate/ review, concur with discretionary T&I extension (see section 5.8.1).

4.3 Area Loss Prevention Division

Shall review and concur to all acceptable EIS Deviation Requests according to section 5.8.2 of this SAEP. Unacceptable requests shall be returned to the initiator with recommended changes or reasons for rejection.

4.4 Inspection Department shall:

- a) Review EIS revision and deviation requests and concur with acceptable requests. Unacceptable requests shall be returned to the initiator with recommended changes or reasons for rejection.
- b) Provide support for original EIS preparation as requested and will review and concur with the final EIS.
- c) Maintain files for all approved EIS drawings, deviations and Annual T&I Reports.
- d) Conduct Plant Inspection Unit Review every 4-5 years and report non-compliance per SAEP-308.

## 5 Instructions

5.1 General

- 5.1.1 The EIS shall be included in the Inspection Record Book as part of the Project Record Book. The EIS shall be submitted for approval 60 days prior to mechanical completion.

- 5.1.2 Development of the EIS shall be in accordance with the applicable documents listed in Section 2.
  - 5.1.3 Saudi Aramco Form SA 2601-ENG (latest revision) shall be used for the preparation of the EIS's. Instructions for completing EIS forms are contained in the Attachment I with an example shown in Attachment IV.
  - 5.1.4 A Saudi Aramco Drawing Number shall be assigned to each EIS Form. Refer to the Saudi Aramco Drafting Manual and SAEP-334.
  - 5.2 Equipment Assignment
    - 5.2.1 EIS shall be prepared for internal and external inspection, and OSI of static equipment used in processing, production, handling, storage and transportation of hydrocarbons, petrochemicals, chemicals and utilities.
    - 5.2.2 EIS shall include external inspection requirements for all equipment inside the plant area. (See section 5.3.4 and 5.5.8)
    - 5.2.3 EIS for the inspection of general equipment used in the community and operation support facilities shall be prepared in accordance SAEP-309 requirements.
  - 5.3 EIS Listing by Plant and Equipment
    - 5.3.1 The EIS equipment column shall identify the equipment by type, number and name. A separate EIS series, identified by a single drawing number with as many sheets as may be needed, shall be developed for each plant. Refer to the Saudi Aramco Drafting Manual.
    - 5.3.2 Equipment shall be grouped in each EIS series according to type, such as general, columns, vessels, exchangers, furnaces, piping, etc.
    - 5.3.3 Equipment numbers for static equipment shall be listed in numerical order for each group in the EIS Equipment Column.
    - 5.3.4 The Equipment Column of the EIS shall include a General Section for external inspection that includes all electrical equipment, structures, foundations and buildings, substations, workshops, etc. This equipment shall be covered by reference without listing the individual items in the EIS. Itemized lists of all such equipment shall be maintained by each inspection unit for administering the inspection program. Also, see paragraphs 5.5.8 and 5.6.
    - 5.3.5 Equipment in parallel service shall be identified in the EIS and be cross-referenced to its parallel counterparts.
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#### 5.4 Initial T&I Interval Assignment

Inspection intervals shall be assigned for each equipment listed in an EIS Form SA 2601-ENG.

5.4.1 An Initial T&I (I-T&I), one-year after start up, is required for new plants or facilities involving technology, processes, or equipment new to Saudi Aramco. On other newly built plants or facilities, an Initial T&I between 12 to 24 months (maximum) shall be assigned as is common industry practice. The purpose is to inspect equipment internally for expected or unexpected corrosion, fouling, possible construction debris, internal coating/lining deterioration, affect of chemical injection, mechanical damage and to establish baseline data for benchmark purposes. The assignment of a time interval for this I-T&I is flexible and shall be determined by Area Operations Inspection. The length of this I-T&I interval shall not be influenced by material selection and/or design considerations, which may delay the onset of this I-T&I.

5.4.2 I-T&I intervals shall be assigned to all newly commissioned and rebuilt equipment except storage tanks that will have the I-T&I as the first regular T&I period (see note 5 in Table I) and carven tanks that will have the I-T&I's per 01-SAIP-06 and not to exceed 5 years. I-T&I's are required to check internal components for any unforeseen problems and to obtain more data to fix subsequent intervals. The I-T&I interval shall be of a sufficient duration to determine the next operating interval.

#### 5.5 T&I Interval Basis

Maximum permissible I-T&I and T&I intervals shall be based on equipment and service conditions or operating experience. I-T&I and T&I intervals shall be determined by applying the following factors:

5.5.1 Remaining Life - Remaining equipment life is based on the existing corrosion allowance divided by OSI generated corrosion rates, or historical corrosion rates. For example, a 75-um/a (3 mpy) average corrosion rate would require a 1.5 mm extra metal thickness to last twenty years.

5.5.2 T&I Intervals Based on Remaining Life - The T&I (or internal inspection) interval shall be at no more than one half the calculated remaining equipment life or ten years whichever is less. This SAEP meets API STD 510 requirements with the exception of T&I interval extension (See Section 5.8).

5.5.3 Service Criteria - Maximum Initial T&I (I-T&I) and maximum subsequent T&I intervals shall be based on the expected corrosion service (Both external and internal corrosion must be considered). Table I shall be employed to establish the following I-T&I and subsequent intervals:

5.5.3.1 I-T&I Intervals for Standard Equipment.

5.5.3.2 I-T&I Intervals for New-Technology Equipment.

5.5.3.3 Corrosion Rate Variations - Non-design process conditions such as process upsets and wet lay-up conditions can subject equipment to unexpectedly high corrosion or fouling conditions. During process upsets localized corrosion attack rates can be over a hundred times greater than regular process conditions. This will subject equipment to highly accelerated deterioration. All process and outage problems shall be documented and reviewed by the facility's Operations Inspection Unit for possible changes in intervals until the next T&I. Wet lay-up time shall be added to the operating time when determining the total equipment run-length for scheduling T&I's. Steam lay-up shall be considered wet lay-up.

**Table I – Maximum T&I Intervals Versus Corrosion Service**

| Corrosion Service                     |                                           | Initial T&I Interval (Months) <sup>(5)</sup> |                          | Subsequent <sup>(1)</sup>            |
|---------------------------------------|-------------------------------------------|----------------------------------------------|--------------------------|--------------------------------------|
| Class                                 | Criteria                                  | Standard Equipment                           | New Technology Equipment | T&I Intervals (Months)               |
| 0<br>Performance Alert <sup>(2)</sup> | 380 um/a (15 mpy) and up or Special Prob. | 24                                           | 12                       | 30 <sup>(1)</sup>                    |
| 1<br>Corrosive Service                | 150 to 350 um/a (6 to 14 mpy)             | 24                                           | 12                       | 60                                   |
| 2<br>Mild Corrosive Service           | 75 to 125 um/a (3 to 5 mpy)               | 24                                           | 12-24                    | 120 <sup>(3)</sup><br><sup>(4)</sup> |
| 3<br>Low Corrosive Service            | Less than 75 um/a (3 mpy)                 | 24                                           | 12-24                    | 120 <sup>(3)</sup><br><sup>(4)</sup> |

**Notes:**

- (1) Subsequent T&I intervals shall not exceed those listed for the specific equipment listed in Section 5.5.9.
- (2) "PERFORMANCE ALERT" (Class 0) refers to special material or process conditions, to address problems such as deaerator cracking, stress-relief-waived weld repairs, molecular sieve plugging, etc. Also, Class-0 refers to problems that require special monitoring such as for cracking, blistering, oxidation, creep, fatigue, fouling, and localized corrosion/erosion attack sites.
- (3) When equipment integrity depends upon internal coating integrity or is in Corrosion Service Class 1, as determined by area Operations Inspection, the maximum T&I interval shall be 60 months.
- (4) Equipment with internal critical coatings that are in mild corrosive service (Corrosion Service Class 2 or 3), as determined by area Operations Inspection, should have their T&I intervals based on anticipated coating life.

- (5) Initial T&I Intervals do not apply to storage tanks unless some chemical compound with an unknown corrosion rate is to be stored.

- 5.5.4 Materials -- Overall performance of alloys, internal coatings, liners, cladding, catalyst, sieves, anodes, etc., shall be reviewed by concerned Plant Units to determine the effect of the findings on future Plant T&I's.
- 5.5.5 T&I History -- After the equipment has been inspected internally, **Inspection's findings become the best basis for determining the new T&I interval.** Also the operational and repair history of equipment under similar process conditions shall be reviewed as this data can be an accurate indicator of the required T&I interval.
- 5.5.6 On-Stream Inspection (OSI) Performance -- External NDT thickness performance can provide information for lengthening or shortening T&I intervals. OSI can be conducted at any time, but maximum OSI program intervals shall be no more than one-fourth the remaining life or five years whichever is less, and in accordance with Table II. SAEP-1135 can be used to set up the OSI program. Applicable NDT results of vent and drain (deadleg) inspections including RT shall be documented in the OSI program and such inspection intervals shall be based on Table II maximum intervals. For buried pipelines other applicable NDT methods shall be used (see Note 6, paragraph 5.5.9).
- 5.5.6.1 Initial maximum OSI intervals shall be one year for Corrosion Class-1 and -2 equipment and two years for Corrosion Class-3 equipment. Corrosion Class-0 equipment intervals shall be one year, or less if specified for particular Performance Alerts. (Refer to Table II). Setting initial OSI intervals assumes that PMT provides baseline OSI thickness data. If this information is not provided with the project records, the proponent inspection unit will be responsible for establishing TMLs and baseline (benchmark) thickness data. Initially, corrosion classes must be based on anticipated corrosion. To establish actual corrosion classes requires two sets of thickness data including baseline data and data taken at the Initial OSI.
- 5.5.6.2 Subsequent OSI intervals shall not exceed the maximum intervals per Table II and shall be based on one of the following scheduling methods:
- Annual scheduling for logistical purposes.
  - Calculated scheduling based on remaining equipment life per the Operations Inspection Unit's OSI program and

applicable codes (ASME B31.1, B31.3, B31.4, B31.8, ASME SEC I, and ASME SEC VIII).

5.5.6.3 Maximum OSI interval for chemical injection point piping corrosion circuits shall not exceed 36 months per API STD 570.

**Table II – OSI Intervals Versus Corrosion Service**

| Corrosion Service                         |                                           | Maximum OSI Service Based On OSI Generated Data |                           | Maximum Initial OSI Intervals (Months) |
|-------------------------------------------|-------------------------------------------|-------------------------------------------------|---------------------------|----------------------------------------|
| Class                                     | Criteria                                  | Remaining Life (Yrs)                            | OSI Inspection Intervals  |                                        |
| 0 and/or Performance Alert <sup>(1)</sup> | 380 um/a (15 mpy) and up or Special Prob. | Less than or equal to 4 years                   | Remain, life divided by 4 | Less than or equal to 12 months        |
| 1 Corrosive Service                       | 150 to 350 um/a (6 to 14 mpy)             | 4-10 Years                                      | 12 months                 | 12 months                              |
| 2 Mild Corrosive Service                  | 75 to 125 um/a (3 to 5 mpy)               | 10-20 years                                     | 30 months                 | 12 months                              |
| 3 Low Corrosive Service                   | Less than 75 um/a (3 mpy)                 | Greater than or equal to 20 years               | 60 months                 | 24 months                              |

**Note:**

- (1) "PERFORMANCE ALERT" (Class 0) refers to special material or process conditions, to address problems such as deaerator cracking, stress-relief-waived weld repairs, molecular sieve plugging, etc. Also, Class-0 refers to problems that require special monitoring such as for cracking, blistering, oxidation, creep, fatigue, fouling, and localized corrosion/erosion attack sites.

5.5.7 Parallel Equipment - When one plant has parallel equipment (e.g., process trains, exchanger banks) with identical design, service, and operating conditions and an initial internal inspection (I-T&I) has been performed on all equipment as outlined in Section 5.5.3, paragraph 1, then the following adjustments to T&I (internal inspection) schedules may be considered:

- (a) If the basis for equipment integrity is critical coating, then internally coated equipment should be inspected on a schedule based on anticipated coating life. (Refer to Notes 3 and 4 of Table I).
- (b) If the internal conditions (e.g., corrosion/erosion patterns and locations) are similar on all parallel equipment at the initial inspection, then on each subsequent T&I (internal inspection), select a different train or piece of equipment (of parallel trains in the same plant). Results of the inspection on one will be considered representative of all similar equipment. If a problem is found on the unit inspected, prepare all similar items for inspection.
- c) Select for inspection the equipment having experienced the most

severe service or the most service time since the last internal inspection.

- d) A deviation request shall be submitted for all parallel equipment not opened for T&I. A process flow diagram shall be attached to each deviation request to show how the equipment is parallel.
- e) No parallel equipment units shall be allowed to skip more than two scheduled T&Is, or twenty years, whichever is less.

#### 5.5.8 External Inspection

Intervals for conducting external mechanical inspections will depend on whether the equipment location is classified as onshore or offshore per the definition in SAES-H-001 paragraph 4.1. Mechanical equipment in facilities that are classified as onshore shall be externally inspected every 24 months and such equipment in locations that are classified as offshore (marine) environment shall be externally inspected annually. External inspections for equipment listed on the EIS shall be performed and documented in the inspection records using a checklist. External electrical inspections shall be performed annually in the interest of safety. External civil inspections shall be performed annually for all locations classified as marine or that is washed down with brackish water. Plants classified as onshore and have sweet water wash down can utilize a 24-month external civil inspection interval. Also see paragraphs 5.3.4 and 5.6.

#### 5.5.9 Maximum T&I Intervals

Based on Saudi Aramco experience and practice, certain equipment types are subject to the following maximum T&I intervals:

| Equipment                             | Maximum T&I Intervals (Months) <sup>(1)</sup> |
|---------------------------------------|-----------------------------------------------|
| Air Receivers, Portable               | 36/72 <sup>(2)</sup>                          |
| Air Receivers, Stationary             | 60/120 <sup>(2)</sup>                         |
| All Surge Drums, Small <sup>(3)</sup> | 120                                           |
| Boilers, Fired                        | 24                                            |
| Boilers, Unfired                      | 36/60 <sup>(11)</sup>                         |
| Boilers Stacks                        | 120                                           |
| Deaerators                            | 24/49 <sup>(4)</sup>                          |
| Flare Tips and Stacks                 | 60                                            |
| Furnaces, Fired and Stacks            | 60                                            |
| Hydrogen Reformer Furnaces            | 48                                            |
| GOSP Desalters and Dehydrators        | 60/84 <sup>(13)</sup>                         |

|                                                                                          |                               |
|------------------------------------------------------------------------------------------|-------------------------------|
| GOSP Traps, Dry Crude                                                                    | 120                           |
| GOSP Traps, Wet Crude                                                                    | 60/84 <sup>(13)</sup>         |
| Isomax and Hydrotreater Reactors<br>Associated Equipment and Piping                      | 48                            |
| Fluid Catalytic Cracker Reactor and Regenerator<br>Associated Equipment and Piping       | 36                            |
| Platformer/Catalytic Reformer Reactors Associated<br>Equipment and Piping                | 48                            |
| Process Vessels, Pipelines, Associated Equipment<br>and Piping in Corrosive Service      | 60 <sup>(5 &amp; 6)(12)</sup> |
| Process Vessels, Pipelines, Associated Equipment<br>and Piping in Mild Corrosive Service | 120 <sup>(6)(12)</sup>        |
| In-Plant Buried Road Crossing Pipe                                                       | 60                            |
| Portable Equipment                                                                       | - <sup>(7)</sup>              |
| Relief Valves                                                                            | - <sup>(8)</sup>              |
| RLPG Piping                                                                              | 60                            |
| Storage Tanks and RLPG tanks at 2.5 psig and<br>less, including water                    | 120 <sup>(10)</sup>           |
| Storage Tanks, Refrigerated-Double Wall,<br>at Less Than 2.5 psig (17 kPa)               | 240                           |
| Parallel Equipment - See Section 5.5.7                                                   |                               |
| Mothballed Equipment - See SAER-2365                                                     | 99 <sup>(9)</sup>             |

**Notes:**

- (1) The selected T&I intervals may be less than the indicated maximums, but shall not be greater. Refer to paragraph 5.8 for deviations.
- (2) The longer interval is acceptable if an ultrasonic OSI survey (for pitting) is passed 6 to 12 months before the start of the scheduled interval.
- (3) Small air surge drums have a capacity of four cubic feet (30 gallons or 114 liters) or less, larger air surge drums fall under the regular "air receiver" category for T&I intervals.
- (4) Deaerator inspection, repair, and subsequent T&I intervals shall all be in accordance with SAEP-325.
- (5) Corrosive Service - those vessels, etc., who are in Corrosion Class 0 or 1, or whose corrosion rates are in excess of 6 mpy (150 um/a), or that are in wet (free water) sour (> 70 ppm H<sub>2</sub>S in the water phase) service.
- (6) All Piping/Pipelines shall be T&I'd at scheduled intervals by one or more of the following procedures or methods: UT (includes the OSI program), radiography, instrumented scraper, approved specialized NDT or a revalidation hydrotesting program .
- (7) Portable equipment such as portable air compressors, PDU's, boilers, etc., shall be given either a T&I or PM depending upon the frequency of use.
- (8) T&I intervals for relief valves are presented in SAEP-319.
- (9) The 99 mo. interval for mothballed equipment shall indicate no T&I (internal inspection) or OSI is required until the equipment is demothballed and recommissioned.
- (10) Acoustic Emission (AE) evaluation can be used for evaluating tank bottoms and an AE evaluation report along with other documents per paragraph 5.8 can be used to support an EIS deviation request.
- (11) The longer T&I Interval is acceptable for ASME SEC VIII vessels only when redundant PZVs and switchover (diverter) valves are provided per SAES-J-600, and PZV testing is provided per SAEP-319.
- (12) Buried and tape wrapped pipelines that are susceptible to SCC shall be revalidated using hydrotest or an NDT method, approved by the Inspection Department for detection of SCC, every five years.
- (13) The longer T& I interval for wet GOSPs equipment is acceptable based on recommendation of an engineering study approved by the inspection department.

## 5.6 Inspection Procedure

A brief procedure, to document special inspection techniques, shall be entered into the right column of the EIS Form for each equipment unit or group. In addition, applicable company procedures, standards, industry recommended practices and locally developed procedures and instructions shall be referenced. Sufficient space should be included between procedure entries to accommodate future references. In addition to special inspection steps, important equipment problems shall be documented. Typical problems that shall be documented are internal areas found during a previous T&I to have unexpectedly high corrosion attack, cracking, blistering, etc. Other significant information would be problems found on similar equipment that have an impact on inspection scheduling or on how inspection is to be conducted. A General Category as referenced in paragraph 5.3.4 shall be included at the beginning or end of equipment listed for each plant. The General Category procedure shall state the specific interval for conducting mechanical, electrical and civil external inspections as required by paragraph 5.5.8.

## 5.7 Original EIS Approval and Distribution

The original EIS shall be approved by the operations / proponent Department Manager or his designee after review and concurrence by the proponent operations organization and the Manager, Inspection Department or his designee. Refer to Section 4 of this SAEP, Inspection document "Schedule Q" and SAEP-122.

The approved EIS shall be transmitted to the SAO Proponent via the Project Record Distribution System (checklist). This information is required no later than 30 days prior to the mechanical completion phase of the plant or facility. A copy of each approved EIS shall be provided to the Operations Inspection Division of the Inspection Department.

## 5.8 EIS Deviation

Equipment under Saudi Aramco operations shall be Tested and Inspected (T&I) as per their approved EIS otherwise, the equipment shall be considered overdue for T&I. However, for situations when the T&I extensions are approved by satisfying paragraphs 5.8.1 and 5.8.2 below, the equipment shall be considered as approved overdue.

### 5.8.1 Discretionary T&I Extension

For flexibility in scheduling, T&I intervals specified on the approved EIS may be extended at the discretion of the facilities' Department

Manager utilizing the form in attachment III. Such extension shall be considered as a tolerance and shall not exceed three months, or one month for each year of the interval, whichever is greater. Such approval shall be obtained prior to publishing the T&I schedule that reflects the extension for the effected equipment. Distribution of the approved T&I extension form shall include the cc noted on Attachment III. If an extension is desired which will exceed the equipment's tolerance period then a deviation request should be processed per Section 5.8.2 of this SAEP. Tolerance extensions shall be based only on the approved EISs. Deviation requests should include the tolerance period since the tolerance is automatically cancelled by an approved deviation.

#### 5.8.2 T&I Extension

Deviation requests with supporting documentation attached shall be presented by the Operations Superintendent to the Inspection Department on Saudi Aramco Engineering Form 2760-ENG (latest revision) at least two months prior to the regular T&I due date. Deviation requests that are submitted less than the two months shall be accompanied by a letter signed by the Plant Manager. Justification must be provided and supported by inspection documentation. Supporting documentation shall include all of the following that are applicable:

- a. Up-to-date process flow diagram.
- b. Latest revision of Equipment Inspection Schedule.
- c. Current and historical OSI data.
- d. Copy of most recent external inspection findings (checklist, worksheet or inspection record). This inspection must have occurred within the past 6 months.
- e. Copy of most recent post T&I report.
- f. For tanks 150 ft (45.7 m) Dia. and larger, provide a recent tank bottom external settlement survey.
- g. Tank EIS deviation requests exceeding 12 months, including the allowable tolerance, must be supported by an Acoustic Emission evaluation report that supports the request.

#### *Commentary Notes:*

- 1) *Additional deviations may be obtained for storage tanks when:*
  - a) *the initial deviation request was granted for an interval equal to or greater than two (2) years*

- Commentary Note:*

Deviation requests are subject to the same review, concurrence, and approval requirements as an EIS Revision Request per paragraph 5.9.2 of this SAEF plus the Area Loss Prevention Supt. concurrence is required. **Note:** Deviation requests citing 'at the request of OSPAS' shall require a concurring signature from the Manager of OSPAS.

## 5.9 EIS Revision

### 5.9.1 General

Inspection intervals and procedures specified on the original EIS shall be based on experience with comparable equipment. Actual corrosion rates or related effects under process conditions could be significantly different from those originally predicted. This usually results in the need to revise the EIS to reflect the actual process conditions.

An internal inspection shall be made prior to placing equipment in a more severe service. The OSI and T&I information provided in the original EIS shall be used as a guideline. When sufficient operation or inspection data becomes available that indicates the approved schedule should be changed, the responsible area Inspection Unit shall submit a recommendation to Operations for an EIS revision. If Operations concurs, a revised EIS (Saudi Aramco Form 2601-ENG) indicating recommended changes shall be submitted for review and approval in accordance with Section 5.9.2 of this SAEP.

When a total plant facility is dismantled or all equipment is removed/abandoned due to end of useful life, the plant's EIS drawing shall be cancelled per the Drafting Manual by processing a drawing cancellation order. The reason for canceling the drawing shall be noted in the revision block on the EIS drawing and copies of both the cancelled EIS and the approved cancellation order shall be sent to the Inspection Department's Operations Inspection Division.

EIS revisions are required when:

- a. Changes between Corrosion Classes 0, 1 and 2 occur.
- b. When corrosion rates dictate a longer or shorter T&I interval for any piece of equipment.
- c. When new equipment is added to an existing plant.
- d. When equipment is mothballed or permanently removed from a plant.
- e. When existing equipment is not included in the current approved EIS.
- f. When Risk Based Assessment (RBA) study, per SAEP-343, recommended a revision on the existing EIS.

*Commentary Note:*

*Any questions on EIS Revisions should be directed to the Operations Inspection Division of the Inspection Department.*

#### 5.9.2 Concurrence and Approval

EIS revision request with attached documents that justify the proposed revision, shall be submitted for the indicated concurrence or approval to the responsible individuals or their designees in the following or equivalent positions:

Supervisor, Oper. Insp. Unit

Concurrence

---

|                                                                        |             |
|------------------------------------------------------------------------|-------------|
| Oper. Engr., Supt. or General Supr, Engineering                        | Concurrence |
| Superintendent, Operations                                             | Concurrence |
| Manager, Inspection Department                                         | Concurrence |
| General Manager, Operations<br>(or Plt. Manager if no General Manager) | Approval    |

Unacceptable revision requests shall be returned to the initiator with comments and recommendations identified.

The administration of approved EIS Revisions shall be in accordance with the Saudi Aramco Drafting Manual and SAEP-334.

#### 5.10 Annual T&I Summary Report

An annual T&I summary report shall be prepared by the responsible Operations Inspection Unit, signed by the facilities' Operations Engineering Superintendent and transmitted to the Operations Inspection Division of the Inspection Department by January 31 of each year. This summary shall be prepared by providing all the information shown on the form designated as Attachment II. All equipment listed on approved EIS forms is subject to the annual T&I reporting during the year in which the T&I is due. An explanation is required for each piece of equipment on the T&I summary that fails to comply with an approved EIS and/or deviation. An action plan must be noted in the comments section of the summary for any non-compliance.

#### Revision Summary

|                   |                                                                                                                                                                                                                                                                                  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 28 September 2005 | Editorial revision to modify paragraphs 4.2.3, 4.2.4 and 5.8.1 to clarify whom can request/initiate Discretionary T&I extension. Modify attachment III. Addition of requirements to revised the EIS for GOSPs equipment from 5 to 7 years.<br>Revised the "Next Planned Update." |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## **Attachment I – Instructions for Completing EIS Form SA 2601-ENG**

Instructions for Filling Out the Columns of Form SA 2601-ENG: As Per SAEP-20

### **Equipment:**

This column shall list the letter designating type equipment, vessel number and description/use (e.g., C-101, Contactor); this listing shall be in accordance with paragraphs 5.2, 5.3 and Attachment IV of this SAEP and each plant Master Equipment List.

### **Inspection Interval-Months:**

- a) OSI - This column shall contain maximum **initial** OSI intervals for all new major equipment items based on estimated corrosion rates and corresponding interval as defined in "Table II" of paragraph 5.5.6.2. After establishing corrosion rates, the EIS drawings shall be revised to reflect the appropriate maximum OSI interval that corresponds to actual corrosion rates per "Table II" of 5.5.6.2.
- b) 1st T&I - This column shall be filled in only when an "Initial T&I (I-T&I)" is to be performed on the equipment. Do not fill out this column when follow up T&Is have been performed. The number of months between equipment commissioning and the start of the I-T&I shall be entered in this column per information found in paragraphs 5.4, 5.5, and "Table-I".
- c) T&I - This column shall list the number of months between subsequent T&Is in accordance with those requirements as listed in "Maximum T&I Intervals" paragraph 5.5.9.

### **Inspection Procedure:**

This column shall contain "brief procedures", inspection techniques, etc.; and shall be in accordance with "Inspection Procedure" paragraph 5.6.

## Attachment II – Annual T&I Summary/Report

Inspection Unit:\_\_\_\_\_

For Calendar Year\_\_\_\_\_ Date Issued:\_\_\_\_\_

[illegible]

**Notes:**

- (1) Show EIS date based on prior T&I excluding tolerance and any deviation, if any.
- (2) T&I finish date shall be the date found on the T&I Acceptance Report form SA 3060-ENG.
- (3) EIS Interval based on approved EIS.

Supervisor, Inspection Unit

Supt. Operations Engineering Div.

**Attachment III –**  
**Approval Form for Utilization of Discretionary T&I Extension**  
**Plant Name**  
**Date**

This form provides approval for discretionary T&I extension as per SAEP-20, for the following listed equipment in Plant Number \_\_\_\_\_ .

| Equipment No. and Service | Last T&I Date | Next T&I Date Per the EIS | Extended T&I Date |
|---------------------------|---------------|---------------------------|-------------------|
|                           |               |                           |                   |
|                           |               |                           |                   |
|                           |               |                           |                   |
|                           |               |                           |                   |
|                           |               |                           |                   |

Concurrence signatures of the operation, engineering and inspection, as shown below indicate support of the extensions and ensure that the above listed equipment is safe to operate for the extended period.

\*Originator: \_\_\_\_\_  
Name, Job Title, Unit

Concurred: \_\_\_\_\_  
Supervisor T&I Planning Unit

\_\_\_\_\_  
Supervisor Inspection Unit

\_\_\_\_\_  
Supervisor Op. Engr. Unit

\_\_\_\_\_  
Superintendent Engr. Div.

\_\_\_\_\_  
Superintendent Op. Div.

Approved: \_\_\_\_\_  
Manager, Operations/Plant Dept.

cc: Facility Insp. Unit  
Facility Op. Engrg.  
Facility Op. Div.  
Inspection Dept. /IEU, E-1140, Dh.

\* Can be from Operation or Maintenance.

## Attachment IV – Saudi Aramco 2601-ENG (01/2003)

| Saudi Aramco 2601-ENG (01/2003)                    |     |      |     |             |                                                                                                                                                           |                                |                      |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------|-----|------|-----|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SAUDI ARABIAN OIL COMPANY                          |     |      |     |             |                                                                                                                                                           |                                |                      |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| EQUIPMENT INSPECTION SCHEDULE (REFER TO SAEP - 20) |     |      |     |             |                                                                                                                                                           |                                |                      |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| OPRS                                               | PMT | CERT | ENG | DESCRIPTION | EQUIPMENT                                                                                                                                                 | INSPECTION INTERVAL-MONTHS     |                      |                      | INSPECTION PROCEDURE                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                    |     |      |     |             |                                                                                                                                                           | OSI                            | Initial T&I          | T&I                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                    |     |      |     |             | A - GENERAL<br>Applicable to all equipment including mothball equipment, if any.                                                                          |                                |                      |                      | A detailed visual external inspection shall be performed on all civil, electrical and mechanical equipment per SAEP-20 at the following specific intervals. All inspections shall be based on master equipment list for each type of equipment within each plant and inspection findings shall be documented in the plant files. Problems identified shall be reported on either a worksheet or inspection report with recommendations for corrective action. |
|                                                    |     |      |     |             | Mechanical including connecting piping and RVs                                                                                                            |                                |                      |                      | Mechanical equipment external inspections shall be conducted every 24 months (non-marine area) per SAEP-20, 5.5.8 guidelines and based on appropriate inspection checklist.                                                                                                                                                                                                                                                                                   |
|                                                    |     |      |     |             | Civil                                                                                                                                                     |                                |                      |                      | Civil annual external inspection shall be performed on all buildings, steel structures and concrete foundations and structures.                                                                                                                                                                                                                                                                                                                               |
|                                                    |     |      |     |             | Electrical                                                                                                                                                |                                |                      |                      | Electrical annual external inspections shall be performed per 00-SAIP-51 entitled Electrical Inspection.                                                                                                                                                                                                                                                                                                                                                      |
|                                                    |     |      |     |             | C - COLUMNS<br>(Include Fractionating, Vacuum, Rerun, Catalytic Reactors, etc.)<br>C-1 - Crude Distillation<br>C-2 - Add Service?<br>C-3 - "              | Note-1<br>12-60                |                      |                      | T&I inspection will be per the requirements of API STD 510, SAES-D-008, SAEP-325 and in-house inspection procedure number, if any.                                                                                                                                                                                                                                                                                                                            |
|                                                    |     |      |     |             | D - VESSELS<br>(Include Drums, All Pressure Vessels, Low Pressure and Atmospheric Tanks, Spheroids, etc.)<br>D-4 Add Service ?<br>D-5 "<br>D-6 "<br>D-8 " |                                |                      |                      | Same as Columns above                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                    |     |      |     |             | Supvr. Oprs Insp.                                                                                                                                         | Gen. Supvr / Supt. Oprs. Engr. | Superintendent Oprs. | Manager, Insp. Dept. | Gen. Mgr. Oprs or Plt. Mgr.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| EQUIPMENT INSPECTION SCHEDULE                      |     |      |     |             |                                                                                                                                                           | DWG. TYPE                      | PLANT NO.            | INDEX                | DRAWING NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                    |     |      |     |             |                                                                                                                                                           | SCH                            |                      | A                    | E-                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| SAUDI ARAMCO                                       |     |      |     |             |                                                                                                                                                           | JO / EWO                       |                      |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| EDSD/2601-0103.XLS                                 |     |      |     |             |                                                                                                                                                           |                                |                      |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

# Attachment IV – Saudi Aramco 2601-ENG (01/2003)

| Saudi Aramco 2601-ENG (01/2003)                    |     |                                 |     |                      |                                                                                       |                            |             |                             |                                                                                                                                                                                                                                            |
|----------------------------------------------------|-----|---------------------------------|-----|----------------------|---------------------------------------------------------------------------------------|----------------------------|-------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SAUDI ARABIAN OIL COMPANY                          |     |                                 |     |                      |                                                                                       |                            |             |                             |                                                                                                                                                                                                                                            |
| EQUIPMENT INSPECTION SCHEDULE (REFER TO SAEP - 20) |     |                                 |     |                      |                                                                                       |                            |             |                             |                                                                                                                                                                                                                                            |
| OPRNS                                              | PMT | CERT                            | ENG | DESCRIPTION          | EQUIPMENT                                                                             | INSPECTION INTERVAL-MONTHS |             |                             | INSPECTION PROCEDURE                                                                                                                                                                                                                       |
|                                                    |     |                                 |     |                      |                                                                                       | OSI                        | Initial T&I | T&I                         |                                                                                                                                                                                                                                            |
|                                                    |     |                                 |     |                      | DEAERATORS                                                                            | Note-1<br>12-60            | 12-24       | *24-48                      | Inspection will be carried out per the requirements of 32-SAIP-20, SAEP-325. *Inspection interval shall be adjusted based on inspection findings, extent of repairs and PWHT carried out per the referenced procedure.                     |
|                                                    |     |                                 |     |                      | TANKS                                                                                 | Note-1<br>12-60            | 120         | 120                         | T&I inspection will be per the requirements of SAES-A-004, API STD 653, SAES-D-108, and in-house inspection procedure number, if any.                                                                                                      |
|                                                    |     |                                 |     |                      | E - EXCHANGERS<br>SHELL AND TUBE<br>Parallel Equipment<br>E-4A Add Service?           | Note-1<br>12-60            | 12-24       | *60                         | T&I inspection shall follow the requirements of SAES-A-004, SAEP-317, SAEP-325 where applicable and in-house inspection procedure number, if any. (*See SAEP-20, Para 5.5.7 d for instructions on parallel equipment interval deviations.) |
|                                                    |     |                                 |     |                      | E-4B     "<br>E-15A    "<br>E-15B    "<br>Non Parallel Equipment<br>E-2 Add Service?  |                            | 12-24       | 60                          | Same as above                                                                                                                                                                                                                              |
|                                                    |     |                                 |     |                      | E-3     "<br>E-6     "                                                                |                            |             |                             |                                                                                                                                                                                                                                            |
|                                                    |     |                                 |     |                      | AIR COOLED (FIN-FAN)<br>Parallel Equipment<br>E-1A Add Service?                       | Note-2<br>12-60            | 12-24       | *60                         | T&I inspection shall follow the requirements of SAES-A-004, SAEP-325 and in-house inspection procedure number, if any. (*See SAEP-20, Para5.5.7, d. for instructions on parallel equipment interval deviations.)                           |
|                                                    |     |                                 |     |                      | E-1B     "<br>E-13A    "<br>E-13B    "<br>Non Parallel Equipment<br>E-11 Add Service? |                            |             |                             | Same as above                                                                                                                                                                                                                              |
|                                                    |     |                                 |     |                      | E-12     "                                                                            |                            |             |                             |                                                                                                                                                                                                                                            |
|                                                    |     |                                 |     |                      | F - FURNACES<br>F-1. Crude Pre-Heat                                                   |                            | 12-24       | *48-60                      | Inspection will be carried out per latest edition of API RP 573 guidelines, NB 23 and in-house inspection procedure number, if any. (*Inspection interval should be adjusted per SAEP-20 paragraph 5.5.9 according to furnace service.)    |
|                                                    |     |                                 |     |                      |                                                                                       |                            |             |                             | Same as Columns above                                                                                                                                                                                                                      |
| Supvr. Opns Insp.                                  |     | Gen. Supvr. / Supt. Opns. Engr. |     | Superintendent Opns. |                                                                                       | Manager, Insp. Dept.       |             | Gen. Mgr. Opns or Plt. Mgr. |                                                                                                                                                                                                                                            |
| EQUIPMENT INSPECTION SCHEDULE                      |     |                                 |     |                      |                                                                                       | DWG. TYPE                  |             | PLANT NO.                   |                                                                                                                                                                                                                                            |
|                                                    |     |                                 |     |                      |                                                                                       | SCH                        |             | A                           |                                                                                                                                                                                                                                            |
|                                                    |     |                                 |     |                      |                                                                                       | INDEX                      |             | E-                          |                                                                                                                                                                                                                                            |
| SAUDI ARAMCO                                       |     |                                 |     |                      |                                                                                       | JO / EWO                   |             | EDSD/2601-0103.XLS          |                                                                                                                                                                                                                                            |

Attachment IV – Saudi Aramco 2601-ENG (01/2003)

| Saudi Aramco 2601-ENG (01/2003)                    |                                                                                                                             |                                |             |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |             |                             |         |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------|-----------------------------|---------|
| SAUDI ARABIAN OIL COMPANY                          |                                                                                                                             |                                |             |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |             |                             |         |
| EQUIPMENT INSPECTION SCHEDULE (REFER TO SAEP - 20) |                                                                                                                             |                                |             |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |             |                             |         |
| DESCRIPTION                                        | EQUIPMENT                                                                                                                   | INSPECTION INTERVAL-MONTHS     |             |                       | INSPECTION PROCEDURE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      |             |                             |         |
|                                                    |                                                                                                                             | OSI                            | Initial T&I | T&I                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |             |                             |         |
|                                                    | UTILITY BOILERS                                                                                                             | Note-2<br>12-60                | 12-24       | *24-36                | Inspection will be carried out per latest edition of API RP 573 guidelines, NB 23 National Board of Inspection Code, and in-house inspection procedure number, if any. (*Inspection interval is to be adjusted per SAEP-20 paragraph 5.5.9 according to type of boiler.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                      |             |                             |         |
|                                                    | L - PIPING<br>1. Chemical Injection Point<br>2. Corrosive Service<br>3. Road Crossing (Buried)<br>4. Mild Corrosive Service | Note-2<br>12-60                | 12-24       | 36<br>60<br>60<br>120 | 1. Inspection will be carried out per API STD 570, guidelines, API RP 574, SAES-L-001, and in-house inspection procedure number, if any. T&I inspection interval will be per SAEP-20, paragraph 5.5.9 as applicable.<br>2. Same as above.<br>3. Same as above.<br>4. Same as above.<br>5. Inspection will be carried out per GI-1781.001 guidelines.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      |             |                             |         |
|                                                    | 5. Fire Water                                                                                                               | Note-2<br>12-60                | 12-24       |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |             |                             |         |
|                                                    | SAFETY RELIEF VALVES<br>DEAERATORS                                                                                          |                                |             | **                    | ** T&I shall comply with the requirements of SAEP-319. See the A - General section for external inspection requirements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                      |             |                             |         |
|                                                    |                                                                                                                             |                                |             |                       | <p>Note-1<br/>OSI frequency for thickness readings (UT/RT) will be per OSI computer program data based on corrosion rate and remaining life per SAEP-20, Table-II.</p> <p>Note-2<br/>OSI thickness readings (UT/RT) must be carried out during a scheduled T&amp;I. (Adjust the OSI interval (UT/RT) to be the same as the furnace T&amp;I interval. For heater tube thickness calculation use API STD 530.<br/>Instruction for mothballed equipment: List all mothballed equipment per this sample and show a 99 month interval in the T&amp;I column and include the term Mothballed in the Inspection Procedure column. These entries indicate no need for a regular OSI or T&amp;I. However, the external inspection must continue to be performed per the A - General section to ensure equipment safety is maintained.</p> |                      |             |                             |         |
| Supvr. Opns Insp.                                  |                                                                                                                             | Gen. Supvr./ Supt. Opns. Engr. |             | Superintendent Opns.  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Manager, Insp. Dept. |             | Gen. Mgr. Opns or Plt. Mgr. |         |
| EQUIPMENT INSPECTION SCHEDULE                      |                                                                                                                             |                                |             | DWG. TYPE             | PLANT NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | INDEX                | DRAWING NO. | SHT NO.                     | REV NO. |
|                                                    |                                                                                                                             |                                |             | SCH                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | A                    | E-          |                             |         |
| SAUDI ARAMCO                                       |                                                                                                                             |                                |             | JO / EWO              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |             |                             |         |

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