

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG: INDUSTRIAL SERVICES / CORPORATE MAINTENANCE SYSTEMS SUBJECT: MAINTENANCE WORK ORDER	G.I. NUMBER Approved 1000.500	
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CONTENT:

This general instruction outlines the use of the Maintenance Work Order and its associated 'Objects' in supporting the various maintenance activities utilizing the SAP Plant Maintenance Module in recording and streamlining this important process. The text includes:

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1.0 **OVERVIEW:**

The Maintenance Order is the essential component for providing and conducting the various types of maintenance activities - perform periodic service routines, carry out Test and Inspections (T&I), accomplishing upgrades of equipment and facilities by Industrial or Community Maintenance work forces - that are required to maintain Saudi Aramco facilities and plants at optimum operating conditions without impacting production. It is used as a tool and mechanism to plan the execution of maintenance activities in detail, monitor the progress of work and settle the costs of maintenance tasks.

With the introduction of SAP-Plant Maintenance, the maintenance processes were designed towards a paperless environment. This introduced the use of:

- On-line Notifications for requesting work by a Proponent/Operational personnel, and replaces the Maintenance Work Order Form 981-A. However, this Form will still be used for capital project and non-process (non-plant) work.
- The automated on-line Workflow Approval for approving Work Order costs. Work Order costs are approved on-line via workflow, by the proponents approver for the cost center related to the technical object; to set a budget for the Work Order based on the initial planned cost or a minimum budget value defined in a User table (table 'ZIPMB', transaction 'ZI0006'), approved by each department. The exceptions being where a pre-defined budget has already been established or input via Form 981-A. The authority approving the Work Order (as set and maintained by sites via table 'ZOPM_BUDGET_APPR', transaction 'ZI0085') should conform to the monetary limits as set in the on-line GI for Automated Approval Authority.

Industrial Maintenance organizations are responsible for the maintenance of various equipment: such as pumps, motors, turbines and instruments which are normally located in industrial environment: such as gas plants, refineries, terminals, gas and oil separating plants (GOSP). Community and Building Maintenance organizations are responsible for the maintenance of community facilities such as office facilities, houses, appliances, air conditioning units, and other facilities in office buildings and residential areas.

Normally, maintenance costs are settled to the appropriate cost center, which will default from the technical object master record or via the master record of an Internal Statistical Order. Internal Statistical Orders are used for Minor Maintenance and T&I Orders (only for incurring cost for budget monitoring and control via reporting functionality). The exception to this is Capital Project work (Order Type PM07) where the cost object can be a WBS element (Work Breakdown Structure) or an Internal Order. Refer to procedures under Section 3.7 for Capital Project work.

Maintenance organizations use Work Orders to plan and estimate works, carry out the maintenance required and record history for the cost of Labor, Materials and Services. The repair history for the technical object for future reference is recorded in the SAP Notification associated with the Work Order.

During Work Order execution, Materials are issued, Invoices are incurred and Labor is charged to the Work Order. Once the work is complete, Maintenance 'Technically Completes' the Work Order. Technical Completion is the SAP function to indicate that the physical work activities are completed. Maintenance is able to reverse 'Technical Completion' at anytime prior to 'Business Completion'.

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1.1 ORDER SETTLEMENT

Order Settlement is the process of recording maintenance cost from the work order to the designated cost object (Cost Center or work breakdown structure) based on the settlement rule defined in each maintenance order. On a weekly/monthly basis a 'batch job' either settles the order or submits an error log to each plant to allow corrections prior to final 'month-end' settlement. All maintenance Work Orders are fully settled (balance zero) each month.

1.2 ORDER COMPLETION

The Business Completion Process will be implemented by Finance for plant maintenance orders identified as Technical Complete, with a balance of zero and with no outstanding purchase orders or invoices. No further processing is possible after Business Completion. However, Reversal of Business Completion is possible where necessary. Currently, Business Completion is to be performed three months or more after Technical Completion.

1.3 BUDGETARY CONTROLS

With the implementation of SAP, budgetary responsibility and control for maintenance work order was changed from the maintenance organizations to proponent (Operations) organizations. As a result, budget approvals and transaction approvals are now the responsibility of the proponent organization. Refer to Section 5, Responsibilities.

1.4 PURCHASE REQUISITIONS

Although a Maintenance Work Order is approved for total cost within the Work Order approval, it is additionally required to also approve any purchase requisitions independently.

1.5 PM ORDER AND ACCOUNTING ERROR CORRECTIONS

Errors resulting from either incorrect settlement rules or incorrect charges for materials or invoices should be referred to the Materials, Services & Payables Accounting Department in Finance. The resulting corrections will be to ensure that both the financial accounts and maintenance work order history accurately reflect the maintenance cost incurred. The correction strategy will vary depending on whether the order has been settled, or whether the order is closed or whether the order cost was incurred in a previous year.

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2.0 **NOTIFICATION TYPES:**

Maintenance Notifications describe malfunctions or exceptional technical situations at an object in the area of maintenance processing, request the maintenance department to perform a necessary task, and document the work that has been performed.

When you create a Notification, you can choose a predefined Notification type that is compatible with the information's business content. This ensures that the information is properly categorized and assigned to the proper person, planning group or department for further processing.

When you process a Notification, the system supports you with functions that allow you among other things:

- Thoroughly describe, prioritize, and categorize the information.
- Monitor the Notification processing activities from start to finish within specified deadlines.
- Evaluate Notification data.

There are five (5) Notification types that are used within Saudi Aramco. These are:

2.1 **MAINTENANCE REQUEST – (M1)**

This Notification type is used to request general work, where no malfunction exists and for work that is considered as 'New Work and Upgrades' to current facilities.

2.2 **MALFUNCTION REPORT – (M2)**

This Notification type is used for creating a work request referencing a technical object that is malfunctioning or has broken down.

2.3 **ACTIVITY REPORT – (M3)**

An Activity Report (Notification Type – M3) is created when you wish to record information / history for a 'Technical Object' (piece of Equipment or Functional Location), and is typically created in the following circumstances:

- In the event that no Work Order exists, and it is necessary to record some information related to a technical object, then an Activity Report would be created and used to record the information.
- PM02 Work Orders (Preventive Maintenance) are not created with reference to a Notification (refer to Section 3.2, Preventive/Predictive Maintenance). The closure of the Order is the record of the work completed and the detail of what was performed is within the 'Task List' that was generated from the 'Preventive Maintenance Plan' to the Order. If it were necessary to record information related to the technical object referenced in the PM02 Work Order, then an Activity Report would be created and used to record such information.
- PM03 Work Orders (T&I's) usually have historical data recorded outside of 'the system'. If it were necessary to record information in the 'SAP system' related to the technical object referenced in the PM03 Work Order; then an Activity Report would be created and used to record such information.

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- PM07 Work Orders (Project Support) would not normally require Notification historical data. If it were necessary to record information, in the 'SAP system', related to the technical object referenced in the PM07 Work Order, then an Activity Report would be created and used to record such information.

2.4 MINOR MAINTENANCE - (M4)

This Notification type is used to record history of work considered as Minor Maintenance. This notification type is used within MMT Work Orders, which are not created via the Notification (refer to Section 3.4, Minor Maintenance). The PM04 Work Order is created directly and the system automatically proposes a Notification number based on an 'Early Assignment', which is only generated if the PM04 Order is saved. The User does not create M4 Notifications; they are automatically created by the system upon creation of the PM04 Work Order.

2.5 TEST AND INSPECTIONS T&I - (M5)

This Notification type is used to request Test and Inspections (T&I), for planned Shutdowns or Turnaround work. The Notification is used for approval in the creation of the T&I 'Main' Order and for transferring the Internal Statistical Order into the PM03 'Main' Maintenance Work Order to create the correct settlement rule. Refer to Section 3.3, Test and Inspections.

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3.0 **ORDER TYPES, BUDGET & PROCESS OVERVIEW:**

Maintenance Work Order is created as a result of a request for work to be performed on a Technical Object (Functional Location or Equipment). The differences associated with each Work Order Type are discussed in detail under the following headings as below. Activity types are used for reporting purposes to further segregate each Work Order Type. Activity types differ for each Order Type.

It is also possible to create 'Sub Orders'. A Sub Order is another Work Order and is different only in that it has a direct link (Parent- Child relationship), to the Main Work Order that it was created from. One of the main applications of Sub Orders is in Organizations stepping work to MSSD (Shops), in that the 'stepping' Organization would create a Sub Order with an MSSD Planning Plant from a Main Work Order of their Planning Plant, for Shops to perform the 'stepped' work. In this instance the details discussed herein for each Order Type are also applicable for Sub Orders.

Saudi Aramco Plant Maintenance will use the following PM Order Types:

- PM01 - Normal Maintenance
- PM02 - Preventive/Predictive Maintenance
- PM03 - Test & Inspection (T&I)
- PM04 - Minor Maintenance
- PM05 - New Work & Upgrades
- PM06 - Non-Process Maintenance
- PM07 - Maintenance Support to Capital Projects

3.1 **PM01 - NORMAL MAINTENANCE**

A Normal Maintenance Work Order is used to support unplanned/planned work, including safety & environment work and emergency work. It is not used for Preventive/Predictive work. It encompasses the following activities and conditions.

Activity

- **Routine Work (Maintenance Activity type '01A')**: Work associated to plant process equipment, which is related to returning a technical object to a state of repair of its original design. Includes all work that cannot be coded otherwise, but excludes work falling in other defined activity types.
- **Safety & Environment Work (Maintenance Activity type '01B')**: Modification and upgrades required by organizations responsible for safety and environmental protection. It covers all works recommended by Loss Prevention, Environmental Affairs, Fire Protection, and Preventive Medicine Services organizations.
- **Preventive Maintenance Associated (Maintenance Activity type '01C')**: Any work resulting from findings of Scheduled Preventive Maintenance activities.

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- **Predictive Maintenance Associated (Maintenance Activity type '01D')**: Any work resulting from findings of Scheduled Predictive Maintenance activities.

Condition

- **Emergency Work**: Is work that must be done immediately and is priority "1". Refer to Section 4., Work Order Priorities. Note: the Emergency Work Order should be created directly by Maintenance and marked as 'Emergency Approval'.

3.1.1 APPROVAL & BUDGET PROCESS

Approvals for maintenance Order Type PM01 are created via workflow based on the values specified in the table 'ZOPM_BUDGET_APPR' via transaction-'ZI0085' and whose entries are maintained by each Maintenance Department. Budget values are created based on the planned cost for each Order and minimum values from table 'ZIPMB' via transaction 'ZI0006', and whose entries are supplied by each Department and maintained centrally by SCC. Each Work Order is assigned an individual budget automatically once the workflow is approved and the Order is released. Exceptions to this standard procedure are where a budget has failed to be created or where an Approver has rejected a budget supplement, and manual intervention is required to create the 'Original Budget' or 'Budget Supplement'. In these instances the Approver should only approve within the level of approval as indicated in the approver Table. For further details refer to 'Responsibilities' under Section 5.

The approval of the Work Order is driven by the cost center in the technical object being maintained. This information (cost center) is copied into the location tab of the Work Order, which is then used to determine the settlement rule. The settlement rule is automatically created when the Work Order is released and determines who is charged for the cost of the maintenance work performed (labor, material & invoices). Refer to 'Responsibilities' under Section 5.

Emergency Condition:

For an emergency condition, which should be designated as priority '1', related to PM01 Work Order Type, the Work Order is created directly by Maintenance and marked as 'Emergency Approval' by changing the User status to 'EMAP' and released manually by Maintenance. A Work Order budget is created for the 'Emergency Work Order' in the normal way, based on the planned cost or minimum value set in the User table. With the Order released, work can commence immediately.

3.1.2 STANDARD PROCEDURE

The standard procedure for Normal Maintenance is for the Proponent to create a Malfunction Report (Maintenance Notification M2), or a Maintenance Request (Maintenance Notification M1), which, after work approval is converted into a Normal Maintenance Work Order by Maintenance. The Normal Maintenance Work Order is then routed for cost approval via workflow to the Proponent. Until approval takes place the Work Order cannot be released (status 'REL') to allow scheduling of requirements, charging of Labor, Materials and Services.

The exception to the standard procedure is where it is not possible to create a Notification or where circumstances dictate its use inefficient; for example:

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- Where the Proponent is unable to access the system to create a Notification and the request is required to be acted upon immediately, or -
- An emergency situation (In the event of an emergency, the normal approval process is bypassed).

In these two situations, the Proponent would contact the Maintenance Planner and request a Normal Maintenance Work Order be created directly. In this instance Maintenance approves and releases the Order manually. At the time of Order creation on setting the User status to 'EMAP' (emergency approved) and on saving the Order prior to release, a workflow message is immediately sent to the first level Approver, to inform him of the action of an Order being created and released outside of his approval. Refer to Responsibilities under Section 5.

For work history requirements, a Notification would be created and linked to the Work Order 'after-the-fact'. An M3 Notification is recommended.

3.2 PM02 - PREVENTIVE/PREDICTIVE MAINTENANCE

A Preventive/Predictive Maintenance Work Order is used for equipment (including Relief Valves), inspection, testing, cleaning and adjustment that are part of a preplanned program of periodic work to be performed at regular intervals.

- Includes
 - Replacement of consumable parts such as filters
 - Labor and Materials pre-approved within the Task List/plan
- Excludes
 - Work requiring spare parts costing more than \$ 250 in total, that were not pre-approved within the Task list/Plan or Check List.
 - Periodic work that is not in a formal preventive maintenance program.

Activity

- **Preventive Maintenance (Maintenance Activity type '02A')**: Is used for equipment (not including Relief Valves), inspection, testing, cleaning and adjustment that are part of a preplanned program of periodic work to be performed at regular intervals.
- **Predictive Maintenance (Maintenance Activity type '02B')**: Predictive Maintenance bases maintenance needs on the *actual condition* of the equipment. it is usually performed by a specialized groups within Maintenance e.g. Vibration Analysis, Lube Oil Analysis, Thermography.
- **Relief Valve Inspections (Maintenance Activity type '02C')**: Is used for Relief Valves inspection, testing, cleaning and adjustment that are part of a preplanned program of periodic work to be performed at regular intervals.

3.2.1 APPROVAL & BUDGET PROCESS

No individual budgets are created for this Order Type. The Order costs are pre-approved, based on the preventive maintenance 'Plan' cost. The budget for preventive maintenance is incorporated into each departments 'operating plan' and is determined for each year from extracting the cost of the preventive maintenance 'Plans', by entering the future dates (e.g.- 01/01/XXXX to 12/31/XXXX) into the Preventive Maintenance Budget Report (transaction- 'ZI0025'). If the total costs of the Plans

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exceed the desired budget (operating plan) for the coming year, then the preventive maintenance Plans would be adjusted and the report would be re-run until the desired budget is achieved. The subsequent report would be downloaded and retained as a record, for comparison against the future years operational cost. Subsequent reports based on monthly dates could also be generated and downloaded for comparison, against monthly reports run in the current budget year; to enable each department to assess if its preventive maintenance Plans cost are within the agreed budget, and to indicate any changes that had been made.

3.2.2 STANDARD PROCEDURE

The Preventive/Predictive Maintenance Work Orders are generated automatically by the system from the planned dates of each 'Plan' and are not initiated via a maintenance Notification or created manually. The SAP system automatically creates the Work Orders from the Plans via a batch program, run weekly on Friday (AM). However, it is possible for maintenance personnel to manually schedule a Maintenance Plan in the event of changes to operational scheduling requirements.

Each Maintenance site (department) is responsible for the setup of their individual Maintenance Plans, the scheduling and the completion of the Work Orders generated subsequently; to ensure their 'Plans' are rescheduled correctly in accordance with their department's and operational requirements.

3.3 PM03 - TEST & INSPECTION (T&I)

The T&I Work Order is used to support the preplanned periodic test, inspection and repair of a plant facility that is required by an Engineering Inspection schedule.

- Includes - Test, inspection and repair work identified as a result of that inspection.
- Maintenance work, which can only be carried out during a plant shutdown that is identified as being part of a T&I expense item.
- Excludes - Any major upgrading work that could be classified as New Expense Work (PM05) or Maintenance Support to Capital Project (PM07).

Activity

- **Repetitive T&I Work (Maintenance Activity type '03A')**: Repetitive work is work performed regularly on T&I's under inspection. Examples are, inspection of vessels/columns/drums and minor repairs as a result of inspection, together with inspection and repairs to Heat Exchanges.
- **Non-Repetitive T&I Work (Maintenance Activity type '03B')**: Non-Repetitive work used for repairs and replacement relative to work not associated with equipment outlined in repetitive work. It includes repairs or replacements to valves and other equipment not designated for regular inspection.

3.3.1 APPROVAL AND BUDGET PROCESS

This process does not use workflow approval or require individual Work Order budget creation/approval. A predefined budget is created based on an Internal Statistical Order as described:

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For reporting purposes a budget is created against an Internal Statistical Order (Type ZITI), representing the total budget for the T&I by budget year, and approved by the proponent. A 'Main' PM03 Work Order is created (via an approved M5 Notification) referencing to the Internal Order. To maintain the Internal Order link, any subsequent Orders for the T&I are created as 'Sub Orders' of the 'Main' Order. The total actual cost of all associated Work Orders of type PM03 are incurred against the Internal Order as settlement occurs. All associated cost for the T&I are reported against the Internal Statistical Order that was subsequently copied into the settlement rule of each PM03 Order. The Internal Order status will change to ISBD (insufficient budget) when the total cost are in excess of the approved budget for the T&I. The cost can be monitored through the appropriate cost report, transaction- 'S_ALR_87013019', to compare the actual cost verses the budget. A budget supplement to reset the status can be made via transaction KO24.

Additionally (optional), if found required (e.g.- Shops); the T&I Engineer could create a budget manually for a Sub Order, to indicate the budget available for the requested work of the individual Order and utilize the Status 'ISBD' to check for any Order exceeding his budget requirement.

There is no requirement to budget individual PM03 Work Orders for this process. The T&I Engineer will monitor his actual and planned T&I cost of these Orders via individual Order cost or via List editing transaction IW38/IW39. In these transactions it is also possible to reference a Group of PM03 Orders relating to an Individual Internal Order by selecting the 'Settlement receivers' tab and entering the Internal Order number in the field 'Order' of the subsequent screen. Refer also to Section 3.3.2, Revisions.

3.3.2 STANDARD PROCEDURE

In view of the expected 'lead-time' for materials, requirements for T&I's are normally entered into the system in advance of operating budgets being approved. T&I Engineers normally dictate the timing of such requirements for a particular T&I.

An Internal Statistical Order of type 'ZITI' is created by the proponent, who will then inform the T&I Engineer of the creation, and request him to enter the appropriate budget estimate via transaction KO22, (create original budget). This estimate would be amended when the operating plan is approved for the year of the T&I, by entering a supplement via transaction KO24 or return via KO26. The responsible proponent 'Approver' for the cost center of the T&I budget would approve and release the Internal Order. The Proponent would then create and approve an M5 Notification, referencing the Internal Statistical Order, to request the T&I 'Main' Work Order creation. This procedure is required to ensure the Internal Order number is referenced into the field 'Settlement Order' in the 'Main' PM03 Order, for the creation of the correct settlement rule. Referencing the Notification, the T&I Engineer would create the 'Main' T&I PM03 Order; the start and finish dates of the Order being based on the expected start and finish dates of the T&I; and would enter his material requirements based on required staged dates. The "Staged" date is set reference to the Order Start Date, by entering an 'Offset' (minus-number of days) in the "Offset" field of the materials 'General data' tab. The Order would then be released for MRP (material requirements planning). A User status of 'NLAB' (no labor charging) is set initially to prevent any inadvertent charging of labor.

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Note: In creating the 'Main' Order, it is important to ensure that the Technical Object is correct, as any change thereafter will cause the Internal Order in the field 'Settlement Order' to be deleted.

Revisions

For the purpose of scheduling and cost evaluation of Work Orders, it is recommended to use a 'Revision'. Revisions are created via transaction 'ZI0043'

Revisions are used in Test and Inspection (T&I) to group Work Orders together, and indicate a period of time during which a plant or a part thereof is temporarily shut down, so that maintenance tasks can be performed. A revision offers the following functionality:

- Revisions can be entered in the PM Order. It is possible to group several Orders together by using a revision number. Transaction IW38 allows the update of a Revision to multiple Orders.
- A start and end date for the revision is linked to the revision number. These dates can be copied into the Work Orders linked to the revision.
- The revision number can be used as a reference number, e.g. to list all Work Orders included in a revision (within the Work Order List Edit report-IW38 or IW39) for cost reporting and scheduling.

Format:

Saudi Aramco uses external number assignment for revisions. Revisions use the numbering convention XXX_YYYY where:

XXX denotes the plant, e.g.- B001 = B01, E003 = E03.

YYYY is free-format and is used to sequentially number the revision.

3.4 PM04 - MINOR MAINTENANCE

Minor Maintenance work is defined as routine and repetitive work, performed by a multi-crafts/skills that requires man-hours not in excess of 24 hours and where all other non-Labor cost (**including Material**) do not exceed \$2000. For example, if the Labor Rate for a given year were calculated at \$26 per hour, then the maximum total cost of all requirements should not exceed \$2624 (maximum of \$2000 for Material, plus maximum of 24 Labor Hours at the prevailing Labor Rate – this Hourly Labor Rate is normally reviewed and potentially modified every year by Finance)

However, organizations may establish lower limits for minor maintenance up to the maximum, as specified above. The approval limits are as defined and approved by each individual department in the SAP table 'ZIMMT_SETUP'.

- This type of Work Order should not be used for preventive maintenance work.

Activity

The default activity type on creation of an MMT is '4MM'. The creator accepts the default or selects a new activity via the 'pull down list'. All system activity types are available for the creator to choose. However,

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the only valid entries are dependant on the maintained values in the applicable 'ZIMMT' table. Activity types are varied and are grouped as follows:

- 4XX: Commonly used Activities
- JXX: Community Services Specific
- WXX: Well Services Specific
- 04C: Preventive Maintenance (Minor Repairs as a Result of Findings from Preventive Maintenance)
- 04D: Predictive Maintenance (Minor Repairs as a Result of Findings from Predictive Maintenance)

3.4.1 APPROVAL AND BUDGET PROCESS

No workflow approval is necessary for this Order Type, as a predefined budget is used. The predefined budgets for each individual Order are controlled via a User defined table, 'ZIMMT_SETUP', via transaction 'ZI0006', per Plant and Minor Maintenance Activity type, set and approved by each department within the limits set by this GI. When an individual MMT Order is created and released, the budget for the Order is created based on the table values. Cost incurred on the Work Order above the budget value, sets the system status of an individual MMT Work Order to 'ISBD', insufficient budget. Maintenance Order Processors are responsible to ensure individual Order costs are within the set GI limits. Refer Section 5., Responsibilities.

To facilitate a yearly overall budget control for all Orders belonging to a 'group' of MMT Orders an Internal Statistical Order (Type 'ZSWO') is created, referencing a cost center and maintained in User tables based on MMT values. An Overall budget is entered for the Internal Statistical Order via transaction KO22 (create original budget) for the relevant year. The Internal Statistical Order is then used to monitor the assigned overall budget. The associated table used is dependent on the object referencing the Internal Order; i.e.- cost center, Functional location or Equipment. The tables used are as specified below:

Transaction: 'ZI0006'
Tables: 'ZIMMT_CC', or 'ZIMMT_FL', or 'ZIMMT_EQ'

The total actual cost associated for the individual MMT's in a 'group' that are referenced to an Internal Statistical Order can be monitored through the appropriate cost report, transaction- 'S_ALR_87013019', to compare the actual cost versus the budget. The cost incurred against an Internal Statistical Order occurs upon settlement of cost of the associated MMT Orders. When cost exceed the established budget value of an individual Internal Statistical Order, the system status of the Statistical Order will change to 'ISBD', insufficient budget. A budget supplement to reset the status can be made via transaction KO24.

The 'budget', the timeframe the Internal Order is valid for, and the control of cost associated with the Internal Statistical Order referencing MMT's are within the responsibility of the Proponent of the cost center of the Internal Statistical Order. Refer Section 5., Responsibilities. Note: it is recommended to maintain the same Internal Order 'across years' and revise/create budgets for each subsequent

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year, rather than create new Internal Orders periodically. In this instance the Internal Order Approver should approve the changes.

Transactions IW38/IW39 can be used to reference a Group of MMT Orders relating to an Individual Internal Order by selecting the 'Settlement receivers' tab and entering the Internal Order number in the field 'Order' of the subsequent screen.

3.4.2 STANDARD PROCEDURE

Prior to the creation of an MMT Work Order the associated tables as indicated under Section 3.4.1, are required to be maintained (SCC maintains the tables centrally). This is under the responsibility of each departments SAP Site Coordinators. Refer to Section 5, Responsibilities.

A prerequisite to the tables being maintained is that a valid Internal Statistical Order is created, budgeted, approved and released by the Proponent.

An MMT Work Order is created directly, (a 'Notification' is not used to initiate a request). MMT Orders are either created by a call desk (in a service-type environment) in response to a telephone call, or (in core business environment) by the Proponent. Upon creation, the MMT creator selects the appropriate priority (Refer to Section 4.4, MMT Priorities). In creating the MMT Order, a Notification (early assignment) number is provided before saving. The creator enters the MMT mandatory required fields: the MMT description, activity type (Refer to Section 3.4.3, 'Activity Types') and MMT contact (employee badge number). The MMT is then planned for requirements within the GI set limits, released and saved to allow scheduling of requirements, charging of Labor and Materials. Optionally, if chosen by the Maintenance Site and set in the table 'ZIMMT_SETUP', the MMT will automatically print, at the printer of the work center that will perform the work.

Upon completion of the work, the MMT is 'Technically Completed'. In 'Technically Completing' the MMT Work Order, it is possible to enter data for the Notification at the same time and complete both MMT Order and Notification. Subsequently if the MMT Work Order is 'Technically Completed', in error, then Technical Completion can be reversed (Refer to Section 1.2). However, in this instance the Notification remains completed unless manually reversed by the function - 'Put In Process'.

3.5 PM05 - NEW WORK & UPGRADES

This type of Order is used to support any discretionary modification to an existing plant or facility that is not covered by a 'Budget Item' in the approved Capital Budgets & Program Book.

- Includes
 - Work that is outside the scope of Normal Maintenance.
 - Special expense project work that is not included in the Capital Budgets & Program Books.
 - Work which adds to, or changes process plant and equipment.
 - Work which adds to, or changes- buildings, fences, and other plant support facilities and equipment.

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- Excludes - Work that would be coded Normal Work (PM01) or non-process Work (PM06), Preventive Maintenance (PM02), Test & Inspection (PM03), Minor Maintenance (PM04) and Capital Project (PM07).

Activity

The following Activity types are used with this Order Type:

- Budgeted New expense work (Maintenance Activity Type '05A'):** - Budgeted discretionary modification to an existing plant or facility which was pre-approved in the operating plan budget; that is not Covered by a 'Budget Item' in the approved Capital Budgets & Program Book.
- Un-Budgeted New expense work (Maintenance Activity Type '05B'):** - Non-budgeted discretionary modification to an existing plant or facility which was NOT pre-approved in the operating plan budget; that is not covered by a 'Budget Item' in the approved Capital Budgets & Program Book.
- CS standard renovations - (Maintenance Activity Type '05C'):** - Used by Community Services for Standard Renovation governed by costs value and nature of renovation.
- CS major renovations - (Maintenance Activity Type '05D'):** - Used by Community Services for Major Renovation governed by costs value and nature of renovation.

3.5.1 APPROVAL & BUDGET PROCESS

Approval of PM05 Work Orders follows the same procedures as PM01. Refer to procedure under PM01 Order Type (3.1.1). However, the New Work Projects must be approved by Executive or General Management unless the authority has been specifically delegated.

3.5.2 STANDARD PROCEDURE

The standard procedure for a New Work and Upgrades Work Order is for the Proponent to create a Maintenance Request (Maintenance Notification- M1), which, after work approval is converted into a New Work and Upgrades Work Order (PM05). The New Work & Upgrades Work Order is then routed for cost approval to the Proponent. Until approval, the Work Order cannot be released (status 'REL') to allow charging of Labor, Materials and Services.

Note: For exceptions, refer to PM01, Section 3.1.2.

3.6 PM06 - NON-PROCESS MAINTENANCE

This Order Type is used to support work that is outside the scope of maintenance process plant or equipment as well as for the maintenance of assets not classified as production / process equipment.

- Includes - Non-maintenance type of assistance to other organization.
- Maintenance of assets not classified as production / process equipment

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- Excludes - All work related to plant facilities and equipment that are by definition considered as part of the plant process.

Activity

The following Activity types are used with this Order Type:

- **Non process field - used for work associated with core business – (Maintenance Activity Type ‘06A’):** - For work considered outside the scope of maintaining process plant equipment. It is used for any non-maintenance type of assistance or Maintenance of assets not classified as production / process equipment to maintenance organization. These organizations have their maintenance plants under SAP. Therefore, a workflow approval can be applied. Examples of this are: - Painting the shop floor, miscellaneous cleanup work to maintenance facilities etc.
- **Non process other – used for work outside the core business – (Maintenance Activity Type ‘06B’):** - For work considered outside the scope of maintaining process plant equipment. It is used for any non-maintenance type of assistance or Maintenance of assets not classified as production / process equipment to non-maintenance organization. These organizations don't have their maintenance plants under SAP. Therefore, a workflow approval cannot be applied. Examples of this are: - Painting the shop floor, miscellaneous cleanup work to maintenance facilities etc.

3.6.1 APPROVAL & BUDGET PROCESS

Depending on to the nature of the non-process work, it can either be Plant or non-Plant specific.

The procedure and Approvals for non-process (Plant specific) maintenance work follows the same procedures as defined under PM01, Section 3.1.1.

- The Approval procedure for non-process (non-Plant) maintenance work differs only in that the approval is manual and controlled by maintenance, based on input of a paper-based request, using the Maintenance Order Form- 981-A. The mandatory entries to the Form are the description of the work to be performed; the cost center to be debited, the approved cost together with the signature of the Approver. To execute the approval process the authorized maintenance personnel selects the User status ‘MAPP’ (maintenance approved). This procedure is provided to accommodate Users who require infrequent work request, being/or, outside of the SAP system and because of the frequency of such work make it impractical for them to operate the ‘on-line’ paperless process. The budget for the Order is still created when the Order is released, based on the planned cost or the minimum values from table ‘ZIPMB’ via transaction ‘ZI0006’, and whose entries are provided by each Department and maintained centrally by SCC. The exception, being only in the instance of the actual cost exceeding the original budget and the Order status becoming ISBD (insufficient budget). In this instance Maintenance would be required to manually contact the Approver and update the original Form to reflect the new approved cost. There is no requirement to create a budget supplement, though if authorization allows, a budget supplement can be created.

Note: The 981-A Form should be retained for audit purposes.

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3.6.2 STANDARD PROCEDURE

The standard procedure for non-process (Plant) Maintenance work is for the Proponent to create a Maintenance Request (M1 Notification), which would then follow the same steps as outlined for PM01 for Maintenance and Proponent. In this instance the activity type selected would be 06A (Non-Process field).

For non-process (non-plant) Maintenance work, the Proponent would provide a paper-based request, using the Maintenance Order Form 981-A, to request to Maintenance specifying the mandatory¹ entries as outlined in Section 3.6.1, to open the Order in the system.

The Order Processor would create the Order based on the 981-A Form input and on planning the requirements within the authorized cost indicated on the 981-A Form, change the status to 'MAPP' (Maintenance Approved), save the Order and then release it in change mode, to allow scheduling of requirements, charging of Labor, Materials and Services.

- ¹ It is also a mandatory requirement in a Work Order or Notification that a technical object (functional location or equipment) is entered. It is recommended, that where possible, a Maintenance Plant creates a Functional Location for each of their Non-Process proponents per unique cost center. Where this is not practical and the proponent of the request for the non-process (non-plant) work is unable to supply a technical object; Maintenance should use a dummy functional location and enter the applicable cost center supplied in the '981-A' Form, to propagate the cost center field in the location tab of the Order and the settlement rule for debit of cost.

When the need exists to capture technical history related to non-process (non-plant) for the technical object, the M3 Notification Type will be used referencing the PM Order. In this instance it is necessary to have a valid individual technical object.

3.7 PM07- MAINTENANCE SUPPORT TO CAPITAL PROJECTS

This type of Order is used to support work authorized by a budget item in the approved Capital Budgets and Program Book.

Activity

The following Activity types are used with this Order Type:

- **Project Department Work (WBS) (Maintenance Activity Type '07A'):** - used to support work authorized by a budget item in the approved Capital Budgets and Program Book.
- **BI _ 1900 Work (WBS) (Maintenance Activity Type '07B'):** - Used for BI-1900 work; defined under Miscellaneous Capital Items Master Appropriation. Use for construction or purchase of miscellaneous assets with a minimum capital value of \$10,001 and maximum TOTAL PROJECT COST of \$2,000,000.

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- **Special Project Work (Internal Order) (Maintenance Activity Type '07C'):** - For the support of special project work with special accounts. Normally, finance creates special internal order start with 670xxxxxxx. Please note this is different from the two specific PM internal orders created by PM Users for Minor Maintenance and Test & Inspection Works.

3.7.1 APPROVAL & BUDGET PROCESS

The budgetary control will normally be via the approved (signed) 981-A Form (Refer to standard procedure, Section 3.7.2). The exception is as outlined below, under activity type 07C (Special Projects) referencing an Internal Order.

Orders with a project assignment (WBS), activity types 07A (Project department work) and 07B (-BI 1900 work), cannot be budgeted directly in plant maintenance. The Work Order cost can be controlled via the WBS budget; provided budgeting is allowed/set and availability control is active. However, budgetary and active availability control at each individual 'Phase' Level is not set in the design. Therefore, 'Projects' will use reporting functionality to review costs associated to a WBS and inform PM Users of any discrepancies. It is the responsibility of the Maintenance User authorized, to ensure costs are maintained within the approved 981-A Form.

Orders with an Internal Order assignment activity type 07C (Special Projects) can be budgeted manually if the Maintenance User has such authorization. Therefore it could be possible to enter an individual budget for each Order related to the request, to assist in controlling the cost via the Order status ISBD. The Internal Order budget would reflect the total cost associated for all requirements against it and is monitored manually via reporting functionality.

3.7.2 STANDARD PROCEDURE

The Requester will provide a paper-based request, using the Maintenance Order Form 981-A, to Maintenance for project support, and would specify a WBS element or Internal Order for debit of cost, a maximum authorized cost and a signature for approval together with a description of the work. The Maintenance Planner (Order Processor) would create the Work Order directly. No further cost approval of the Work Order is required. The WBS element or Internal Order controls via reporting functionality, both the planned and the actual cost within the Work Order.

In creating the Work Order, if the activity type chosen were '07A' or '07B', the 'Order Processor' would enter a WBS element (mandatory) in the additional data tab (tab- 'Add Data'). If the activity type chosen were '07C' then on releasing the Order a pop-up screen is provided to enter the (mandatory) Internal Order.

In either instance, the Work Order is first saved and then released in change mode, to allow scheduling of requirements, charging of Labor, Materials and Services.

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As the WBS or Internal Order consolidates all cost related to multiple Orders, then the creation of Sub Orders referencing the same request would require no further approval. However, where the same WBS or Internal Order is provided for multiple Work Order requests of an individual requirement then each should reference a separate 981-A Form.

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4. **WORK ORDER PRIORITIES:**

4.1 **PRIORITY 1 – EMERGENCY WORK**

Work, which must be done immediately in order to:

- Prevent Injury to personnel or damage to equipment.
- Correct safety and fire hazard or extreme service failure.
- Prevent significant loss of production or loss of products in storage or transit.

Work classified as Priority “1” takes precedence over all other work, scheduled or non-scheduled.

Priority “1” requires the approval of a Superintendent or above unless delegated otherwise. This could take the format of a letter to the Service Provider, or in the instance of an emergency condition, be integrated into the procedure as outlined in Section 5.11.

Exception: Refer Section 4.4, MMT Priorities.

4.2 **PRIORITY 2 – URGENT WORK**

Work of an urgent nature, which must be completed as soon as possible, maintenance schedules this work to start within 48 hours after receipt of the maintenance request; if materials and manpower requirements permit.

4.3 **PRIORITIES 3/4/5 - NORMAL WORK**

Normal Maintenance Work is defined as work, which may be delayed for more than 48 hours and is scheduled as Maintenance resources permit. Most of the Maintenance requests should fall in this category.

4.4 **MMT PRIORITIES**

MMT's include only priorities 1, 2 & 3. Priority '1' for MMT's normally does not require approval. However, individual Sites can determine their own internal control for Priority “1”.

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5. **RESPONSIBILITIES:**

Within Maintenance and Operations the following responsibilities are defined:

- 5.1 **NOTIFICATION CREATORS** are responsible for creating the correct Notification type and content.
- 5.2 **NOTIFICATION APPROVERS** In approving the Notification the Approvers are responsible for ensuring the correct cost center of the Technical Object is referenced in a Notification.
- 5.3 **ORDER PROCESSORS** will be responsible for creating and planning Work Orders for their plant. Order Processors will be responsible for ensuring that the correct settlement rule is created; either via the defaulted Notification cost center, or when manually creating Work Orders without a prior Notification, or via information provided via the 981-A Form.
- 5.4 **ORDER PROCESSORS** are responsible to ensure individual MMT Order costs are within the set GI limits.
- 5.5 The '**BUDGET APPROVER**' for each Proponents Cost Center within a plant, is authorized and responsible to approve the 'Original budget' and supplement budgets via workflow for Order Types PM01, PM05 and PM06 (plant specific). Also, they are responsible to create budget supplements and original budgets where manual intervention is required, within the level of his approval as entered in the approver table (ZI0085). In this instance it is the responsibility of the approver (User) to understand he should only approve within his limit of approval as set in the table. The system will record automatically the name of the approver and the amount approved for audit purposes.
 - 5.5.1 Exceptions to the above are where Maintenance creates and approves the Work Order, as in the instance of the 'Emergency' condition, or where an approved 981-A Form is provided for maintenance to manually create an Order and subsequent budget.
- 5.6 The '**INTERNAL ORDER BUDGET CREATOR**' is responsible within a plant to create and monitor budgets for Internal Statistical Orders of type ZITI and ZSWO.
- 5.7 The '**INTERNAL ORDER APPROVER**' of each Proponents Cost Center within a Plant should be responsible for approving and monitoring budgets for Internal Statistical Orders relating to Order Types 'ZSWO' and 'ZITI' (Minor Maintenance and T&I).
- 5.8 The '**T&I ENGINEER**' is responsible within a plant to create and monitor manual budgets for T&I Sub Orders. Also, he is responsible to ensure that PM03 Work Orders created for a T&I are within the approved referenced Internal Order budget and to ensure the correct Internal Statistical Order is copied into the PM03 Order to obtain correct settlement of cost.
- 5.9 **FIRST LEVEL BUDGET APPROVERS** are responsible, having been informed through workflow, to follow-up on Work Orders created directly and approved as 'emergency' (Status EMAP) by Maintenance; to ensure that they meet the emergency condition and cost approval.

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- 5.10 SAP SITE COORDINATORS are responsible for ensuring the correct set-up of the MMT tables associated with their department. SCC maintains these tables centrally. Also they are responsible for maintaining the 'Approvers' Users ID's for each cost center within the table 'ZOPM_BUDGET_APPR' via transaction-'ZI0085'.
- 5.11 DEPARTMENTS are requested for Audit purposes to setup an Internal procedure, to provide an Audit trail for Work Orders that have been created and approved as Priority-1, 'Emergency' (EMAP) by Maintenance. It is required to have support documentation to show that the Work Order has been approved by the Proponent/Operations. This should be driven by the workflow message to the first level Approver and can take the format of (but is not limited to), an 'after-the-fact' manual record, an attachment to the Order or if the Notification is linked to the Order an attachment or written approval in the Long Text of the Notification.

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6. **PROCEDURAL STEPS:**

The following steps are provided with reference to 'Normal' Maintenance work requests. It includes PM01, PM05 and PM06 non-process-plants.

- 6.1 **PROPONENT (NOTIFICATION CREATOR):** Based on the nature of the equipment condition and repair requirement, Proponent creates a Notification via SAP transaction IW21, IW24 or IW26. This Notification should clearly identify the equipment, problem or request. On saving the Notification, the system will set the status to OSNO (Notification outstanding) for obtaining approval from the Notification Approver (please see 6.2), before being passed on to Maintenance.
- 6.2 **PROPONENT (NOTIFICATION APPROVER):** It is the Notification Approver's job function to check via Transaction IW28 to list all Notifications awaiting approval (status 'OSNO'). He selects the desired Notification and reviews and validates the information. If the data is correct and the problem or request valid, he approves it.
- 6.3 **MAINTENANCE (WORK ORDER PROCESSOR):** It is the Work Order Processor's job function to check via Transaction IW28 to list all approved Notifications. He would review the request. If the information were valid and complete, would create the appropriate Work Order Type (Refer Section 7 Fig 2). The details of the Notification are automatically copied to the Order on creation and normally the Order Processor would accept the defaults provided. However, the Order Processor can change these defaults or information (e.g., description, priority) if he requires. In the instance of any changes and the fact that the Notification is not automatically updated, he should ensure the proponent is informed of such. If the information is not valid or completed correctly the Order Processor can return the Notification utilizing the User status 'PEND' (pending), stating the reason in the long text. On creation of the Order, the 'Order Processor' can either save the Order in status created, for planning at a later date, or plan the Order at the time of create and then subsequently save the Order with the appropriate status. In creating the Order the 'Order Processor' should select the appropriate 'Activity Type'. After planning the Order for the necessary requirements (Labor, Material and Services) the Order Processor would change the user status to "PLND" (Planned, requires approval) and save the Order, to initiate the workflow approval process. After setting the status to 'PLND' the Order Processor should only view the Order via transaction IW33/IW39, until the Order is approved, released and budgeted, via workflow. Any use in the interim of transactions such as IW32 or IW38 can cause workflow to fail.

Note: Where circumstances dictate, the Order Processor can create a Work Order directly without a Notification through Transaction IW31. Used where an Emergency condition exists.

- 6.4 **PROPONENT (BUDGET APPROVER):** The budget approver for the cost center of the planned Work Order will receive an automatic SAP express mail requesting him to approve the Work Order cost. The budget approver can review the Work Order requirements and cost in detail, via the SAP workflow and should ensure himself that the cost and requirements meet his approval. Depending on the Approvers level of approval he will be able to approve, reject or forwarded to the next higher-level approver. An escalation time, based on the priority of the Order, automatically activates the workflow to the next level approver, in the event the current approver does not approve the workflow in the desired timeframe. This

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escalation is controlled via transaction 'ZO0017'; table 'ZOPM_WF_PRIORITY'. Upon approving the workflow the system automatically changes the Work Order status to 'APPR' (Approved), releases the Order and creates the original budget value. The Work Order Processor is informed via SAP mail that the Order is approved and released. Once the Order is released it is available for scheduling and incurring cost. The statuses of the Order relative to the completion of the workflow process are- System status: (REL) - released, (BUDG) - budgeted. User status: (APPR)-approved.

- 6.5 MAINTENANCE (WORK ORDER SCHEDULER): The Work Order being released, the 'Work Order Scheduler' can schedule the work using transaction ZI0002.
- 6.6 MAINTENANCE (TIME RECORDER): For a released Order and as work is completed, the Time Recorder is able to record the time incurred against the Order via the approved timesheet using transaction IW41/IW48.
- 6.7 MAINTENANCE (WORK ORDER PROCESSOR): Once the requested job is completed the 'Work Order Processor' would change the Work Order status to 'TECO' (technically complete) using transaction IW32.
- 6.8 MAINTENANCE (WORK HISTORY PROCESSOR): The Work History Processor would enter the relevant history in the Notification referenced to the Order, and either, (for those Sites requiring history approval) change the status to HISE to indicate history or HISEN if no history is relevant. Or, (for Sites not requiring history approval) change the status to 'MCOM' (Maintenance completion) using transaction IW22.
- 6.9 MAINTENANCE/OPERATIONS (WORK HISTORY REVIEWER): For those Sites requiring history approval, the History Reviewer would check via Transaction IW28 to list all Notifications requiring History review. The History Reviewer would change the Notification status to MCOM to accept the history entered against the Notification, or if unacceptable, change the status to 'MRJT' (maintenance rejected) and enter the reason for rejection in the header long text. On correction, the process reverts to step 6.8.
- 6.10 PROPONENT (NOTIFICATION APPROVER): The Notification Approver would check via Transaction IW28 to list all Notifications with a status of 'MCOM'. The Notification Approver will complete the Notification and set the system status to 'NOCO', 'Notification Complete' if he considers the work and the information of the Notification is complete. If on reviewing the Notification he determines the work or content were not complete, he would set the User status to 'JINC' (Job Incomplete), entering in the long text the reason. Transaction IW22.
- 6.11 MAINTENANCE (HISTORY PROCESSOR): The Maintenance History Processor would check via Transaction IW28 to list all Notifications with a status of 'JINC' and after rectifying the discrepancy return the Notification status for acceptance. Refer to steps 6.8 and 6.9.

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7. SUPPLEMENT

7.1 FIGURE 1 – MAINTENANCE PROCESS

Shows a diagrammatical view of the above-explained process in Section 6.

7.2 FIGURE 2 - RELATIONSHIP BETWEEN NOTIFICATION AND ORDER TYPES

Shows a table of the relationships between Notifications and Work Orders.

7.3 FIGURE 3 - MAINTENANCE WORK ORDERS BUDGET APPROVAL MODES

Shows a table of the budget approval modes for each Order Type

7.4 FIGURE 4 – RELATIONSHIP BETWEEN MAINTENANCE ORDER TYPE AND ACTIVITY TYPE

7.5 SAUDI ARAMCO FORM SA 981-A MAINTENANCE WORK ORDER (FOR SAP USERS)

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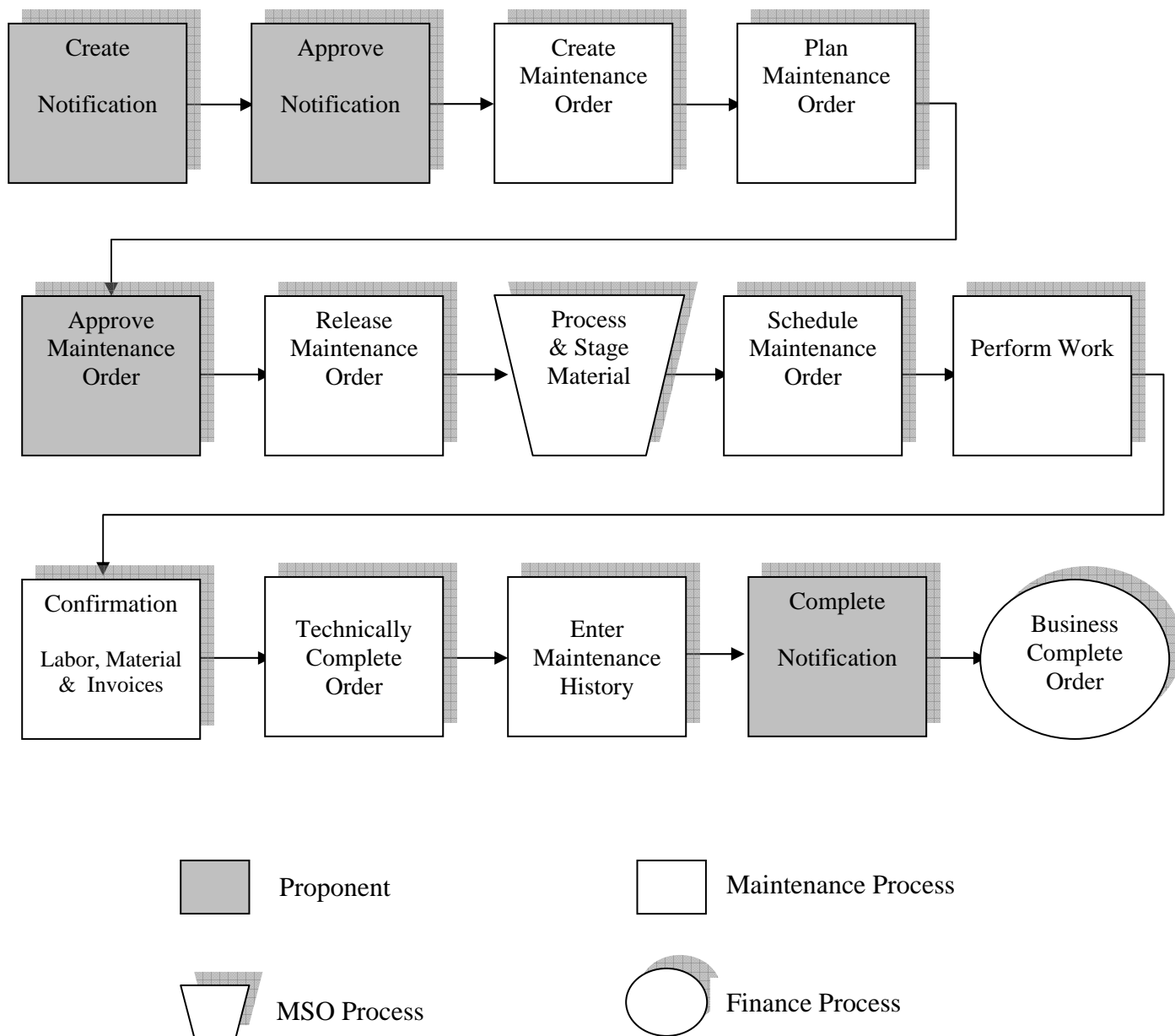
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**Figure 1 – Maintenance Process***CHANGE ☒**ADDITION ☐NEW INSTRUCTION ☐COMPLETE REVISION ☐

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<u>Notification Types</u>	<u>Maintenance Order Types</u>
M1 - Maintenance Request M2 - Malfunction Report	PM01 - Normal Maintenance
M3 - Activity Report	PM02 - Predictive/Preventive Maintenance
M5 - T&I Request	PM03 - Test and Inspection
M4 - Minor Maintenance	PM04 - Minor maintenance
M1 - Maintenance Request	PM05 - New Work & Upgrades
M1 - Maintenance Request M3 - Activity Report (optional)	PM06 - Non-Process (Plant) Maintenance PM06 - Non-Process (Non-Plant)
M3 - Activity Report (optional)	PM07 - Maintenance Support to Capital Projects

Figure 2 - Relationship Between Notification And Order Types

*CHANGE ☒**ADDITION ☐NEW INSTRUCTION ☐COMPLETE REVISION ☐

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG: INDUSTRIAL SERVICES / CORPORATE MAINTENANCE SYSTEMS SUBJECT: MAINTENANCE WORK ORDER	G.I. NUMBER Approved 1000.500	
	ISSUE DATE	REPLACES
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Order Type	Approval Mode	Explanation
PM01 Normal Maintenance	Approval made via Work Flow	SAP Business Workflow is a means of automating business processes that are not directly linked to an application. It enables us to streamline a process such as the Approval procedure.
PM05 New Work & Upgrades		
PM06 Non Process (plant) Work		
PM01 Normal Maintenance (emergency work)	Approval made manually in maintenance order	Approvers manually change the user status of the maintenance order to EMAP for Emergency Approval.
PM06 Non Process (non-plant) Work		Approvers manually change the user status of the maintenance order to MAPP for Maintenance Approval. Budget is initially approved on a form provided to the Order Processor.
PM03 Test & Inspection	Approval made via pre-defined budget object	These order types have pre-defined budget objects, which are approved before the creation of the maintenance order.
PM04 Minor Maintenance		
PM02 Preventive Maintenance		
PM07 Maintenance Support to Capital Projects/BI-1900		

Figure 3 - Maintenance Work Orders Budget Approval Modes

*CHANGE ☒

**ADDITION ☐

NEW INSTRUCTION ☐

COMPLETE REVISION ☐

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG: INDUSTRIAL SERVICES / CORPORATE MAINTENANCE SYSTEMS SUBJECT: MAINTENANCE WORK ORDER	G.I. NUMBER Approved 1000.500	
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7.4 SAUDI ARAMCO FORM SA 981-A MAINTENANCE WORK ORDER (FOR SAP USERS)

USE:

The SA981-1 Form is mainly used (but not necessarily limited to), work associated with PM06 Non Process (Non-plant) and PM07 Work Order Types.

FORM DESCRIPTION:

The Maintenance Work Order (SA981-A) is a three-part NCR Form, which is divided into three general areas. The upper half is to be completed by the Operations/Proponent, to request and authorize work.

The lower half of the Form is completed by Maintenance with the relevant Work Order header information for entry into SAP-PM.

Details of the work done/history are also entered in the lower portion of the Form on completion of the work. The reverse side of the Form is for aiding Maintenance in formulating a detailed job plan.

- **The following pages describe in detail the field entries.**

Approved:

Date: _____

AMER A. AL-SULAIM, Executive Director
Industrial Services

*CHANGE ☒

**ADDITION ☐

NEW INSTRUCTION ☐

COMPLETE REVISION ☐

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG: INDUSTRIAL SERVICES / CORPORATE MAINTENANCE SYSTEMS SUBJECT: MAINTENANCE WORK ORDER	G.I. NUMBER Approved 1000.500	
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USE OF MAINTENANCE WORK ORDER FORM SA981 - BY ORIGINATOR

The originator writes a separate SA981-A Form for each manual maintenance request. He completes the upper half of the SA981-A Form with the exception of the MWO number, which is entered by Maintenance. The required information is as detailed below in sequence by Field numbers. Refer to FORM SA981-A, Field-numbering Example.

FIELD	TITLE	DETAILS TO BE ENTERED
2	Legacy EPN	Enter the Engineering Plant Number where the equipment is located. E.g. 031_ _ _.
3	SAP Equipment	Enter the SAP Equipment Number if the Object to be work on is a piece of Equipment.
4	Legacy Equipment No.	If the SAP Equipment number is unknown but the Legacy number is, then enter the old Accounting Plant Number of the equipment as shown affixed to it or on the AMMS equipment list.
5	Functional Location	Enter the SAP Functional Location number if the Object to be work on is a Functional Location.
6	Priority	Tick the appropriate box for the Priority code (1, 2, 3, 4 or 5) to indicate the priority of work as detailed in section 4 of the GI 1000.500.
7	Overtime Approved?	Indicate Yes or No by ticking the appropriate box. If YES, then the Approver's signature is required. For Priority '1' work orders, overtime is automatically approved.
8	Work Location	Optional data. Enter the location where the work is to be carried out to further facilitate identification of the exact work place to the maintenance craftsmen, especially if it is in a remote location.
9	Problem and/or description of work	Indicate here the problem/malfunction, and/or- description of work, related to the Equipment or Functional Location. The detail should be clearly defined to ensure the correct action is taken.
10	Cost Center	Enter here the account number of the organization that is requesting the work and is required to be debited for all the work order expenses of the requested work. If a six-digit Expense account is entered, it should be preceded by four zeroes to make the required ten digits

*CHANGE ☒**ADDITION ☐NEW INSTRUCTION ☐COMPLETE REVISION ☐

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG: INDUSTRIAL SERVICES / CORPORATE MAINTENANCE SYSTEMS SUBJECT: MAINTENANCE WORK ORDER		G.I. NUMBER Approved	
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USE OF MAINTENANCE WORK ORDER FORM SA981 - BY ORIGINATOR

(Continued)

11	Maximum Authorized Cost \$	The originator should enter here the maximum expenditure that he authorizes for the requested work.
12	Permits Required?	Check Yes or No in the appropriate box.
13	When Available	Enter 'NOW' if the equipment is available to be worked on immediately, otherwise enter the date when it will be available. Blank field implies NOW .
14	Date Required	Enter the date when the work is required to be completed. Blank will indicate no time limit .
15	WBS/ Internal Order	For Capital Projects enter the WBS (Work Breakdown Structure) or the Internal Order number that will be debited for the expenses of the requested work in the PM07 Work Order.
16	Dept./Div.	Enter the name of the originator's department and division.
17	Section/Unit	Enter the name of the originator's Section and/or Unit.
18	Box No.	Enter originator's office mail box number or mailing address.
19	Location/Area	Enter originator's location, e.g. Dhahran, Safaniyah, Abu Ali, etc.
20	Originated By	<p>The originator should enter his name and job title, badge number, network ID, signature, date MWO is originated; fax number (if any) and telephone number, in the appropriate blocks/boxes.</p> <p>An originator can be any person who requires a maintenance service.</p>
21	Approved By	Requires the Approver's name and job title, network ID, badge number, signature, date work order is approved; fax number (if any) and telephone number, in the appropriate blocks/boxes. A work order must be approved by the person responsible/accountable for the work order's cost center/benefiting account -or a higher authority. The approving authority's level must also conform to any monetary limits set by the on-line GI for Automated Approval Authorities.

*CHANGE ☒**ADDITION ☐NEW INSTRUCTION ☐COMPLETE REVISION ☐

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG: INDUSTRIAL SERVICES / CORPORATE MAINTENANCE SYSTEMS SUBJECT: MAINTENANCE WORK ORDER		G.I. NUMBER Approved 1000.500	
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USE OF MAINTENANCE WORK ORDER FORM SA981 - BY MAINTENANCE

The maintenance organization, after receiving the work order from the originator, verifies that the upper portion has been properly filled out with the required information. The lower portion of the form needs to be completed as indicated below and the work order number entered once it is created and saved in the SAP system.

FIELD	TITLE	DETAILS TO BE ENTERED
1	Work Order Number	Enter the eight long numeric number generated by the SAP system.
22	Maintenance Plant	Enter the SAP Maintenance Plant number that it responsible for the Technical object.
23	Planning Plant	Enter the SAP Planning Plant that is responsibly for Planning the Work Order.
24	Planner Group	Enter the SAP Planner Group that will be responsible for planning the work.
25	Maintenance Work Center	Enter the SAP Main Maintenance Work Center that will be responsible for the work.
26	PM Order Type	Enter the Work Order Type. E.g.- PM06 or PM07
27	PM Order Activity Type	Enter the SAP PM Work Order Activity Type. Refer to the applicable Section related to each Order type in GI 1000.500.
28	Review Dates by Maintenance Engineer or Supervisor.	Optional field. Maintenance Engineer or Maintenance Supervisor reviewing the work order may enter his initials and the date of the review.
29	Senior Planner	Optional field. Senior Planner reviewing the work order may enter his initials and the date of the review
30	Planned By	Enter the name, network ID, badge number, date planned, fax number, and telephone number of the planner of the work order. Sign in the signature box.

*CHANGE ☒**ADDITION ☐NEW INSTRUCTION ☐COMPLETE REVISION ☐

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG: INDUSTRIAL SERVICES / CORPORATE MAINTENANCE SYSTEMS SUBJECT: MAINTENANCE WORK ORDER	G.I. NUMBER Approved 1000.500	
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DETAILS OF WORK DONE/HISTORY

Write the work done/accomplished to complete the Work Order. It is highly recommended to write sufficient details here to facilitate future review of this historical information. Alternatively, the same data may be entered directly into SAP-PM via the applicable Notification Type.

FIELD	TITLE	DETAILS TO BE ENTERED
31	Equipment Replaced?	If the equipment was replaced instead of repaired to complete the work, then tick mark in the ' YES ' box, otherwise mark in the ' NO ' box.
32	New Equipment Number	If the equipment was replaced, then enter the New SAP equipment number here.
33	Object code	If History is referenced a single Object of an Equipment or Functional Location then enter the Object code here.
34	Damage code	If History is referenced a single Damage of an Equipment or Functional Location then enter the Damage code here
35	Cause Code	If History is referenced a single Cause of Damage then enter the Cause code here
36	Activity Code	If History is referenced a single Activity of a Object/Damage and/or for an Equipment or Functional Location, then enter the Activity code here
37	Job Completed By	Enter name, badge number, date job completed, box number (mailing address) and telephone number of the craftsman completing the work order. Sign in the signature field. If several craftsmen worked on the MWO, then the lead craftsman should sign, otherwise the maintenance foreman/engineer/supervisor may sign.
38	Job Accepted By	Enter name, badge number, date job completed, box number (mailing address) and telephone number of a person, (normally this would be the Approver or Originator) accepting that the work has been completed. Sign in the signature field. This authority may be re-delegated at the discretion of local Proponent/Operations and Maintenance management by mutual agreement.
39	SAP Notification number	Enter the SAP Notification number if History was entered via a Notification.

*CHANGE ☒**ADDITION ☐NEW INSTRUCTION ☐COMPLETE REVISION ☐

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG: INDUSTRIAL SERVICES / CORPORATE MAINTENANCE SYSTEMS SUBJECT: MAINTENANCE WORK ORDER	G.I. NUMBER 1000.500 Approved	
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Order Type	Maintenance Activity Type	Activity Description	Cases Examples
PM01	01A	Routine Maintenance	Work associated to plant process equipment, which is related to returning a technical object to a state of repair of its original design. Includes all work that cannot be coded otherwise, but excludes work falling in other defined activity types.
	01B	Safety & Environmental	For any modification and upgrades required by organizations responsible for safety and environmental protection. It covers all works recommended by Loss Prevention, Environmental Affairs, Fire Protection, and Preventive Medicine Services organizations.
	01C	PREV. MAINT. Associated	Any work resulted of finding from scheduled preventative maintenance activities.
	01D	Predictive Maintenance	Any work as result of findings from scheduled predictive maintenance activities resulting in a requirement for repair. Special note: Predictive Maintenance differs from Preventive Maintenance by basing maintenance needs on the actual condition of the equipment, rather than on a fixed predetermined schedule – it is usually performed by specialized groups within Maintenance e.g. Vibration Analysis, Lube Oil Analysis, Thermography
PM02	02A	Preventive Maintenance	Is used for equipment (not including Relief Valves), inspection, testing, cleaning and adjustment that are part of a preplanned program of periodic work to be performed at regular intervals.
	02B	Predictive Maintenance	Predictive Maintenance bases maintenance needs on the actual condition of the equipment. It is usually performed by a specialized groups within Maintenance e.g. Vibration Analysis, Lube Oil Analysis, Thermography
	02C	Relief valve Inspections	Is used for Relief Valves inspection, testing, cleaning and adjustment that are part of a preplanned program of periodic work to be performed at regular intervals.
PM03	03A	Repetitive T&I work	T&I Work Orders are used to support the preplanned periodic test, inspection and repair of a plant facility that is required by an Engineering Inspection schedule. Two different activities are used in this Order Type- ('03A'-Repetitive T&I work and '03B'- Non Repetitive T&I work). Repetitive work is work deemed as work regularly being performed on T&I's under inspection. Examples are, inspection of vessels/columns/drums and minor repairs as a result of inspection, together with inspection and repairs to Heat Exchanges.
	03B	Non Repetitive T&I work	'03B'- Non Repetitive T&I work, is used for repairs and replacement relative to work not associated with equipment outlined in repetitive work. It includes repairs or replacements to valves and other equipment not designated for regular inspection.
PM04			PM04 Orders (MMT) are used to do Minor Maintenance - this is work that is routine and repetitive but not Preventive/Predictive Maintenance Work. Since PM04 Order are pre-approved, they do not have the overhead of approval or workflow. However, PM04 Orders should not exceed 24 Labor Hours. Materials should cost less than \$2000.
	04C	PREV. MAINT. Associated	Any minor work resulted of finding from scheduled Preventive Maintenance activities.
	04D	Predictive Maintenance	Any work as result of findings from Scheduled Predictive Maintenance activities resulting in a requirement for a minor repair. Special note: Predictive Maintenance differs from Preventive Maintenance by basing maintenance needs on the actual condition of the equipment, rather than on a fixed predetermined schedule – it is usually performed by specialized groups within Maintenance e.g. Vibration Analysis, Lube Oil Analysis, Thermography
	4XX	Commonly Used Activities	For use by all Aramco Departments
	JXX	Specific to Community Services	Used by Community Services
	WXX	Specific to Well Services	Used by Well Services
PM05	05A	Budgeted New Expense Work	This is used to support any budgeted discretionary modification to an existing plant or facility which was pre-approved in the operating plan budget; that is not Covered by a 'Budget Item' in the approved Capital Budgets & Program Book.
	05B	Un Budgeted New Expense Work	This is used to support any non-budgeted discretionary modification to an existing plant or facility which was NOT pre-approved in the operating plan budget; that is not Covered by a 'Budget Item' in the approved Capital Budgets & Program Book.
	05C	CS Standard Renovations	Used by Community Services for Standard Renovation governed by costs value and nature of renovation.
	05D	CS Major Renovations	Used by Community Services for Major Renovation governed by costs value and nature of renovation.
PM06	06A	Non-Process-Field	For work considered outside the scope of maintaining process plant equipment. It is used for any non-maintenance type of assistance or Maintenance of assets not classified as production / process equipment to <u>maintenance organization</u> . These organizations have their maintenance plants under SAP. Therefore, a workflow approval can be applied. Examples of this are: - Painting the shop floor, Miscellaneous cleanup work to maintenance facilities etc.
	06B	Non-Process-Other	For work considered outside the scope of maintaining process plant equipment. It is used for any non-maintenance type of assistance or Maintenance of assets not classified as production / process equipment to <u>non-maintenance organization</u> . These organizations don't have their maintenance plants under SAP. Therefore, a workflow approval cannot be applied. Examples of this are: - Painting the shop floor, Miscellaneous cleanup work to maintenance facilities etc.
PM07	07A	Project Department Work (WBS)	Is used to support work authorized by a budget item in the approved Capital Budgets and Program Book.
	07B	BI-1900 Work (WBS)	Used for BI-1900 work; defined under Miscellaneous Capital Items Master Appropriation. Use for construction or purchase of miscellaneous assets with a minimum capital value of \$10,001 and maximum TOTAL PROJECT COST of \$2,000,000.
	07C	Special Projects (Int Order)	For the support of special project work with special accounts. Normally, finance creates special internal order start with 670xxxxxx. Please note this is different from the two specific PM internal orders created by PM Users for Minor Maintenance and Test & Inspection Works.

Figure 4 - Relationship Between Maintenance Order Type and Activity Type

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SAUDI ARABIAN OIL COMPANY (Saudi Aramco)
GENERAL INSTRUCTION MANUAL

ISSUING ORG: INDUSTRIAL SERVICES / CORPORATE MAINTENANCE SYSTEMS

SUBJECT: MAINTENANCE WORK ORDER

G.I. NUMBER **Approved****1000.500**

ISSUE DATE

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FORM SA981 Field numbering Example

MAINTENANCE WORK ORDER (For SAP Users)				Notification No. 39			
Saudi Aramco 981-A (2/02) Front (G.I. 1000.500)				1 Work Order No. 			
				(To be filled by Maintenance)			

TO BE FILLED BY OPERATIONS/PROponent						6 Priority: 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
2 Legacy EPN No. 		4 Legacy Equipment: 		7 Overtime Approved? Yes <input type="checkbox"/> No <input type="checkbox"/>		Approver's Signature (if yes)	
3 SAP Equipment No: 		5 Function Location: 		8 Work Location: 		9 Work To Be Done (and/or) Problem /Malfunction: 	
10 Cost Center 		11 Maximum Authorized Cost 		12 Permits Req'd? Yes <input type="checkbox"/> No <input type="checkbox"/>		13 When Available 	
14 Date Required 		15 Work Breakdown Structure/Internal Order 					

16 Dept/Div.		17 Section/Unit		18 Box No.		19 Loc./Area	
20 Originated By:	Name & Job Title	Network ID	Badge No.	Signature	Date	Fax No.	Phone No.
21 Approved By:	Name & Job Title	Network ID	Badge No.	Signature	Date	Fax No.	Phone No.

TO BE FILLED BY MAINTENANCE							
22 Maintenance Plant 		24 Planner Group 		25 Maint Work Center 			
23 Planning Plant 		26 PM Order Type 		27 PM Activity Type 			
28 Review Dates: Maint Engr/Supvr 		29 Senior Planner 					
30 Planned By:	Name	Network ID	Badge No.	Signature	Date	Fax No.	Phone No.

WORK DONE/HISTORY:				31 Equipment Replaced? Yes <input type="checkbox"/> No <input type="checkbox"/>		If Yes, Enter New Equipt No. 32 	

33 Object Code 		34 Damage Code 		35 Cause Code 		36 Activity Code 	
37 Job Completed By:	Name	Badge No.	Signature	Date	Box No.	Phone No.	
38 Job Accepted By:	Name	Badge No.	Signature	Date	Box No.	Phone No.	

SAUDI ARAMCO FORM SA 981-A MAINTENANCE WORK ORDER (FOR SAP USERS)
*CHANGE ☒**ADDITION ☐NEW INSTRUCTION ☐COMPLETE REVISION ☐