THE ANATOMY OF AN OPERATOR-ORIENTED RENTAL TOOL QUALITY ASSURANCE PROGRAM

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1. Introduction:

The purpose of this presentation is to share the internal efforts and measurably successful crusade put forth by an oilfield rental tool company embarking on a quality initiative. The establishment of a viable alternative to the way the company had been operated during the previous seventeen years was paramount to this effort launched in 1989. At that time, the demands set forth by the oil companies of the industry established mandates for tighter and higher standards in the quality and performance of rental tools. If the rental tool company's desire to participate in the deeper drilling projects was to be realized, great strides in quality processes would be essential. This quality initiative involved a sound commitment on the parts of the owner and management of the company to converge around a central theme: A commitment to quality through perseverance and teamwork resulting in unparalleled value and superior service. This charge and charter for change would require a complete overhaul of the infrastructure of the company thereby accommodating the new edicts set forth by this initiative. These directives were as follows.

A. Develop a quality assurance program that insures complete traceability of all rental equipment.
B. Establish accountability through a written Standard Operating Procedure Manual that encompasses the entire product line and defines the requirements for maintenance, inspection and repair.
C. Involve the entire work force as an integral part of the development of the quality initiative.
D. Utilize the quality initiative at all levels of the business transaction to reduce risk and liability and promote customer satisfaction.
E. Qualify existing suppliers of materials and services through mandatory audits.
F. Promote client participation through education and full disclosure.

2. Concepts and Commitments

The inaugural action was to set in motion this resolute commitment by selecting a course of action that would insure implementation of the charge. This would require the development of realistic goals borne of clearly-defined issues. The nurturing of these concepts would ultimately yield a quality management philosophy based on a progressive and diligent pledge to strengthen all sectors of the organization. These concepts helped delineate the broadly-used and often abused term known as, "quality assurance." To this point we define Quality Assurance / Quality Control as follows.

A. Quality Assurance (Q.A.)

Quality Assurance is the plan of the essential steps deemed necessary to achieve the desired product attributes. This includes the necessary documented Quality Assurance Program and Standard Operating Procedures designed to meet the various guidelines set forth by the industry as a whole, the API, the manufacturers and other specification agencies.

B. Quality Control (Q.C.)

Quality Control is the enactment of the quality assurance program and the policing and verification of compliance with the standard operating procedures. This involves the maintenance, testing, inspection and repair of equipment to assure compliance with the appropriate standards and specifications outlined. The policing and verification of these activities through monitoring and audits serve as a measure of one's performance against the anticipated standards of an industry.

3. Planning and Development

There are numerous options available for the planning and developmental phases of the quality initiative. Once the concepts and commitments have been realized and the goals are set, the establishment of a viable program becomes the order of the day. There are two primary sets of documents that define and establish the Quality Program. They are the Quality Program Manual and the Standard Operating Procedures Manual. The time lines for the development of these documents must run concurrent and bear the same signature mission statement.

A. Quality Program Development

In general, there are two venues for approaching the development of the Quality Program. These are external *third-party implementation* and internal *in-house implementation.* A brief discussion on the two venues follows.

1. Third-Party Implementation

This popular approach calls for a company to contract the services of an outside quality professional. This is a sizable investment. A company can realize an entire quality package delivered to its doorstep complete with on-site instructors. The contreacted quality professional will conduct rallies, and provide impressively-bound documents with the company name strategically inserted throughout the document with some semblance of authenticity. An announcement via a memo, foretells the new quality directives which <u>will</u> be implemented. The work force is assembled for orientation to the documents and plans for action. Within a short period of time the company is left to fend for itself against considerable odds. In essence, a few knowledgeable and diligent employees are selected during the "fleshing-out" process from the existing work force and appointed as Quality Control Supervisors. They are to carry out the duties of implementation. These appointees are soon faced with the animosities of a work force that has been riddled with procedural changes and extra paperwork. The newly-appointed supervisors are soon viewed as whistle blowers that can be sidestepped. Inevitably, some areas of management in the company view

the whole quality initiative as a beast of burden because the details of their direct concerns were not addressed during the critical stages of commitment. Thus come the arbitration and subsequent decision where the battle is won by someone but the war is lost by all concerned. This scenario has been played out time and time again. Ultimately, this method of implementation yields little if any change in the way the company conducts its affairs on a day to day basis. In some isolated instances the workforce is able to support the real desires for quality until management grasps the concept and things fall loosely into place.

2. In-house Implementation

A company that chooses the path of in-house implementation has, in effect, chosen to ford the stormy waters of change alone. They are just as susceptible to failure and often, do fail miserably. In-house Implementation calls for the ultimate sacrifice on the part of the principal owners and management. They must turn inward and face their demons of complacency and proclaim in unanimity the need for change. They must have the unyielding support of the workforce to insure that these impending changes are not self-serving. They must consult with the workforce to identify the benefits the employees will realize as a result of the proposed changes and be committed to the materialization of these benefits. Once this seemingly insurmountable task has been accomplished, the question of approach becomes the order of the day. It is a realization of these issues that inspires true self-analysis and acceptance that one and all have reached the point of no-return. A clear path has now been forged by all, with a clear desire to attain an elemental understanding of that of which the Quality Program should be comprised. From this point forward, the entire company must educate itself on the various phases of the quality initiative and immerse itself in further self-analysis and open-mindedness, thereby establishing an effective course of action.

In summary, these two approaches historically have yielded both excellent and disastrous results. Ultimately, without a deep internal commitment to quality, reflecting every facet of business activity at the principal roots of an organization, long-term, positive changes will not be realized in the various branches of the company.

B. Quality Program Manual (Q.P.M.)

As a prerequisite, it is recommended that The American National Standards Institute / American Society for Quality Control Q90-Q94 Models for Quality Management be acquired and read by all concerned. The contents of these documents that appear pertinent to management's defined goals then are adopted as policy and the writing of the Quality Program Manual (QPM) begins. The actual development of the Quality Program Manual requires an in-depth self-analysis on the part of those concerned. The company must pour over every aspect of its day-to-day operations and painstakingly define that which will bring the quality initiative full circle. It is imperative that all areas of management within the organization contribute to the fabric of the document. Equally important to this initiative, is

that management incorporates the fundamental needs and aptitudes of its subordinate workforce in the framework of the document. These critical elements must not be overlooked. The enforcement of these principals will insure that the early stages of development will promote ownership of the contents of the document by all concerned. This process of development, with involvement of the organization at all levels, establishes by induction the implementation of the QPM. The QPM content selected for oilfield rental tools complies with the following format as stipulated by the ANSI/ASQC.

QPM No.	Subject
QPM 1.0	Statement of Policy and Authority
QPM 2.0	Definitions, Terms and Abbreviations
QPM 3.0	Organizational Charts
QPM 4.0	Quality Program Manual Control
QPM 5.0	Training and Qualification
QPM 6.0	Design Control
QPM 7.0	Quality Program Documents
QPM 8.0	Procedures, Specifications and Acceptance Criteria
QPM 9.0	Vendor Certification and Approval
QPM 10.0	Procurement Control
QPM 11.0	Material Identification Control
QPM 12.0	Process Control
QPM 13.0	Inspection and Testing
QPM 14.0	Measurement and Test Equipment
QPM 15.0	Handling, Storing and Shipping
QPM 16.0	Non-Conformance Controls
QPM 17.0	Quality Records
QPM 18.0	Audit Process
QPM 19.0	Corrective Actions

C. Standard Operating Procedures (SOP)

Simultaneous with the development of the QPM, is the writing of the Standard Operating Procedures. This set of documents is developed in order to define and direct the procedural actions for maintenance, dimensional integrity, testing, inspection, repair and handling of the subject product line. It is imperative that the SOP reflects only the directives for the aforementioned procedural actions. There are various control points such as the manufacturer recommendations for maintenance and handling, API specifications, recommended procedures and other pertinent industry standards such as the DS-1. Such documents must be consulted and adhered to thus assuring that the SOP maintains consistency with industry quality standards. There often is a tendency on the part of the author and editors of the document to incorporate an excess amount of engineering data favorable to the usage or field application of the subject equipment. Although impressive with heavy content, the document soon loses focus and intent. It is highly recommended that each

section of the SOP document deal solely with the specific details of one type of equipment. Where various models or subcategory of one equipment line is an issue, the procedure must be specific to those items and delineate the associated procedural activities.

The SOP must incorporate clear and decisive terminology that the laborer can understand and execute. This is promoted through the involvement of the affected workforce as contributing editors. This will give each employee an in-depth understanding and lasting stake in the venture . . . the most critical aspect in implementation.

Ultimately, the SOP must be put to the test of time through implementation. The day-to-day practice of utilizing the SOP will yield revisions and addenda that further will clarify the quality objective. The addition of new product lines and changes and improvements to existing product lines also will contribute to the evolution of the SOP document.

4. **Controls and Enforcement**

The success of a Quality Assurance Program relies heavily on a company's ability to control and enforce the implementation of policy and procedure. With qualified management and supervision and a well-educated workforce the full benefits of a Quality Program will be realized. The results of these successful efforts will yield growth and maturity as well as the solidarity of the workforce.

As previously discussed in the development of the QPM and SOP, employee involvement is paramount to successful implementation. The daily task of controlling quality processes requires intense documentation and communication. The key areas for the control and enforcement of the Quality Program are as follows.

A. Quality Program Manual Control

This control feature sets forth the issuance and revision of the **Quality Program Manual (QPM).** Each section (identified with a **QPM** procedure number and subject block on each page) within the **Quality Program Manual** is individually controlled as follows.

B. Training and Qualification

This section of the **Quality Program Manual** defines the control features instituted for the training and qualification of those personnel occupying a position with a function in the Quality Program.

C. Design Control

As a lessor and also non-manufacturer of oilfield equipment, the inclusion of "Design Controls" is imperative to the rental tool company to insure verification of product integrity from the time of manufacture to the procurement and usage thereafter.

D. Quality Program Documents

This section of the **Quality Program Manual** sets forth the development, approval, control and distribution of Quality Program Documents.

E. Procedures, Specifications and Acceptance Criteria

This section of the **Quality Program Manual** specifies a series of registered texts that reveal the procedures, specifications and acceptance criteria with which a rental tool company must comply.

F. Vendor Certification and Approval

The vendors' certification and approval process is designed to insure that a selected vendor who performs services or supplies products has been evaluated thoroughly for conformance with quality program criteria.

G. Procurement Control

This section of the **Quality Program Manual** sets forth the control features instituted to insure that critical or significant materials and services are procured from a supplier or manufacturer that has the ability to conform to the rental tool company, client and **API Specifications** as dictated under Vendor Certification and Approval.

H. Material Identification Control

This section of the **Quality Program Manual** dictates the control features utilized to maintain identification of rental tool equipment and drill stem products. All tools and drill stem components possess an alphanumeric serial number. The alpha sector refers to specific documentation called for and received at the time of receipt of the item into inventory. The numeric sector refers to the individual identity of the tool or drill stem component.

I. Process Control

This section of the **Quality Program Manual** sets forth the control features instituted to ensure that all materials are processed in a manner consistent with the requirements of this **Quality Program**, clients' specifications and applicable **Industry and API Standards.**

J. Inspection and Testing

This section of the **Quality Program Manual** establishes the inspection and testing program to ensure that inspection requirements are adhered to and performed by qualified individuals using the appropriate methods and equipment.

K. Measurement and Test Equipment

The calibration program is established for measuring and testing equipment utilized in the acceptance or rejection of equipment.

L. Handling, Storing and Shipping

Handling, storage and shipping controls are established to ensure that a finished product, one which has completed servicing and inspection and is approved for rental will not be damaged and preclude the occurrence of satisfactory performance.

M. Non-Conformance Controls

This section of the **Quality Program Manual** sets forth the features established for the control of non-conforming materials.

5. "Communication," A Vital Process

In order for a quality assurance program to be successful, it must have exposure to a viable client base and the associated activity level with which to measure its performance. The participation of the client through a medium such as third-party monitoring of testing and inspection helps the client to establish a heightened trust for the rental tool company's ability to deliver on its promise of quality.

The rental tool company should in turn welcome this critique thereby acknowledging the importance of audits and the trust they develop. As the relationship grows and the associated workforces of the operator and rental tool company align themselves, a better understanding of their capacities and common goals such as cost savings, reduced damages and the quest for zero failures become the focal point. This level of communication is not the product of demand, negotiation or good fortune it is a vital process between allied companies who share the same goals.

A. The Job Order

The ability to successfully communicate one's needs in our industry is preponderant. The operator needs specific rental tools and the rental tool company needs specific information to accommodate the operators' needs. The operator must have a central point of contact to place his tool order without the hindrance of answering services or paging devices. He must be able to make one phone call and place a tool order without delay. As this exchange of information takes place, the operator must canvas the drilling or workover project to insure that all of the necessary tools have been ordered. The technically oriented dispatcher with the rental tool company must listen to and record the order, reviewing its completeness and insuring that the operator has advertently left something off of his tool list. Time lines are drawn to insure that the order is dispatched to the location with ample time for delivery. This considerable exchange of information requires the utmost care. In short, the quality of the exchange of information must remain the first order of business.

B. Preparation of Order

After the rental tool order has been placed, the dispatcher must verify tool availability and readiness The dispatcher who takes the rental tool order, is ultimately responsible for ensuring that the job order is processed. This process requires a sound computerized materials management system that is fully integrated to encompass all phases of a specific tool's disposition in inventory. It is imperative that this system maintains a register of tool condition as determined through inspection after the previous job and what, if any, corrective actions such as repairs were performed in rectification of damages. A system such as this will allow for absolute verification that a tool has been accepted back into the active inventory along with the appropriate documentation and is in ready condition, available for rental. At this point, the requested tool is pulled from inventory along with the associated quality control documents. All pressure containment tools are re-tested and charted so that a current test chart can accompany the tool to the location. The test chart is signed and dated by the attending foreman. All other tools are rechecked for fitness for purpose. Verification of the tool's inspection document is made and the tool is moved to a staging area pending load out. Drill stem components are rerouted through the cleaning facility for a second cleaning and visual inspection to insure that the surfaces and connections are absent of debris and damage. The appropriate inspection reports are pulled to verify the individual alphanumeric serial numbers and the pipe is staged pending load out. As the tools are assembled, the dispatcher will once again, physically verify every item on his computer generated tool list against the assembled tools and verify every serial number for accuracy. After the job has been assembled for loading, the foreman in attendance supervises the loading to insure that a safe and proper load is attained.

6. Full Disclosure

In a quality system, one of the most critical elements is the documentation of a product's service history. From acquisition to the final rejection and removal from inventory, the history of a product provides valuable information that will help a company understand it's performance and value. A major pitfall in the rental tool industry lies with the lack of information provided while the tool is in service on a rig location. For many reasons, the operator or lessee of the tool is not at liberty to fully disclose and account for exact work loads to which the tool has been subjected. Inevitably, the tool is returned to the rental company and must be disassembled, cleaned and inspected to determine its current condition and to establish the processes necessary for refurbishment. With all this said, a rental tool quality program must address every tool returned from a rig location as if it had been exposed to the worst of environments and therefore must be inspected accordingly. To make an exception even one time is to plan for a failure.

An effective Quality Assurance Program promotes pride in the workforce and an attitude of winning the battle against non-conformance issues. It also promotes an attitude of full disclosure. When a non-conformance occurs, at it surely will, it is imperative that the rental tool company aggressively pursue the failure incident to gather all information available surrounding the occurrence. Because an in-depth service history on the tools is generally not available as previously discussed, the rental company must give full disclosure to the client with regard to the tool's origin and recent service history. In light of this, it can be said that a tool is only as good as its origin, repair history and its latest inspection. In all non-conformance events, the tool or joint of pipe must be sent to an independent laboratory for evaluation of the failed section. The selected lab should be mutually agreed upon with full access given to both parties regarding the evaluation processes and results thereof. Jointly, a meeting should be called and require presentation of all pertinent information surrounding the tool's history, its application on the rig location and the results of the failure analysis. Throughout this process every effort should be made to eliminate conjecture regarding the failure. Knowing the facts based on scientific evaluation and documentation should always yield an amicable resolution to the inquiry. The failure will either be traced back to a non-conformance on the part of the rental tool company or the actions of the operator and possibly Mother Nature herself. The importance of the matter is to accept and document the findings and establish corrective actions to insure that this non-conformance or error in judgement does not occur again. To approach this in any other fashion will most assuredly result in additional failures . . . on the rig floor and in future business relations. An effective Quality Assurance Program is truly the conscience of a company. Its edicts must dictate the principals necessary for doing the right thing the first time and every time thereafter. No matter the degree of non-conformance, without acceptance of failure, full disclosure, and resolution to change there can be no real growth and maturity in a quality organization.

7. Defining "Value"

An effective Quality Assurance Program is an asset. It will impart a discipline within an organization that will make evident sound solutions for doing things accurately and efficiently. Though somewhat costly in its initiation, the quality initiative unfolds as a protector of assets and a destroyer of liabilities. The most distressing liability of a rental transaction rests with the occurrence of damages. A rental company that uses damages as a profit center, in effect, lives by the sword and dies by it.

The life span of a rental item is reduced by damage. This accelerated depreciation of an asset, coupled with the loss of revenue while the rental item is down for repair, serves to undermine the profitability of the business transaction and depletes the asset value. An efficient Quality Assurance Program will insure that stringent certification processes are followed. Without these processes, self-inflicted non-conformance such as dimensional errors and the damages they incur cannot be answered for either by the operator, or the rental tool company. The operator views the equipment as sent out as such and disputes the notification of repair. The rental tool company on the other hand is faced with a customer's dispute and the costly action of absorbing the cost of repair and depletion of the asset.

8. Price Reduction vs. Cost Reduction

The cost of maintaining an effective Quality Assurance Program once established is self-sustaining through its contribution to asset management and an increased customer base. The true meaning of price reductions vs. cost reductions is brought to the forefront as the customer realizes and overall reduction in his operating cost. The customer soon realizes that price reductions and the inherent risk associated with an underfunded quality program can promote the disastrous effects of a costly equipment failure. In short, a properly-funded rental transaction, supported by an effective quality initiative, insures that there are superior tool performance and less downtime on the rig location.

9. A Look at the Bottom Line

A look at the bottom line may be one of the more refreshing aspects of an effective Quality Assurance Program. A clearly-delineated cost analysis, broken down by commodity offers an insightful review of a rental transaction. This type of analysis requires a full audit able disclosure of all costs associated with a rental transaction. Among these commodity lines, exist the equipment repair cost and inspection cost. In an effort to capture or fix certain commodity lines, many companies have chosen to commingle one or more of these costs with the daily rental fees. This precludes any meritable measure of assessing a rental company's efforts to account for a viable Quality Assurance Program or insure the refurbishment of its assets. In order to insure our efforts in reducing risk and liability, a rental company must provide, and an operator must demand traceability and accountability for every facet of the rental tool transaction.