MECHANICAL INTEGRITY PROGRAM

The facility is obligated to develop and implement a program to ensure that equipment and instruments are maintained in a manner to prevent failure and to ensure that maintenance personnel are trained to perform the maintenance tasks in a safe and adequate manner. They are further obligated to thoroughly document these activities. This data form is intended to help gather the information necessary to develop a successful mechanical integrity program.

Section 1 – Elements of a Mechanical Integrity Program

Elements of a Mechanical Integrity Program	Equipment, piping, and instrumentation used to process, store, or handle highly hazardous substances needs to be maintained to minimize the risk of releases of such substances. This requires that a mechanical integrity program be in place for preventive maintenance **(not "breakdown" maintenance)** to assure the continued integrity of the process. Elements of a mechanical integrity program include the identification of equipment, piping, and instrumentation; types of preventive maintenance (inspections and tests); development of maintenance procedures; frequency of preventive maintenance (inspections and tests); criteria for acceptable inspection and test results; documentation of preventive maintenance activities; development of maintenance training program; and quality assurance / quality control procedures. This section applies to: • Pressure vessel and storage tanks • Piping systems, including piping components such as valves • Relief and vent systems and devices • Emergency shutdown systems • Controls, including monitoring devices and sensors, alarms and interlocks • Rotating equipment

Structure of This Data Form	The following pages consist of tabular information to assist the facility in the development and evaluation of their mechanical integrity program. The organization of this data form generally following the format of the Mechanical Integrity checklist as follows: Section 2. Identification of Equipment, Piping, and Instrumentation Section 3. Sources of Preventive Maintenance (inspections and tests) Requirements Section 4. Preventive Maintenance (inspections and tests) Requirements Section 5. Frequency of Preventive Maintenance (inspections and tests) Section 6. Development of Preventive Maintenance (inspections and tests) Procedures Section 7. Criteria for Acceptable Preventive Maintenance (inspections and tests) Results Section 8. Documentation of Preventive Maintenance (inspections and tests) Activities Section 9. Training Program Section 10. Quality Assurance / Quality Control

Section 2 – Identification of Equipment, Piping, and Instrumentation

Identification of Equipment, Piping, and Instrumentation	In order to develop a maintenance program, equipment, piping, and instruments must be identified. A possible starting point to generate this list is the piping and instrumentation diagrams. Additionally, if there are associated utilities that could impact the safe operation of the process (e.g. utilities that were included in the process hazard analysis), the appropriate portion of the utility should be included as well. ***Note: The development of the mechanical integrity program requires the compilation of process safety information.***

Identification of Critical Equipment	Critical equipment, piping, and instrumentation must have some type of periodic maintenance. Equipment is considered critical if its failure to function (or function properly) could lead to a fire, explosion or cause acute health impacts due to an exposure to a regulated substance. If the equipment is used to initiate action under the emergency response program, calibration and testing must be done at least annually. ***Note: The facility may utilize the risk rankings from the process hazard analysis to establish critical equipment.***

MECHANICAL INTEGRITY PROGRAM – PROCEDURE AND LISTING OF EQUIPMENT, PIPING, AND INSTRUMENTATION

The following table will prompt the user to identify the Mechanical Integrity Program Procedure(s); and describe how equipment, piping, and instrumentation were identified at the facility, including the establishment of critical equipment.

Facility:	**Process:**	**Date:**

MECHANICAL INTEGRITY PROGRAM PROCEDURE (Note Current Version of the Mechanical Integrity Program Procedure (title, date, revision number)):

EQUIPMENT, PIPING, AND INSTRUMENTATION (Describe How Equipment, Piping, and Instrumentation was Identified and Listed; Additionally, Describe How Critical Equipment was Identified):

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Section 3 – Sources of Preventive Maintenance (inspections and tests) Requirements

Sources of Preventive Maintenance Requirements	Once a listing of equipment, piping, and instrumentation is compiled; the facility must identify the required types of preventive maintenance. There are several sources to consider: • Vendor O&M (Operation and Maintenance) Manuals • Codes and Standards • Industry Recommended Practice • Operating Experience Some examples of sources of preventive maintenance requirements from the American Petroleum Institute (API): • API 510 – Pressure Vessel Inspection Code: In-Service Inspection, Rating, Repair, and Alteration • API 570 – Piping Inspection Code: Inspection, repair, Alteration, and Rerating of In-Service Piping Systems • API Recommended Practice 572 – Inspection of Pressure Vessels (Towers, Drums, Reactors, Heat Exchangers, and Condensers) • API Recommended Practice 574 – Inspection Practices for Piping System Components • API Recommended Practice 580 – Risk-Based Inspection

MECHANICAL INTEGRITY PROGRAM – MATRIX OF SOURCES OF PREVENTIVE MAINTENANCE (inspections and tests) REQUIREMENTS

The table that follows is intended to assist the facility in the review of sources of preventive maintenance requirements for each category of equipment, piping, and instrumentation. Including, what sources have been reviewed and where that information is located.

Facility:	**Process:**	**Date:**

	Vendor O&M Manuals	**Codes and Standards (revision and date)**	**Industry Recommended Practice**	**Operating Experience**	**Other** *(specify)*
Heat Exchangers					
Other Types of Pressure Vessels and Storage Tanks					
Piping Systems					
Manual Valves					
Pressure Relief Devices					
Pressure Relief Systems *(pressure relief discharge headers and flare systems)*					

MECHANICAL INTEGRITY PROGRAM – MATRIX OF SOURCES OF PREVENTIVE MAINTENANCE (inspections and tests) REQUIREMENTS

The table that follows is intended to assist the facility in the review of sources of preventive maintenance requirements for each category of equipment, piping, and instrumentation. Including, what sources have been reviewed and where that information is located.

Facility:	**Process:**	**Date:**

	Vendor O&M Manuals	**Codes and Standards (revision and date)**	**Industry Recommended Practice**	**Operating Experience**	**Other** *(specify)*
Scrubber Systems					
Building Ventilation Systems *(if CAPP process inside)*					
Emergency Shutdown Systems					
Instrumentation					
Sensors (toxic/combustible gas, flame)					

MECHANICAL INTEGRITY PROGRAM – MATRIX OF SOURCES OF PREVENTIVE MAINTENANCE (inspections and tests) REQUIREMENTS

The table that follows is intended to assist the facility in the review of sources of preventive maintenance requirements for each category of equipment, piping, and instrumentation. Including, what sources have been reviewed and where that information is located.

Facility:	**Process:**	**Date:**

	Vendor O&M Manuals	**Codes and Standards (revision and date)**	**Industry Recommended Practice**	**Operating Experience**	**Other** *(specify)*
Alarm Systems					
Pumps					
Compressors					
Other Rotating Equipment					

Section 4 – Preventive Maintenance (inspections and tests) Requirements

Preventive Maintenance Requirements	Researching the possible source of preventive maintenance requirements from Section 3, for the listing of equipment, piping, and instrumentation created in Section 2, may yield several types of preventive maintenance requirements.

MECHANICAL INTEGRITY PROGRAM – QUESTIONS TO CONSIDER FOR THE IDENTIFICATION OF PREVENTIVE MAINTENANCE (inspections and tests) REQUIREMENTS

The listing of questions that follows is intended to assist the facility in identifying preventive maintenance requirements. The list is meant as a starting point/example, and not all maintenance requirements may be identified using these questions.

Facility:	**Process:**	**Date:**

	Yes	**NA**
Is wall thickness monitored for pressure vessels (operating in excess of 15 psi), storage tanks (operating at 15 psi or less), and process piping (where failure could result in the release of toxic gas, a fire, or explosion)?		
Are pressure relief devices recertified or changed-out, which includes verifying the set pressures? (and, if recertified is the recertification conducted by a nationally recognized code shop when required?)		
Are emergency shutdown system circuits checked for continuity, and are system components checked for operability?		
Does the supervised employee alarm system provide positive notification to assigned personnel whenever a deficiency exists in the system?		

MECHANICAL INTEGRITY PROGRAM – MATRIX OF PREVENTIVE MAINTENANCE (inspections and tests) REQUIREMENTS

The table that follows is intended to assist the facility in ensuring that each category of equipment, piping, and instrumentation has been considered and appropriate preventive maintenance requirements have been identified. Including, what sources have been reviewed and where that information is located.

Facility:	**Process:**				**Date:**		
	Corrosion / Erosion Monitoring *(note 1)*	**Other Monitoring** *(note 2)*	**Calibration**	**Function Testing**	**Part Replacement or Rebuild**	**Total Replacement**	**Other** *(note 3)*
Heat Exchangers							
Other Types of Pressure Vessels and Storage Tanks							
Piping Systems							
Manual Valves							
Pressure Relief Devices							
Pressure Relief Systems *(e.g. pressure relief discharge headers and flare systems)*							

MECHANICAL INTEGRITY PROGRAM – MATRIX OF PREVENTIVE MAINTENANCE (inspections and tests) REQUIREMENTS

The table that follows is intended to assist the facility in ensuring that each category of equipment, piping, and instrumentation has been considered and appropriate preventive maintenance requirements have been identified. Including, what sources have been reviewed and where that information is located.

Facility:	**Process:**				**Date:**		
	Corrosion / Erosion Monitoring *(note 1)*	**Other Monitoring** *(note 2)*	**Calibration**	**Function Testing**	**Part Replacement or Rebuild**	**Total Replacement**	**Other** *(note 3)*
Scrubber Systems							
Building Ventilation Systems							
Emergency Shutdown Systems							
Instrumentation							
Sensors *(e.g. toxic/combustible gas, flame)*							
Alarm Systems							

MECHANICAL INTEGRITY PROGRAM – MATRIX OF PREVENTIVE MAINTENANCE (inspections and tests) REQUIREMENTS

The table that follows is intended to assist the facility in ensuring that each category of equipment, piping, and instrumentation has been considered and appropriate preventive maintenance requirements have been identified. Including, what sources have been reviewed and where that information is located.

Facility:	**Process:**				**Date:**		
	Corrosion / Erosion Monitoring *(note 1)*	**Other Monitoring** *(note 2)*	**Calibration**	**Function Testing**	**Part Replacement or Rebuild**	**Total Replacement**	**Other** *(note 3)*
Pumps							
Compressors							
Other Rotating Equipment							

Notes:

1. Indicates corrosion or erosion monitoring through non-destructive examination, corrosion coupons or other methods.
2. Indicates other types of monitoring such as external and internal visual inspection, vibration monitoring (only acoustic shall apply) or other types of monitoring.
3. Indicates other types of preventive maintenance such as heat exchanger cleaning, valve rebuilding, etc.

	Maintenance Interval										
Assembly	Daily	Weekly	Monthly	Quarterly	Semi-Annual	Annual	Biennial	Triennial	Every Five Years	Every Ten Years	Reference
Condensers (Air or Water as Applicable)		X						X	X		OEM Manuals and Industry Best Practice
Air System (Compressor, Drier, Piping, Receivers)	X	X	X		X	X	X		X		OEM Manuals and Industry Best Practice
Alarm System			X		X						OEM Manuals, Industry Best Practice, and State of Nevada Requirements
Batteries			X	X		X		X			NFPA 70B
Condenser Fans (Where Applicable)		X		X	X	X					OEM Manuals and Industry Best Practice
Cooling Water Pumps (Where Applicable)		X		X	X	X					OEM Manuals and Industry Best Practice
Control Valves		X		X	X	X					OEM Manuals and Industry Best Practice
Diesel Fire Pump		X		X	X	X	X	X			OEM Manuals, Industry Best Practice, and State of Nevada Requirements
Emergency Shutdown System			X			X					OEM Manuals, Industry Best Practice, and State of Nevada Requirements
Emissions Checking					X						OEM Manuals and Industry Best Practice
Emissions Testing			X								OEM Manuals, Industry

***Industry best practices can include (but are not limited to) NFPA and Chlorine Institute**

Fig. 1 : Example Matrix of Preventative Maintenance Requirements

Assembly (Or Equipment)	Maintenance Interval										References
	Daily	Weekly	Monthly	Quarterly	Semi-Annual	Annual	biennial	Triennial	Every 5 Years	Every 10 years	

Fig. 2 : Blank Matrix of Preventative Maintenance Requirements

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Section 5 – Frequency of Preventive Maintenance (inspections and tests)

Frequency of Preventive Maintenance	The frequency of preventive maintenance must be determined to be the most conservative of vendor recommendations, best engineering practices, or operating experience. Some things to consider when establishing the frequency of inspections and tests: ***Establishing the frequency of inspections and tests sets the time frame for when equipment integrity is verified. Better understanding of the type and rate of deterioration, allows the establishment of frequencies that are more dependent on equipment condition (e.g. setting frequencies based on some percentage of equipment life).*** ***Establishing frequencies also needs to consider the consequence (e.g. increasing the frequency of inspections and tests can better define, identify, and monitor the deterioration mechanisms and therefore reduce the risk by reducing the likelihood of failure).***

MECHANICAL INTEGRITY PROGRAM – QUESTIONS TO CONSIDER FOR THE IDENTIFICATION OF FREQUENCY OF PREVENTIVE MAINTENANCE (inspection and tests)

The listing of questions that follows is intended to assist the facility in identifying frequency of preventive maintenance. The list is meant as a starting point/example, and not all maintenance frequency may be identified using these questions.

	Yes	NA
Does the frequency of wall thickness monitoring consider historical wall loss or the potential for corrosion or erosion in the system?		
Are alarm system power supplies maintained to assure a fully operational condition?		
Is a test of the reliability and adequacy of non-supervised employee alarm systems made every two months? Is a different actuation device used in each test of a multi-actuation device system so that no individual device is used for two consecutive tests?		
Are all supervised employee alarm systems tested at least annually for reliability and adequacy?		

MECHANICAL INTEGRITY PROGRAM – QUESTIONS TO CONSIDER FOR THE IDENTIFICATION OF FREQUENCY OF PREVENTIVE MAINTENANCE (inspection and tests)

The listing of questions that follows is intended to assist the facility in identifying frequency of preventive maintenance. The list is meant as a starting point/example, and not all maintenance frequency may be identified using these questions.

	Yes	NA
Are critical process instruments, controls, and analyzers calibrated and maintained pursuant to vendor recommendations, industry recommendations, or operating experience; and are risk rankings considered as assigned in the PHA?		

Section 6 – Development of Preventive Maintenance (inspections and tests) Procedures

Development of Preventive Maintenance Procedures	Procedures must be developed for preventive maintenance activities and confirmed to follow generally accepted good engineering practices (e.g. if procedures are based upon vendor O&M manuals, codes and standards, or industry recommended practice). The procedures must also be written to direct personnel in how to perform the task in a safe manner. This would include isolating equipment for maintenance and placing it back in service. This procedure is often separate from the actual maintenance procedure and may be addressed in the safe work practices. Other safe work practice may be applicable (e.g. hot work permit, lockout / tagout, and confine space entry).

Assembly	Inspection, Maintenance, and Checkout	Reference
	Daily Inspections	
Air System (Compressors)	Indicators, PDP temperature	SMP-10.1.1
Feed Pumps/Feed Pump Drivers	Leaks, Vibrations, Oil level	SMP-4.1.1
Fire Protection System	Check for leaks and System Pressure	SMP-2.2.1
Generators	Bearing temperature log, Lube oil system, Coolant temperature log, Pressure, Electrical	SMP-3.1.1
Generator Cooling System	Leaks, Vibration, Oil level, and Discharge pressure	SMP-12.2.1
OEC general system and piping	Mechanical damage or deformity, Oil and motive fluid leaks, Vaporizer motive fluid level, Condenser pressure, Warning indications	SMP-4.3.1
Oil Systems	Pressure, Level, and Temperatures	SMP-9.1.1
Plant UPS	Check for warning indicators	SMP-3.13.1
Production Well Systems	Inspection	SMP-5.1.1
Rupture Disks and PSVs	Check Leaks and DP	SMP-4.3.2
Turbines	Inspection	SMP-4.3.1
	Weekly Inspections	
Condensers	Optimization	SMP-4.2.2
Air System	Indicators, PDP temperature	SMP-10.1.2
Air System (Receivers)	Moisture separator	SMP-10.4.1
Cooling Water Pumps	Inspections	SMP-4.4.1
Control valves	Leak check and Operational Test/ Timing Check	SMP-4.3.4
Diesel Fire Pump	Inspection	SMP-2.1.1
Feed pumps	Leaks, Vibrations, Oil level, Water separator draining	SMP-4.1.2
Feed pump/Feed Pump Driver	Pump driver cleaning, Leak inspections, Vibration analysis	SMP-4.1.3
Fire Protection System	Inspections	SMP-2.9.1
Generator	General Inspection and data logging	SMP-3.1.2
Generator Cooling System	Pump inspections	SMP-12.2.2

Fig 3: Example Table Referencing Maintenance Procedures for Various Systems

Assembly	Inspection, Maintenance, and, Checkout	Reference
Daily Inspections		
Weekly Inspections		

Fig 4: Blank Table Referencing Maintenance Procedures for Various Systems

Section 7 – Criteria for Acceptable Preventive Maintenance (inspections and tests) Results

Criteria for Acceptable Preventive Maintenance Results	In addition to establishing what types and frequencies of preventive maintenance activities are required for the list of equipment, piping, and instrumentation; the facility must establish criteria for what constitutes acceptable inspection and test results (e.g. minimum wall thickness for vessels or piping, test pressures for flexible connectors, bench test of instrumentation, etc.). In order to determine acceptable results, process safety information must be available, for example: • *Pressure vessel / piping specifications for wall thicknesses and corrosion allowance for non-destructive examination criteria.* • *Relief valve set pressures and capacities for recertification* • *Emergency shutdown system schematics to ensure all appropriate components are included in the preventive maintenance program and to allow personnel to troubleshoot and maintain circuits.* Additionally, the program must provide direction for the personnel performing maintenance when the results of an inspection or test are outside the criteria. ***Deficiencies that are outside the acceptable limits which are defined in the process safety information need to be corrected before the equipment, piping, or instrumentation is put back into service.***

Section 8 – Documentation of Preventive Maintenance (inspections and tests) Activities

Frequency of Preventive Maintenance	Document each inspection and test that has been performed on the equipment, piping, or instrumentation, including: 1. The date of the inspection or test 2. The name of the person who performed the inspection or test 3. The serial number or other identifier of the equipment 4. A description of the inspection or test performed 5. The results of the inspection or test ***The facility may want to consider establishing a preventive maintenance file for each piece of equipment, piping system, or instrument. This will assist in the discovery of trends (e.g. corrosion rates, sensor replacement, cleaning schedules, etc.).***

MECHANICAL INTEGRITY PROGRAM – SCHEDULING AND DOCUMENTATION OF PREVENTIVE MAINTENANCE (inspections and tests) ACTIVITIES

The following table will prompt the user to identify the Work Order System(s) at the facility for preventive and corrective maintenance activities.

Facility:	**Process:**	**Date:**

SCHEDULE, TRACK, AND DOCUMENT PREVENTIVE MAINTENANCE ACTIVIES (Describe How Preventive Maintenance Activities are Scheduled, Tracked, and Documented by the Facility):

SCHEDULE, TRACK, AND DOCUMENT CORRECTIVE MAINTENANCE ACTIVIES (Describe How Corrective Maintenance Activities are Scheduled, Tracked, and Documented by the Facility):

Section 9 – Training Program

Development of Maintenance Training Program	Appropriate training is to be provided to maintenance personnel to ensure that they understand the preventive maintenance program procedures, safe practices, and the proper use and application of special equipment or unique tools that may be required. ***[NAC 459.95421]***

MECHANICAL INTEGRITY PROGRAM – TRAINING TOPICS

The following table is provided as an example of the possible organization of a training program for maintenance personnel.

Facility:	**Process:**	**Date:**
Position:		

Training Topic	**References** *(List the source document(s) that require this training topic. For example: NAC 459.95418, 29CFR1910 or Company Policy #08-123)*	**Lesson Plans or Training Materials** *(For example: Lesson Plan #123 or Document #456)*	**Duration**	**Venue**		**Type of Training**		**Refresher Frequency**	**Competency Test Pass-Fail Criteria**		
				Field	**Classroom**	**Initial**	**Refresher**		**Written Test**	**Oral Test**	**Performance**
OVERVIEW OF THE PROCESS AND THE POTENTIAL HAZARDS ASSOCIATED WITH THE PROCESS											
Hazard Communication	***29CFR1910.1200***										
Process Flow Diagram (e.g. overview of the process)											

MECHANICAL INTEGRITY PROGRAM – TRAINING TOPICS

The following table is provided as an example of the possible organization of a training program for maintenance personnel.

Facility:	**Process:**	**Date:**
Position:		

Training Topic	**References** *(List the source document(s) that require this training topic. For example: NAC 459.95418, 29CFR1910 or Company Policy #08-123)*	**Lesson Plans or Training Materials** *(For example: Lesson Plan #123 or Document #456)*	**Duration**	**Venue**		**Type of Training**		**Refresher Frequency**	**Competency Test Pass-Fail Criteria**		
				Field	**Classroom**	**Initial**	**Refresher**		**Written Test**	**Oral Test**	**Performance**
SAFE WORK PRACTICES											
Hot Work Procedures	***29CFR1910.119(k) 29CFR1910.252(a)***										
Lock-Out / Tag-Out Procedures	***29CFR1910.147***										

MECHANICAL INTEGRITY PROGRAM – TRAINING TOPICS

The following table is provided as an example of the possible organization of a training program for maintenance personnel.

Facility:	**Process:**	**Date:**
Position:		

Training Topic	**References** *(List the source document(s) that require this training topic. For example: NAC 459.95418, 29CFR1910 or Company Policy #08-123)*	**Lesson Plans or Training Materials** *(For example: Lesson Plan #123 or Document #456)*	**Duration**	**Venue**		**Type of Training**		**Refresher Frequency**	**Competency Test Pass-Fail Criteria**		
				Field	**Classroom**	**Initial**	**Refresher**		**Written Test**	**Oral Test**	**Performance**
Confined Space Entry Procedures	***29CFR1910.146***										
Process Equipment Opening and Line Breaking Procedures											

MECHANICAL INTEGRITY PROGRAM – TRAINING TOPICS

The following table is provided as an example of the possible organization of a training program for maintenance personnel.

Facility:	**Process:**	**Date:**
Position:		

Training Topic	**References** *(List the source document(s) that require this training topic. For example: NAC 459.95418, 29CFR1910 or Company Policy #08-123)*	**Lesson Plans or Training Materials** *(For example: Lesson Plan #123 or Document #456)*	**Duration**	**Venue**		**Type of Training**		**Refresher Frequency**	**Competency Test Pass-Fail Criteria**		
				Field	**Classroom**	**Initial**	**Refresher**		**Written Test**	**Oral Test**	**Performance**
Controlled Access Procedures											
PREVENTIVE / CORRECTIVE MAINTENANCE PROCEDURES											
Preventive Maintenance Procedures	***NAC 459.95421(1)(b)(2)***										

MECHANICAL INTEGRITY PROGRAM – TRAINING TOPICS

The following table is provided as an example of the possible organization of a training program for maintenance personnel.

Facility:	**Process:**	**Date:**
Position:		

Training Topic	**References** *(List the source document(s) that require this training topic. For example: NAC 459.95418, 29CFR1910 or Company Policy #08-123)*	**Lesson Plans or Training Materials** *(For example: Lesson Plan #123 or Document #456)*	**Duration**	**Venue**		**Type of Training**		**Refresher Frequency**	**Competency Test Pass-Fail Criteria**		
				Field	**Classroom**	**Initial**	**Refresher**		**Written Test**	**Oral Test**	**Performance**
Corrective Maintenance Procedures	***NAC 459.95421(1)(b)(2)***										
MANAGEMENT OF CHANGE PROVISIONS, INCLUDING HOW TO RECOGNIZE A CHANGE THAT WOULD PROMPT THE NEED FOR THE MOC											
Management of Change	***NAC 459.95421(1)(b)(3)***										

MECHANICAL INTEGRITY PROGRAM – TRAINING TOPICS

The following table is provided as an example of the possible organization of a training program for maintenance personnel.

Facility:	**Process:**	**Date:**
Position:		

Training Topic	**References** *(List the source document(s) that require this training topic. For example: NAC 459.95418, 29CFR1910 or Company Policy #08-123)*	**Lesson Plans or Training Materials** *(For example: Lesson Plan #123 or Document #456)*	**Duration**	**Venue**		**Type of Training**		**Refresher Frequency**	**Competency Test Pass-Fail Criteria**		
				Field	**Classroom**	**Initial**	**Refresher**		**Written Test**	**Oral Test**	**Performance**
OTHER											

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Section 10 – Quality Assurance / Quality Control

QA / QC Procedures	A quality assurance system is needed to help ensure that the proper materials of construction are used, that fabrication and inspection procedures are proper, and that installation procedures recognize field installation concerns. "As built" drawings, together with certifications of coded vessels and other equipment, and materials of construction need to be verified and retained in the quality assurance documentation. Equipment installation jobs need to be properly inspected in the field for use of proper materials and procedures and to assure that qualified craftsmen are used to do the job. The use of appropriate gaskets, packing, bolts, valves, lubricants and welding rods need to be verified in the field. Also, procedures for installation of safety devices need to be verified, such as the torque on the bolts on ruptured disc installations, uniform torque on flange bolts, proper installation of pump seals, etc. If the quality of parts is a problem, it may be appropriate to conduct audits of the equipment supplier's facilities to better assure proper purchases of required equipment which is suitable for its intended service. Any changes in equipment that may become necessary will need to go through the management of change procedures. ***[NAC 459.95421]***
QA / QC Procedures (continued)	***Quality Assurance –*** Is the management oversight function of the portion of the Mechanical Integrity Program procedure that deals with the proper specification, procurement, receiving, warehouse, and installation of process components. ***Quality Control –*** Is the technical function of the Mechanical Integrity Program procedure that ensures verification that the process components were installed according to the Quality Assurance Program Replacement equipment can be checked against the specifications. But, new equipment must be evaluated to ensure that the new specifications are compatible with the process (management of change program)

MECHANICAL INTEGRITY PROGRAM – QUALITY ASSURANCE / QUALITY CONTROL PROGRAMS		
The following table will prompt the user to identify the QA / QC programs at the facility.		
Facility:	**Process:**	**Date:**
NEW EQUIPMENT, PIPING, AND INSTRUMENTATION (Describe What System is in Place to Ensure the Suitability of New Components. ***Note: This would typically be addressed through the MOC / PSSR Programs***):		

MECHANICAL INTEGRITY PROGRAM – QUALITY ASSURANCE / QUALITY CONTROL PROGRAMS

The following table will prompt the user to identify the QA / QC programs at the facility.

Facility:	**Process:**	**Date:**

EXISTING EQUIPMENT, PIPING, AND INSTRUMENTATION (Describe What System is in Place to Ensure Installation is per Design Specifications and Vendor Instructions):

MAINTENANCE MATERIALS AND SPARE PARTS (Describe What System is in Place to Ensure the Following):

MECHANICAL INTEGRITY PROGRAM – QUALITY ASSURANCE / QUALITY CONTROL PROGRAMS

The following table will prompt the user to identify the QA / QC programs at the facility.

Facility:	**Process:**	**Date:**
1) Proper Materials are Specified?		
2) Specified Materials are Ordered?		
3) Specified Materials are Received?		
4) Specified Materials are Issued for Installation?		