C. Mechanical Integrity

Mechanical Integrity is a new term used in the OSHA Process Safety Management Regulation (1910.119, Paragraph J). At Dow, Mechanical Integrity includes the items in this section:

Electrical Systems

Fire Protection Systems

Fired Equipment

Critical Instrument Systems

Emergency Block Valves

Storage Tanks

Pressure Vessels/Relief Devices/Glass Devices/Expansion Joints

Critical and Rotating Equipment (Including Compressors and Pumps)

Management Systems

Piping, Compressors and Pumps

Mechanical Integrity

ELECTRICAL SYSTEMS

REFERENCES: Minimum Requirements, National Electric Code, LPP 3. Included as part of the Loss Prevention Audit, is an Electrical 5-Point inspection by the Electrical Maintenance Department. Contact your area electrical supervision to verify and coordinate this activity.

Following is a list of some Loss Prevention items that will be included in that plant's inspection:

1). The Electrical Area Plot Plan drawing should be reviewed and current. Contact Loss Prevention if revisions are required. (L.P.P.)Identify any installations that are in conflict with electrical plot plan.

2). The Safety Electrical One Line Diagram (SEOLD) should be reviewed and current per LAD S&LP S-214.

3). The electrical field audit will be included an inspection of existing installations to observe mechanical integrity maintenance needs and conformance with L.P.P.-3., the National Electrical Code, and Area Classification practices.

4). The results of this Electrical Department 5-Point inspection audit be included in the follow-up portions of this audit.

Mechanical Integrity

FIRE PROTECTION SYSTEMS

REFERENCES: Minimum Requirements

C 1. Yes [✓] No [] Do you have fire monitors and/or fixed sprinkler systems to protect flammable areas?

Plans: Maintain them.

B 2. Yes [✓] No [] Do you have a plant program to routinely exercise/test fire monitors and fixed sprinkler systems?

Plans: Follow existing program.

A 3. Yes [✓] No [] Is your extinguisher testing up-to-date and are they in good condition?

Plans: _____

B 4. Yes [✓] No [] Are the size and type of extinguishers appropriate to the anticipated fire -- for example, a "C" rated extinguisher where electrical fires could be expected?

Yes [✓] No [] Are they properly located (i.e., office, MCC, switchgear rooms)?

Plans: _____

B 5. Yes [✓] No [] Have your employees participated in fire extinguisher training?

Last Training Date: November 1993
Plans: Hands-on fire training will be received by all operations personnel in 1994. All other personnel will receive refresher training.

B 6. Yes [] No [✓] Do you have hose cabinets?
Yes [] No [] If yes, are employees trained on their use?
Yes [] No [] Is there a Preventative Maintenance Program on the hoses?
Yes [] No [] Are the hose cabinets necessary?

C 7. Yes [✓] No [] Do office areas, MCC's, switchgear, computer rooms and unoccupied buildings have smoke detectors alarming in a 24-hour/day occupied area? (LPP 9.1 and 9.2) Alarm in the Control Room.

Plans: _____

A 8. Yes [✓] No [] Are checks of smoke detectors made routinely and documented? (LPP 10.13)

Plans: _____

C 9. How is your structural steel protected from a spill fire? (LPP 10.10)

~~Plans:~~ Spills will mostly be gas which will rise quickly. Areas containing oil are protected by deluge systems.

B 10. Yes [] No [] NA [✓]
Is fire proofing well maintained? (LPP 10.10.7)
Yes [] No [] NA [✓] Is there an inspection program?

Date of Last Inspection? _____
Plans: _____
_____

B 11. Yes [] No [] NA [✓]

Is pipe insulation on hot lines (i.e.: 150# steam or DOWTHERM*) in good condition to prevent a chemical leak from entering the insulation and auto-igniting? (LPP 10.12.4) *No chemicals to ignite.*

Plans: _____
_____

A 12. Yes [] No [] NA [✓]

Are gas AND spill detectors adequately maintained (LPP 9.9.6) and tested routinely? (LPP 10.13) Provide Documentation.

Plans: _____
_____

B 13. Yes [] No [✓]

Do you maintain foam within your area to fight fires? (LPP 5.8)

If yes, what kind of foam is used and when was the material last tested?

_____

Contact the Fire Department for the above information.

Plans: _____

_____

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B -- DELUGE & SPRINKLER SYSTEMS

REFERENCE: Fire Protection Manual -- The intent of this page is to assure that are properly maintained. Your process Safety and Loss Prevention contact can ass out.

	EXAMPLE	1	2	3	
Adequate access to valves during an emergency?	Yes				
Explosion or traffic exposure to valve?	No				
Explosion or traffic exposure to piping?	No				
Is the valve freeze protected?	Yes				
Is the system adequately drained of water?	Yes				
Is the pilot system adequately drained of condensate?	Yes				
Is remote dump switch labeled on deluge systems?	Yes				
Date of most recent 2" drain test?	1/18/85				
Static pressure in recent drain test (psig)?	92				
Flowing pressure in recent drain test (psig)?	90				
Design flow (gpm)?	2123				
Design pressure at deluge valve inlet (psig)?	11				
Date of last flow test?	10/12/86				
Were there plugged heads/corrected?	Yes/Yes	/	/	/	
Are any pilot heads painted?	No				
Is there any missing or damaged pipe?	No				

Use another page if you have more than six sys

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Mechanical Integrity

PRESSURE VESSELS/RELIEF DEVICES/GLASS DEVICES/ EXPANSION JOINTS

REFERENCES: Minimum Requirements, LPP 6.5., 6.9.

A 1. Yes [] No [✓] Are all pressure vessels (Pressure Containing Equipment) registered?
If no, how many are not? 40
Plans: 40 vessels are "In Acquisition" stage. These should be complete by July 1994

Yes [✓] No [] Do you have any vendor-supplied tanks in your plant? (i.e., the vendor fills) Bdz HPT-2

How do you assure mechanical integrity for these vessels?

Plans: Hydrostatically tested before being put into service May 1994.

B 2. Yes [] No [✓] Do file folder(s) on each pressure vessel (Pressure Containing Equipment) have the registration form, calculations, inspection and status change reports, spec sheets, record prints, U-1 forms, mill tests, and visual inspections? (LPP 6.5.4.C)
Plans: The 40 vessels "In Acquisition" do not have complete files yet. To be complete July 1994.

B 3. Who is responsible for managing the pressure vessel testing inspection program in your plant? _____

Power & Utilities Maintenance Planner

C 4. List any vessels with known mechanical integrity problems.

None

Plans: _____

Have current inspection printout on pressure vessel and relief valve status available at the audit. O.K.

B 5. Yes [✓] No [] Has responsibility for execution of the pressure relief devices (i.e., valves and rupture discs, vacuum relief's) program been specifically assigned? (Including Relief Design) (LPP 14.3.4)

To whom? Power #1/Utilities Maintenance Planner

A 6. Yes [✓] No [] Are all pressure relief devices registered? (LPP 14.3.4)

Plans: _____

A 7. Yes [✓] No [] Are design calculations on all pressure relief devices done?*(Corporate Relief Design Manual)*

If no, number incomplete? _____

Schedule for completion? _____

B 8. Is there a file folder for each pressure relief device with registration form, design calculations, specifications and piping isometric sketch?

Yes [✓] No []

Plans: _____

A 9. Yes [] No [✓] Have all glass devices in hazardous service been registered?

Plans: Register glass devices (8). Glass devices are part of our current C-9 checks.

B 10. Yes [✓] No []

Are glass devices in hazardous service adequately guarded?

Plans: _____

B 11. Yes [✓] No []

Are required inspections, maintenance, evaluation and recordkeeping done for glass devices in hazardous service? (Site Safety Standards)

Plans: _____

C 12. Yes [✓] No []

Does the plant utilize expansion joints in hazardous applications? (Site Safety Standards)

A 13. Yes [✓] No []

Are all expansion joints registered?

Plans: _____

B 14. Yes [✓] No []

Are required inspections, maintenance, evaluation and recordkeeping done?

Plans: _____

B 15. Yes [✓] No []

Does your plant have a test/replacement program for flexible hoses?

Plans: Hydrostatically test

Mechanical Integrity

CRITICAL AND ROTATING EQUIPMENT

These questions pertain primarily to large rotating equipment but also apply to equipment critical to the operation of the plant (hard to replace, costly).

REFERENCES: LPP 16.1.

A/C 1. Yes [✓] No [] Have you identified your critical equipment? *(Please attach your list.)* (LPP 16.1.2)

Plans: _____

_____

B 2. Yes [✓] No [] Does the list include items such as large and/or unusual motors, transformers, foreign and/or domestic equipment requiring long deliveries? (Centrifuges and Blowers)

Plans: _____

_____

B 3. Yes [✓] No [] Do you have adequate spare parts to minimize downtime (business interruption)?

Plans: _____

_____

B 4. Yes [✓] No [] Are spares/spare parts stored in a controlled environment?

Plans: Inventory management controls now.

B 5. Yes [] No [✓] Do you have adequate monitoring/protection devices for your identified critical equipment? (LPP 16.1.4)

Plans: River water pump vibration and temperature monitoring.

B 6. Yes [✓] No [] Do you have vibration monitors? Turbine/Generators
Plans: Need to install on Boiler Water pumps

B 7. Yes [✓] No [] Do you have an on-going preventative maintenance program? (LPP 16.1.5)
Please describe: CHAMPS based computer maintenance and history system. PM modules are contained within.
Plans:

A 8. Yes [✓] No [] Do you have dead-head protection on all pumps?
(LPP 16.4.)
Describe: Recirculation systems on high pressure feed water pumps.
Plans:

B 9. Yes [✓] No [] Are stainless steel bolts a problem because of potential process or atmospheric corrosion?
If so, how do you control their use? We do not use stainless steel bolts.

Mechanical Integrity

MANAGEMENT SYSTEMS

REFERENCES: OSHA Process Safety Management (1910.119, Paragraph J)

A 1. Yes [] No [] Do you have written procedures to assure on-going integrity of process equipment? (i.e., pressure vessels, EBV's, fire protection systems, etc.)

Plans: _____

A 2. Yes [✓] No [] Do you train each employee involved in maintaining the on-going integrity of process equipment in an overview of the process and its hazards and in the procedures applicable to the employees job task to assure that the employee can perform the job in a safe manner.

Plans: _____

A 3. Yes [✓] No [] Do inspection and testing procedures follow Dow site or Division guidelines?

Plans: _____

A 4. Yes [✓] No [] Do the frequency of inspections and tests of process equipment meet accepted Dow site or Division guidelines?

Plans: _____

A 5. Yes [✓] No [] Are all inspections and tests documented as per Dow guidelines?

Plans: _____

_____

A 6. Yes [✓] No [] Are deficiencies discovered from tests and inspections corrected before further use or in a safe and timely manner when necessary means are taken to assure safe operations.

Plans: _____

A 7. Yes [✓] No [] In the construction of new plants and equipment, is equipment fabricated according to Dow site or Division standards and suitable for the process application for which they will be used?

Plans: _____

A 8. Yes [✓] No [] Are appropriate checks and inspections performed to assure that equipment is installed properly and consistently with design specifications and manufacturers instructions?

Plans: _____

B 9. How do you assure that maintenance materials, spare parts and equipment are suitable for the process application for which they are being used?

Follow division and department engineering specifications. Use Material Engineering etc. as needed.

Plans: _____

B 10. How do you ensure the proper materials of construction are used in maintenance and new projects? We specify them.

Plans: _____

_____

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B 11. Yes [✓] No []

Do you have a list of the proper gaskets for each part of your process? (LPP 6.6)

Plans: _____

_____

Yes [✓] No [] Is gasketing covered in your piping specification?

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PIPING, PUMPS, COMPRESSORS

REFERENCES: Pipeline Technology Center (Angleton, TX), Dow Pipeline-Texas Operations only (Freeport, TX)

B 1. Yes [✓] No [] Do you have accurate drawings showing the routing of your pipelines?

B 2. How often are your pipelines inspected? Supposed to be annually. We don't get to them that often. New Division inspection program is being developed to meet OSHA 1910.

B 3. Yes [] No [✓] Are all your pipelines well identified and maintained? Not all identified as well as we need to.

A 4. Yes [✓] No [] Has definite ownership, including predictive, preventative maintenance (PPM) responsibilities, been clearly defined between the origin and termination of your pipelines?

B 5. Yes [✓] No [] If more than one owner is involved for outside-block-limits pipelines, does each concur in writing with your interpretation of the extent of ownership? N/A

B 6. Yes [] No [✓] Do you have records showing the design criteria for each of your pipelines (material of construction, MAWP, operating pressure, coatings, etc.)? We don't have all of this information for every pipeline on record.

Where is the information kept? _____

B 7. Do you have a scheduled and documented periodic program for maintaining your pipelines for:

Yes [✓] No [] N/A []
Painting?

Yes [✓] No [] N/A []
Cathodic Protection?

Yes [✓] No [] N/A []
Ground Interface Deterioration?

Yes [✓] No [] N/A []
Surveillance?

B 8. Yes [] No [✓] Are your pipelines in the original service for which they were designed?
Most are. Some fuel oil piping and Oxygen piping have been used for condensate, instrument air and Nitrogen.

B 9. Yes [] No [✓] Do you maintain a record of pipeline repairs?

B 10. Where are the repair records kept? ___

B 11. If another owner is responsible for working on/repairing one of your outside-block-limits pipelines, how do they know the hazards (if any) associated with your materials? _____
No other owners work on our pipelines.

B 12. Yes [] No [✓] N/A []

When work is performed by others on lines adjacent to yours, do you inspect the repair scene to assure the integrity of your piping has not been compromised?

B 13. Yes [✓] No [] N/A []

Within the last 5 years, has your coated buried piping been free of leaks or other problems?

If "NO", what type (material) of coating was involved? _____

B 14. Yes [] No [✓]

Other than visually, can you determine if your pipeline is leaking?

B 15. Yes [] No [✓]

Do you have written contingency plans for handling leaks from your outside-block-limits pipelines?

B 16. Yes [] No [] N/A [✓]

If more than one owner is involved, do they concur with your emergency contingency plans?

B 17. Yes [✓] No []
In a pipeline emergency, will you, as the owner, normally respond?

B 18. Yes [] No [] N/A [✓]

If others are expected to respond, have they been included in training/planning necessary to handle a pipeline leak with your materials?

B 19. Yes [✓] No []
Is there a list of owner contacts

available to those responding to the emergency?

B 20. Yes [✓] No []
Is the list of contacts dated and periodically updated?

B 21. Yes [] No [✓]
Is Distribution E/R included on the "pipeline emergency" call list?

B 22. Yes [✓] No [] N/A []

If you handle flammable or combustible materials, are there provisions for grounding containers at the take-off point stations?

B 23. What deficiencies presently exist on your pipeline systems?

In process of upgrading cathodic protection on underground piping.

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