Facility Material Condition Inspection Guideline

To facilitate more effective identification and reporting of deficiencies, implement a Material Condition Inspection Program (MCI). The principal staff members for performing MCI inspections are the MRO Specialists. Other operations and administrative personnel can also report deficiencies and to ensure this can be done by others with a minimum of training, the MCI card is used.

The MCI card requires a minimum of information, almost all of which can be entered by the reporter in their own words. No codes or predetermined data items are needed. The cards are 3x5 so they can be conveniently carried in a pocket. Once filled out, the cards can be given to any MRO supervisor for further processing and corrective action.

For clarity, the following abbreviations are used on the MCI cards:

MC	Material Condition
S	Safety
H	Housekeeping
GOMP	Good Operations & Maintenance Practices

MATERIAL CONDITION INSPECTION CARD

Area_____**Date**_____**Initials**_____

Affected Equipment_____

Describe Deficiency: MC_____**S**_____**H**_____**GO&MP**_____

Goals

1. To ensure facility cleanliness, safety, and equipment are not deteriorating and going undetected by other facility monitoring or assessment methods.
2. To increase the awareness of facility management and supervision regarding the state of facility cleanliness, safety, and equipment condition.
3. To provide a mechanism for providing an inspection of facility systems and equipment to identify and correct discrepancies.
4. To utilize the human element as an integral aspect of routine equipment monitoring and diagnostics.

Enabling Objectives

1 Develop and implement an inspection program to define responsibilities for conducting inspection, identifying and correcting deficiencies, and assuring cleanliness, safety, and good equipment material condition.

2 Establish inspection areas so that the entire facility is inspected, including areas with difficult access.

3 Establish inspection guidelines and criteria to assist inspectors in performing their inspections.

4 Develop a training program for selected facility personnel, including facility managers and supervisors, to receive inspection techniques training.

5 Establish a means to report, track, and correct, identified deficiencies in a timely manner.

6 Evaluate exiting inspection programs and guidelines to identify areas of deficiency and methods of improvement.

Facility Material Condition Tasks

"The material condition of the facility should be maintained to support safe and reliable facility operations."

A. <u>Inspection Preparation:</u>

1. Obtain area assignments from the Maintenance Planning and Scheduling Manager (MPSM) for the material condition, housekeeping, and safety inspection.

2. Review appropriate facility procedures and policies regarding housekeeping, safety, material deficiency identification, and facility inspection requirements. Specifically ensure familiarity with the following, if applicable:

   - Calibration administrative procedures
   - Tagging or marking inspection procedures
   - Deficiency tagging procedures

3. Review the facility's last inspection report for the areas in question and note improvements, new deficiencies, or no change.

Facility Inspections

A. Initial Facility Tour

The following example points should be considered to gain better insight into the management control of facility material condition in the areas to be inspected:

1. Review facility equipment problems.

2. Ensure familiarity with work going on in the facility areas to be inspected.

3. Identify items in the area of the facility that should be examined in depth for equipment, housekeeping, or safety concerns.

4. Thoroughly inspect your assigned area (about two hours of checking). Do not try to cover everything. Concentrate on key areas that were determined from your reviews and initial tour.

5. Document the deficiencies as soon as possible and turn them in to the MPSM who will distribute them to the appropriate work planner. Make sure that they are descriptive. These deficiency reports can be used to check the maintenance effort to maintain the facility and contribute to the feedback necessary to sustain improvement.

Material Condition Inspection Details

The following are typical facility equipment problems that may be observed during inspection:

A. General system inspection of valves, piping, and flanges (water, steam, air, or oil)

1. Manual valves.

   a. Packing up on stops, cocked packing gland or lacking lubrication
   b. Hand wheels bad
   c. Other leaks besides packing
   d. Unlubricated stems, gear boxes
   e. Corrosion

2. Motor-operated valves – bonnet leaks can indicate valve torque problems, bolt tightening failures, or procedures problems.

   a. Packing up on stops – no ability to pull up on if leak should start.
   b. Deteriorating condition of electrical conduit, (frayed, loose), or conduit used for other purposes (such as scaffold corner brace).
   c. Leaking oil or grease from valve operator (may indicate bad seals, over greasing, poor maintenance practices).

d. Lack of value stem lubrication or leak residue on stems restricting valve operation.

3. Rust and/or corrosion caused by system leaks.

4. Insulation ruined, missing, or laying in area (possibly caused by leaks or previous maintenance activities).

B. Other Associated System Equipment:

1. Pipe hangers and/or supports loose, broken, or removed. Snubbers leaking oil; hydraulic reservoir low oil level.

2. Insulation missing from hot piping (presents a potential for burns to facility personnel and increased facility thermal losses).

3. System filters and sight glasses in poor condition (cracked, missing, dirty, or corrosion problems).

4. Facility equipment and compartments identification markings poor.

5. Gauges, instruments that have out-of-date calibration tags, pegged pointers, broken glass, or appear to be temporary modifications to equipment.

6. Poor preservation of buildings and equipment, e.g., lack of cleaning, painting, and upgrading of older equipment.

7. Equipment exposed to outside atmosphere not properly protected.

8. Floor drains plugged.

C. Rotating Equipment – Pumps, Compressors, Motors

1. Excessive equipment vibration or noise, e.g., bearing noise, system vibrations, cycling of pump, compressors, or system.

2. Deteriorating pump seal condition such as leaks, corrosion in seal area, conditions on standby pumps (seal leaks, gauge indications).

3. Pump packing problems such as excessive leakage, packing gland up on stops bent or cocked.

4. Lubrication equipment checks for oil sight glass dirty, leaking bearing throwing oil, bearing running hot with fresh grease on fittings. Also check for satisfactory lubrication practices such as proper oil levels and greasing of bearings.

5. Excessive compressor noise, loose belts, motor noise, lubrication leaks, dirty inlet filters.

6. Dryers – caution tags, cycle times of compressors, leaks on valving. Poor filter differential pressure low but not zero.

7. Unclear, improper, or missing identification of equipment (pumps, motors, valves, breakers).

D. Facility Measurement and Control Equipment

(Need input from facility operators regarding control room alarms and facility problems).

1. Facility gauges, instruments identification.

2. Protection of important instruments: covers, glasses, protective barriers (including specialized protection from environmental conditions).

3. Instrument valves: leaks, packing, bonnets, hand wheel conditions.

4. Temporary rigged instrumentation in facility, lacking supports.

5. Notes, procedures, operating aids at instrument valve stations.

6. Markings on control boxes/cabinets inadequate, or instrument technician notes used to help identify facility control stations.

7. Calibration stickers – use of, out of date, control of instrumentation.

8. Instrument reading indicates possible problems (i.e., pegged, cycling, or bent) – discrepancy with redundant standby equipment readings.

E. Electrical Equipment

1. Motor operator valve leaks, steam, water, or operator lubricant.

2. Motors/generators – clogged vent screens, plastic protection, dirty, lubrication leaks, noisy, cycling, and/or excessive vibration.

3. Temporary wiring left in areas from test or modifications.

4. Belts loose, jumping, squealing.

5. Control cabinets in poor condition – identification, preservation, handles broken, lights out, fasteners missing or loose.

6. Informational aids, operations or electrician markings or notes on control panels.

7. Area lighting – poor, missing, or underrated for area maintenance.

F. Maintainability of Equipment

1. Special fixtures, jigs, tools, and equipment in facility:

   a. Condition of equipment.
   b. Control of equipment (laying in areas of the facility)
   c. Preservation, lubrication of specialty items.
   d. Slings, straps and wire rope conditions – marking and control of facility rigging.

2. Access to equipment – pump change outs, motor repairs, valve repairs. (Maintainability)

3. New facility modifications installed limiting access to equipment – overhead problems such as electrical runs, ventilation ducts, curbing around pumps, transformers to contain oil. (Lack of equipment removal scheme for facility maintenance work).

Personnel Safety Inspection Details

A. Facility Design

1. Workplace designed in such a manner that personnel are not required to walk along pipes and cable trays to reach or work on equipment that must be inspected, serviced, or repaired.

2. Evidence of measures taken to add ladders, catwalks, and work platforms where possible.

3. Handrails and barriers in place where there is the potential for falling from elevated areas.

4. Lighting sufficient to perform tours, inspections, maintenance activities.

5. Facility hardware elements that protrude into pathways that present head injury hazards and tripping hazards appropriately flagged, colored or otherwise modified to eliminate personnel safety hazards.

6. Walking surfaces provided (and maintained) to allow secure footing for personnel; floor gratings maintained flush with floor level to prevent tripping hazards; floor gratings used in areas where open holes would otherwise present trip and fall hazards.

B. Equipment Design

1. Suitable protective guards provided on moving parts of shop and facility equipment to avoid personnel injuries.

2. Pipes adequately insulated to prevent burns to personnel who might accidentally make contact with them.

3. Safety relief valve location will not endanger nearby personnel.

C. Protective Measures and Practices

1. Safety equipment such as emergency showers and eye wash stations located in the immediate vicinity of potential danger sources, equipment situated to provide unobstructed access.

2. Instructions provided for proper use of emergency showers and eye wash stations; equipment routinely tested for operability.

3. Additional safety equipment in good operating condition, e.g., emergency breathing air, aprons, masks, shields.

4. Fire extinguishers available throughout the facility and in good mechanical condition; tested and or inspected at regular intervals.

5. Leaks corrected promptly to avoid slippery walking surfaces or prevent the spread of dangerous fluids, e.g., acids, caustics, contaminated liquids.

6. Hazardous areas well posted to warn of the specific hazard.

7. High noise areas in the facility clearly identified (85 db and above) and ear protection devices readily available and worn.

8. Eye protection devices available and used in areas or work situations where flying particles or steam leaks can potentially cause eye injuries.

9. Worksites being maintained safe for workers and other facility personnel who may be working or passing through the area.

10. “NO STEP” sign posted where necessary to prevent personnel injuries or damage to equipment.

11. Facility paging system and fire alarm system reaches all areas where personnel may need to be warned of emergency conditions.

12. Hard hats worn by all persons in areas where equipment hazards and/or falling hazards exist.

13. Scaffolds in place to support work activities that cannot be reached without climbing on facility equipment.

14. Facility equipment, piping, should not be used as structural support for scaffolding; scaffolding interfering or damaging facility equipment.

15. Stairwells free from debris and tripping hazards.

16. Compressed gas cylinders secured properly to prevent falling; metal caps place on cylinders that are not connected to gauge/regulator assemblies.

17. Chemicals stored properly.

18. Flammable materials not stored openly throughout that facility, e.g., cardboard boxes, packing materials, wooden scaffolding, temporary structures.

19. Safety bulletins and signs posted throughout the facility to call attention to safety matters.

Housekeeping Inspection Details

A. Repair and modification Work

Monitor for accumulation of debris remaining from modification or repair work. Items may include the following:

- Scaffolding left in work area.
- Temporary lighting cords and lights, pieces of conduit, wire, gasket Materials.
- Packing crates and cardboard containers.
- Lubricants.
- Specialty items.
- Oil on floors or equipment pedestals.
- Tools, jigs, fixtures.

B. General Housekeeping Items

1. Rooms or areas requiring relamping

2. Combustible sources present in corridors and rooms

3. No trash cans available

4. No cigarette butt cans where smoking is allowed

5. No containers for disposable and/or contaminated PPE

6. No areas for oil or lubricant storage

7. Trash and debris present

C. Shop Housekeeping

1. Old parts remaining in shop after repairs have been completed

2. Trash and clutter in work areas and offices

3. Workbenches cluttered and unkept

4. Floors dirty, discarded containers or packing, chips, weld rod studs