



Issue Paper (IP)

IP Number: CIP EASA 2025-02\_R00

Initial Date (DD/MM/YYYY):

Revision - Date (DD/MM/YYYY):

Effective Date (DD/MM/YYYY):

Retroactivity (Y/N): N

<b>Title:</b>	L/HIRF workflow review - tasks covered by Zonal
<b>Submitter:</b>	EASA

Applies To:	
MSG-3 Vol 1	X
MSG-3 Vol 2	X
IMPS	

**Issue:**

The MSG-3 Rev. 2022.01 Volume 1 and Volume 2 L/HIRF Protection Logic Diagram (Figure 2-6-1.3, part 1 and part 2) Step 11 allows the selection of “No dedicated L/HIRF task” (Step 10) solely based on the assessment that the degradation of the LHSI is detectable with a Zonal inspection, without any consideration regarding the Zonal inspection program tasks interval.

**Problem:**

The MSG-3 Rev. 2022.01 Volume 1 and Volume 2 L/HIRF Protection Logic Diagram (Figure 2-6-1.3, part 1 and part 2) is reported hereafter:

Figure 2-6-1.3 L/HIRF Protection MSG-3 Logic Diagram (part 1)

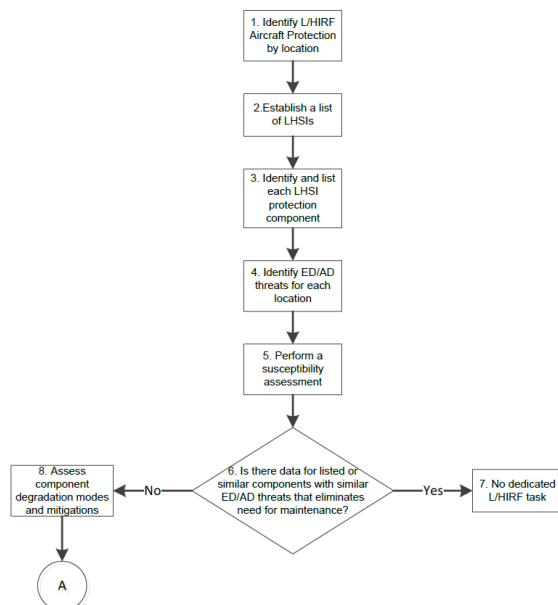
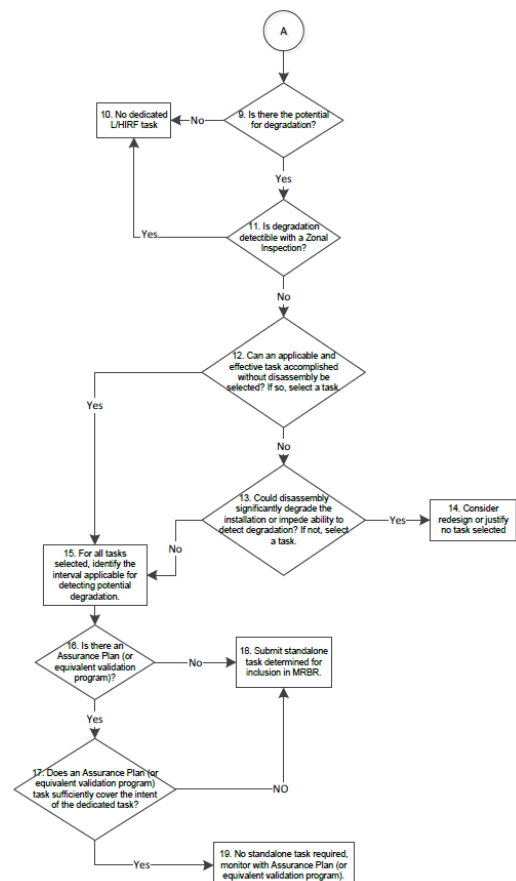


Figure 2-6-1.3 L/HIRF Protection MSG-3 Logic Diagram (part 2)





*Issue Paper (IP)*

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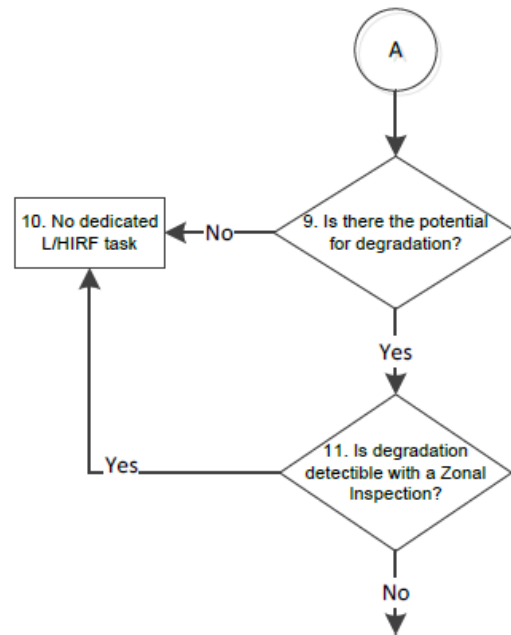
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To answer the Step 11 “Is degradation detectable with a Zonal inspection?” the L/HIRF working group is required to perform an assessment using access, visibility or other means to determine if degradation is detectable by a Zonal Inspection.

A positive answer results in “No dedicated L-HIRF task”, based on the assumption that all visible components including L/HIRF protection components are inspected as part of the Zonal inspections, capable to detect all the identified degradation modes of the L/HIRF protection.

It must be noted that the Step 10 represents an exit ramp from the MSG-3 logic, implying “No task selected” from the L/HIRF MSG-3 analysis module: at this point of the logic diagram there is formally no task (identified instead in Step 15).



The current L/HIRF logic diagram does not take into consideration the concept of “timely detection” of the degradation.

The intent of the task should be carefully considered in order to ensure that the expected degradation will be detected in a timely manner and that the monitoring and reporting of in-service issues is properly addressed.

Therefore, a positive answer to Step 11 implies that the interval of the hypothetical L/HIRF-derived GVI is less than or equal to the interval of the Zonal GVI that could be used to detect the degradation.

There is the need to identify the interval effective to detect the specific L/HIRF protection degradation mode, prior to proceed with the assessment that a Zonal inspection is applicable and effective.

**Recommendation (including Implementation):**

It is recommended the application of the concept of “LHSI zonal transfer candidate”, as already done for the Systems/Powerplant and Structures modules of the MSG-3 analysis.

1. The following L/HIRF Protection Logic Diagram can be used as Figure 2-6-1.3 (part 2) in both MSG-3 Volume 1 and Volume 2:



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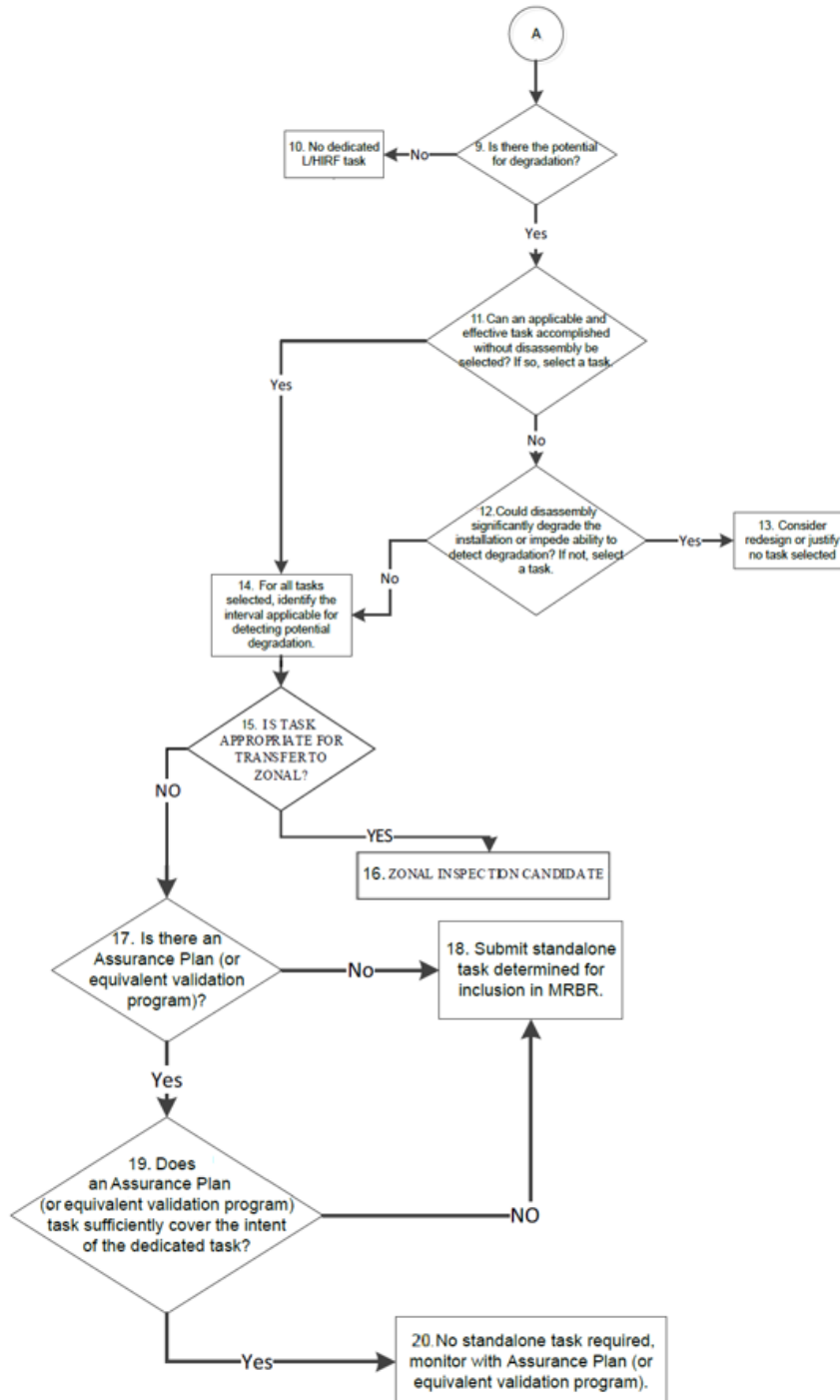
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**Figure 2-6-1.3 L/HIRF Protection MSG-3 Logic Diagram (part 2)**





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2. The MSG-3 2022.1 Volume 1 and Volume 2 paragraph 2-6-1 should be revised, as follows:

## **2-6-1. L/HIRF Maintenance**

Visual detection of obvious deterioration of L/HIRF protection is included in the Zonal Inspections; additional dedicated L/HIRF maintenance may not be required.

### **1. L/HIRF Protection Analysis Concepts**

The following concepts are accepted to support justification ~~of no dedicated~~ of L/HIRF task transfer to Zonal or no dedicated L/HIRF task selection:

1. Visible L/HIRF protection (e.g., wires, shields, connectors, bonding straps, or raceways between connectors or termination points) ~~is addressed by the Zonal Inspections~~ are evaluated for zonal transfer (Step 15).
2. L/HIRF protection within conduit or heat shrink, is addressed ~~by the Zonal Inspections~~ by confirming integrity of the protective covering and are evaluated for zonal transfer (Step 15).
3. Maintenance of the inherent conductivity of the metallic aircraft structure is addressed by the ~~Zonal Inspections~~ L/HIRF Inspections and is evaluated for zonal transfer (Step 15). Corrosion concerns are addressed by the Structural Inspections.
4. L/HIRF protection components with proven good in-service performance in a similar location and environment do not require detailed component assessment and no dedicated L/HIRF maintenance task is required.

### **2. LHSI Selection**

Before the actual MSG-3 logic can be applied, the aircraft's significant L/HIRF protection must be identified. A detailed explanation of the LHSI selection process is provided in the logic diagram and L/HIRF protection analysis methodology.

### **3. L/HIRF Protection Analysis Methodology and Logic Diagram (see Figure 2-6-1.3)**

#### **Step 1: Identify L/HIRF Aircraft Protection by location**

Using a process acceptable to the certifying authority, OEM Design Engineering specialists will identify and list L/HIRF protection components relating to all systems and structural components required to maintain the inherent safety of the aircraft. Additional protection



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components can be added to the list at the discretion of the MSG-3 analyst. The aircraft protection components shall be identified by location on the aircraft.

**Step 2: Establish list of LHSIs**

The MSG-3 analyst will select candidate LHSIs (see definition in the Glossary) from the list provided in Step 1. The L/HIRF protection components will be grouped by area, component type, bonding path or any logical collection of similar components to form the boundaries of each LHSI as determined by the MSG-3 analyst. The candidate LHSI list will be submitted to the ISC for approval. As part of the MSG-3 analysis process, the Working Group will ensure that the right level for the analysis has been chosen and may recommend changes to the ISC.

**Step 3: Identify, list and describe each LHSI protection component**

For each LHSI, a list and description of the L/HIRF protection components will be provided by OEM engineering for WG review. This should include:

- A general description of the installation that may include material and finish.
- The type(s) of protection the L/HIRF protection components do provide (e.g. shielding).
- The mechanism(s) by which the L/HIRF protection components do provide protection (e.g. by providing a low resistance conductivity path).
- The type(s) of deterioration the L/HIRF protection components can experience (e.g. chafing of braids, corrosion of contact areas).

A process specification may be used to support the component installation description. Component specifications may be used to describe their performance characteristics.

**Step 4: Identify Environmental Deterioration / Accidental Damage (ED/AD) threats for each location**

The ED/AD threats are determined in each location where LHSIs are installed. The ED/AD threats can be derived from a standalone process or the assessment from the Zonal analysis is acceptable.

**Step 5: Perform a susceptibility assessment**

For each LHSI, a process will be developed and utilized by the working group to determine a rating of the susceptibility of the protection components to degradation due to ED/AD.



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**Step 6: Is there data for listed or similar components with similar ED/AD threats that eliminates need for dedicated maintenance?**

For all components listed in Step 3, a review of available data is accomplished. This data also must consider the component installation needs to be within a location with similar ED/AD threats. Criteria for determining favorable data will be developed by the OEM and utilized by the WG to determine if a dedicated L/HIRF task is necessary.

**Step 7: No dedicated L/HIRF task**

Self-explanatory.

~~NOTE: All visible components, including L/HIRF protection components, are inspected as part of the Zonal inspections.~~

NOTE: Justification of good performance shall be recorded for traceability.

**Step 8: Assess component degradation modes and mitigations**

An assessment process will be developed by the OEM and utilized by the working group to determine if there is a potential for unacceptable degradation of the protection components (including mitigation) due to ED/AD.

The following should be assessed as minimum:

- The way deterioration can be detected (directly or indirectly)
- The type / amount of deterioration that is critical / needs to be detected

Mitigations within the installed environment may eliminate requirement for dedicated maintenance.

**Step 9: Is there the potential for degradation?**

If component is expected to experience unacceptable degradation within the installed location, proceed to Step 11.

**Step 10: No dedicated L/HIRF Task**

Self-explanatory.

~~NOTE: All visible components, including L/HIRF protection components, are inspected as part of the Zonal inspections.~~



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**~~Step 11: Is degradation detectable with a Zonal Inspection?~~**

~~The L/HIRF WG will perform an assessment using access, visibility or other means to determine if degradation is detectable by a Zonal Inspection.~~

**~~Step 12~~ Step 11: Can an applicable and effective task be accomplished without disassembly be selected? If so, select a task.**

Determine if the potential degradation is detectable by a maintenance task without disassembly. If disassembly is required in order to detect identified potential degradation, then proceed to ~~Step 13~~ Step 12. If potential degradation is detectable without disassembly, then select appropriate level task that is most applicable and effective in detecting potential degradation from the following and proceed to Step 14:

1. GVI
2. DET
3. FNC
4. SDI

NOTE:	If there is an L/HIRF Assurance Plan (or equivalent validation program) in place, more credit can be given to detect protection degradation through applicable and effective visual inspections.
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NOTE:	At the WG discretion, a combination of tasks may be selected. In the case of multiple task selection, the Working Group should consider the cost of the task compared to the effectiveness of the combined tasks taking into consideration the cost of the protection degradation prevented. Consideration of interval to be selected in <del>Step 15</del> Step 14 can be used for the evaluation.
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**~~Step 13~~ Step 12: Could disassembly significantly degrade the installation or impede ability to detect degradation? If not, select a task.**



*Issue Paper (IP)*

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Accomplish an assessment of the effects of disassembly and compare the installation's probability for degradation, versus the effect of the disassembly. Also, consider if disassembly would negatively affect the ability to detect the protection degradation.

If this assessment shows a task is applicable and effective with disassembly, then select from the following and proceed to ~~Step 15~~ Step 14:

1. GVI
2. DET
3. FNC
4. SDI
5. RST
6. DIS

If assessment shows that the negative effects of disassembly outweigh the benefits of maintenance proceed to ~~Step 14~~ Step 13.

NOTE:	If there is an L/HIRF Assurance Plan (or equivalent validation program) in place, more credit can be given to detect protection degradation through applicable and effective visual inspections.
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NOTE:	At the WG discretion, a combination of tasks may be selected. In the case of multiple task selection, the Working Group should consider the cost of the task taking into consideration the effectiveness of the combined tasks compared to the cost of the protection degradation prevented. Consideration of interval to be selected in <del>Step 15</del> Step 14 can be used for the evaluation.
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**~~Step 14~~ Step 13: Consider redesign or justify no task selected.**

Consideration by the working group of the risks associated with disassembly results in redesign or no task selected. Use of disassembly to determine effectiveness of the L/HIRF protection can result in unexpected additional deterioration or induce damage into the LHSI. An example may be removal of structural bonds that require special techniques or procedures that can cause damage or introduce human error. The possibility for a redesign is assessed by the OEM and results are provided to the Working Group. If redesign is not





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possible and disassembly is determined to be detrimental to the design, then an additional assessment should be made to justify no task being selected.

**Step 15 Step 14: For all tasks selected, identify the interval applicable for detecting potential degradation**

To determine the maintenance task interval, the Working Group considers the impact of the ED/AD threat on the protection characteristics using best judgment and available information of expected degradation.

**Step 15: Is task appropriate for transfer to Zonal?**

General Visual Inspections may be compared with the Zonal Inspections determined from the Standard Zonal Analysis (paragraph 2-5-1.). These GVIs may be considered Zonal Inspection Candidates if the access requirement is the same and the proposed interval is at least as frequent. Otherwise, proceed to Step 17.

~~**Step 16: Is there an L/HIRF Assurance Plan (or equivalent validation program)?**  
OEM to provide details to the Working Group that may include summary of anticipated test methodologies, sample size details, and general information on type and number of test points.~~

**Step 16: Zonal Inspection Candidate**

The L/HIRF WG will proceed with the zonal transfer. Work sheets should record the interval proposed in the originating analysis.

~~**Step 17: Does an L/HIRF Assurance Plan (or equivalent validation program) task sufficiently cover the intent of the dedicated task?**~~

~~OEM must provide details in the L/HIRF Assurance Plan to satisfy the working group that the degradation concern is sufficiently covered. If the need for a task is based on unfavorable in-service experience, it is not a candidate for coverage by the L/HIRF Assurance Plan.~~

**Step 17: Is there an L/HIRF Assurance Plan (or equivalent validation program)?**

If Yes, proceed to Step 19.

**Step 18: Submit standalone task determined for inclusion in MRBR.**

All L/HIRF-derived stand-alone tasks should be uniquely identified in the MRBR for traceability during future changes.

Once the analysis is completed, the resulting maintenance tasks and intervals for all L/HIRF systems are submitted to the ISC for approval and inclusion in the MRB Report proposal.



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**~~Step 19: No standalone task required, monitor with an L/HIRF Assurance Plan (or equivalent validation program)~~**

~~OEM must ensure traceability of all dedicated tasks covered by the L/HIRF Assurance Plan, until Engineering and the ISC have agreed sufficient data has been collected to determine permanent disposition of the recommended dedicated task.~~

**Step 19: Does an Assurance Plan (or equivalent validation program) task sufficiently cover the intent of the dedicated task?**

OEM must provide details in the L/HIRF Assurance Plan to satisfy the working group that the degradation concern is sufficiently covered. Those details may include summary of anticipated test methodologies, sample size details, and general information on type and number of test points.

If the need for a task is based on unfavorable in-service experience, it is not a candidate for coverage by the L/HIRF Assurance Plan.

**Step 20: No standalone task required, monitor with an L/HIRF Assurance Plan (or equivalent validation program)**

OEM must ensure traceability of all dedicated tasks covered by the L/HIRF Assurance Plan, until Engineering and the ISC have agreed sufficient data has been collected to determine permanent disposition of the recommended dedicated task.

NOTE:	If an L/HIRF Assurance Plan is discontinued, OEM has responsibility to either use the collected data to support “No dedicated task required” or to institute the original dedicated task into the maintenance program.
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3. The MSG-3 2022.1 Volume 1 and Volume 2 paragraph 2-5-1. should be revised, as follows:

- g. General Visual Inspections arising from the enhanced zonal analysis (paragraph e.) may be compared with the Zonal Inspections determined from the standard zonal analysis (paragraph d.). The former may be considered fully covered by the zonal inspection if the access requirement is the same and the proposed interval is at least as frequent. Otherwise, a stand-alone GVI should be included with the tasks identified in paragraph (f.).
- h. Except as noted in paragraph 2-3-7.4, General Visual Inspections arising from the ~~systems, powerplants and~~ systems/powerplant, structures and L/HIRF may be compared with the Zonal Inspections determined from the standard zonal analysis



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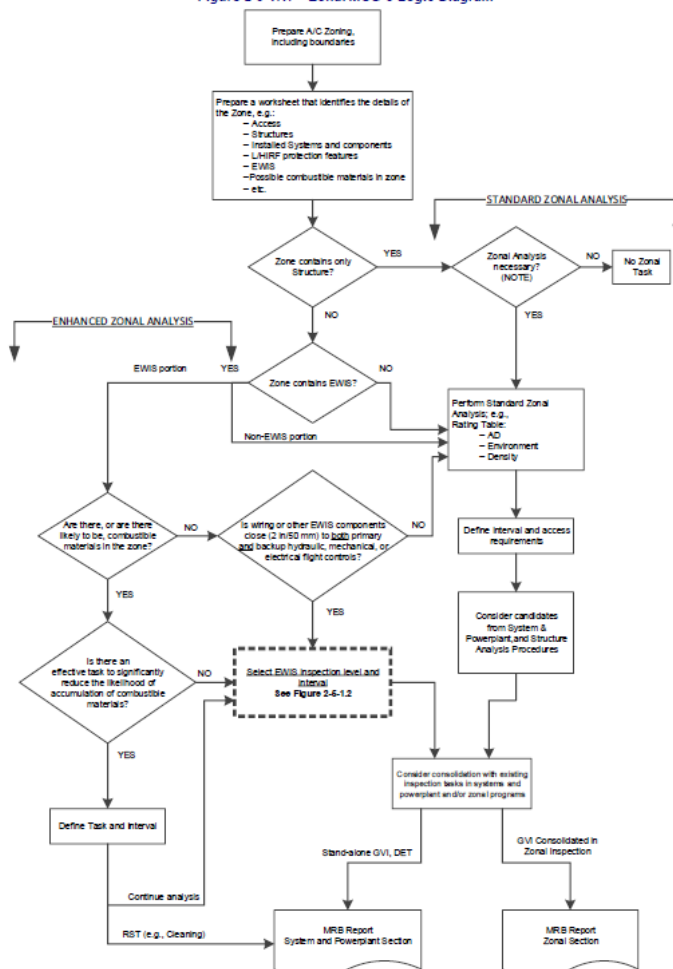
(paragraph d.). Work sheets should record the interval proposed in the originating analysis. These GVIs may be considered fully covered by the zonal inspection if the access requirement is the same and the proposed interval is at least as frequent. Otherwise, a standalone GVI should be included within the MSI or SSI from which it was identified.

- i. Visual Checks may be considered covered by the Zonal Inspections provided that the Systems Working Group that identified them consider that the failure would be noted and addressed during a zonal inspection. Otherwise, the task should remain in the Systems and Powerplants tasks where specific attention can be drawn to the item.

4. The MSG-3 2022.1 Volume 1 and Volume 2 Figure 2-5-1.1. “Zonal MSG-3 Logic Diagram” should be revised in the Standard Zonal Analysis branch to consider as well candidate from the L/HIRF analysis procedure, as follows:

From:

Figure 2-5-1.1. Zonal MSG-3 Logic Diagram





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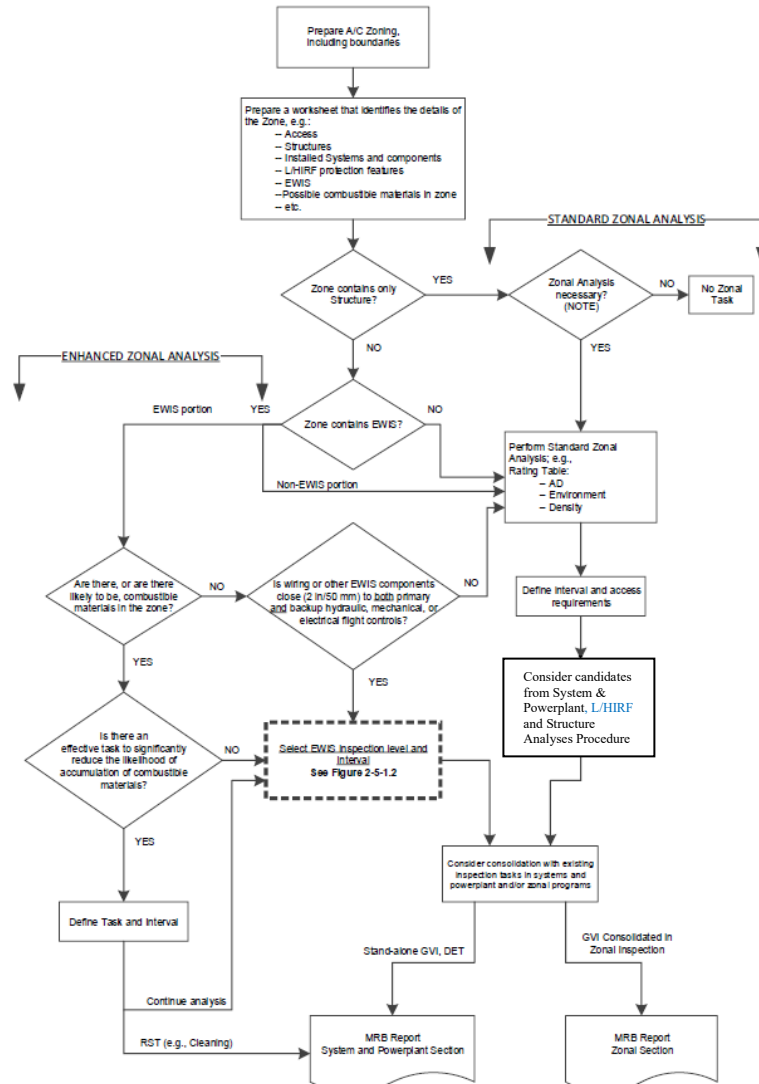
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To:

**Figure 2-5-1.1. Zonal MSG-3 Logic Diagram**





## International MRB Policy Board

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**Retroactivity (Y/N):** N

<b>IMRBPB Position:</b>	
<b>Date:</b>	
<b>Position:</b>	
<b>Recommendation for Implementation:</b>	

<b>Status of the Issue Paper:</b>	<input type="checkbox"/>	Active
	<input type="checkbox"/>	Incorporated in MSG-3 / IMPS (with details)
	<input type="checkbox"/>	Archived