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RoHS Enforcement – Post – implementation issues

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**DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 27 January 2003
on the restriction of the use of certain hazardous substances in electrical and electronic equipment**

RoHS Simplified

| | | |
|--------------------------------------|--------------------|-----------------|
| Cadmium | < 0.01 % | 100 ppm |
| Mercury | < 0.1 % | 1000 ppm |
| Lead | < 0.1 % | 1000 ppm |
| Chromium (vi) | < 0.1 % | 1000 ppm |
| Polybromobiphenyls (PBB) | < 0.1 % | 1000 ppm |
| Polybromodipheylethers (PBDE) | < 0.1 % | 1000 ppm |

(in homogeneous materials of EE)

1. The term “homogeneous material” means a material that cannot be mechanically disjointed into different materials
2. The term “homogeneous” means “of uniform composition throughout”; e.g. individual types of plastics, ceramics, glass, metals, alloys, paper, board, resins and coatings
3. The term “mechanically disjointed” means that the materials can, in principle, be separated by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes

RoHS Application (Electronics & Electrical equipments)

Equipments that need electricity to provide the function

1. Large household appliances (e.g. Refrigerators, Washing Machines, Microwave Ovens etc.)
2. Small household appliances (e.g. Mixer-Grinders, Toasters, Coffee Makers etc.)
3. IT and Telecommunication equipment (e.g. PCs, Printers, Mainframes, telephones, mobile phone etc.)
4. Consumer equipment (e.g. Televisions, Radios, musical instruments, Video Cameras etc.)
5. Lighting equipment (e.g. Tubelights, CFLs, HIDs, Luminaires)

RoHS Application (Continued)

6. Electrical & Electronic Tools (except large scale stationary industrial tools) (e.g. drills, sewing machines, welding equipments etc.)
7. Toys, leisure and sports equipment (e.g. toy trains, cars, video games etc.)
8. Automatic Dispensers (e.g. Liquid/Solid dispensers, ATMs etc.)

RoHS Exemptions

1. Mercury in CFL < 5 mg per lamp
2. Mercury in straight fluorescent lamps for general purpose not exceeding:
 - halophosphate 10 mg
 - triphosphate with normal life 5 mg
 - triphosphate with long life 8 mg
3. Mercury in straight fluorescent lamps for special purposes
4. Mercury in lamps not specifically mentioned above
 - Lead in glass of CRTs, electronic components, TLs

RoHS Exemptions (Continued)

6. Lead as an alloying element in Steel (< 0.35 %), Aluminium alloys (< 0.4 %) and copper alloys (< 4 %)

7. - Lead in high temperature melting solders (tin/lead solders with > 85 % lead)
 - Lead in solders for servers, storage and storage array systems (exemption granted till 2010)
 - Lead in solders for network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunication
 - Lead in electronic ceramic parts (e.g. piezoelectronic devices)

8. Cadmium plating for special applications (e.g. Defense)

RoHS Exemptions (Continued)

9. Chromium (vi) as an anticorrosion of the carbon steel cooling system in absorption refrigerators

10. The commission will evaluate the application for
 - DBDE
 - Mercury in straight fluorescent lamps for special purposes
 - Lead in solders for servers, storage and storage array systems network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunication (with a view to setting a specific time limit for this exemption) and
 - light bulbs

RoHS – Enforcement

How do we prepare ourselves for this Phase ?

Guidance to Enforcement Authorities

Principles

- 1. Common interpretation by member states and consistently applied**
- 2. Presumption that products conform to RoHS directives**
- 3. Self-Declaration by producers**

Guidance to Enforcement Authorities

Authorities Decide

Which EEE categories and products they wish to select for further investigation, based on market surveillance activities, such as:

- Market intelligence
- Random selection
- Products known to contain materials of high concern
- High Volume products
- Short life products
- Consumer products unlikely to be recycled
- Notification of concern from external parties
- Notification of concern from other member states

Guidance to Enforcement Authorities

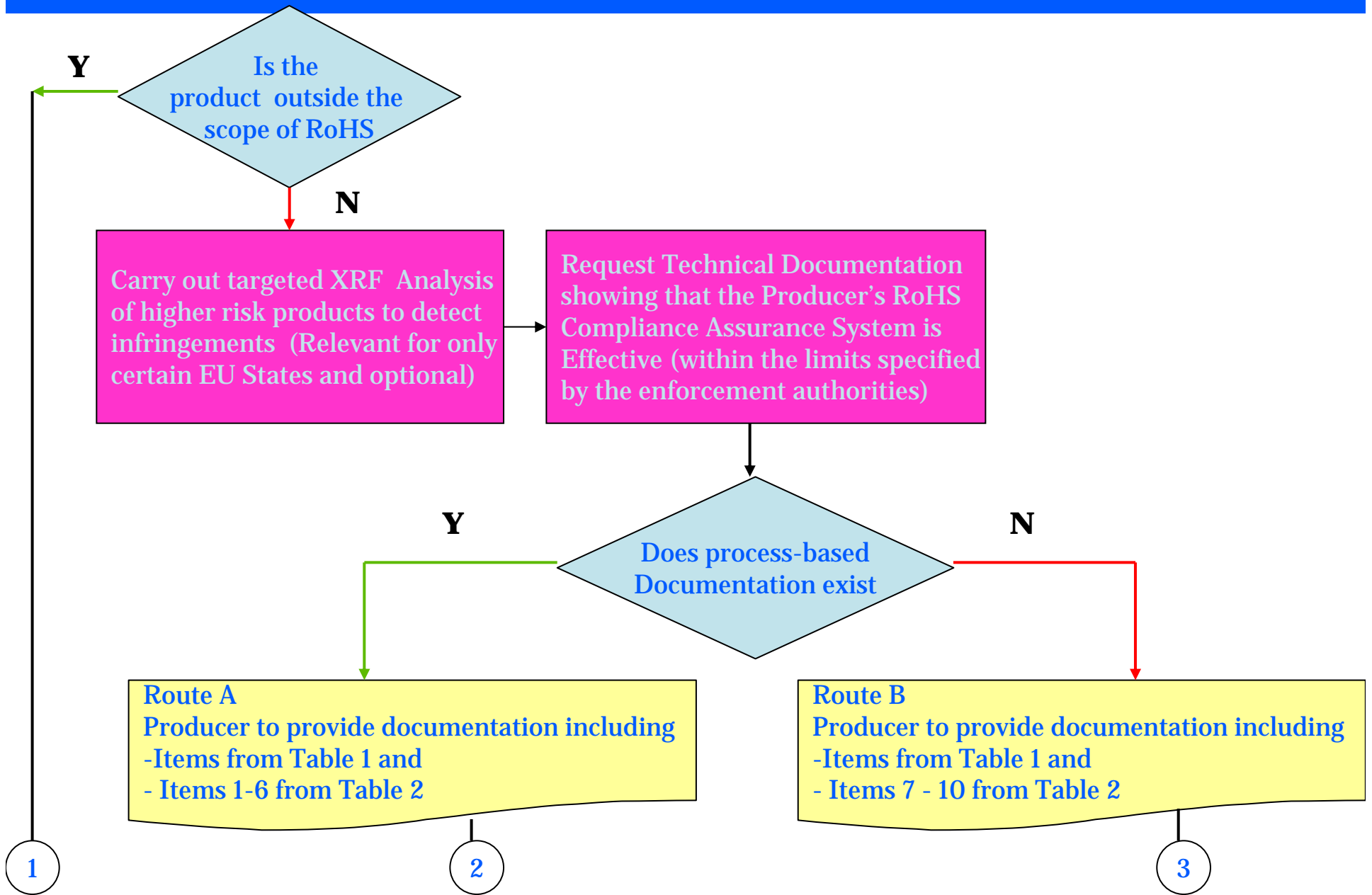
If there is a concern

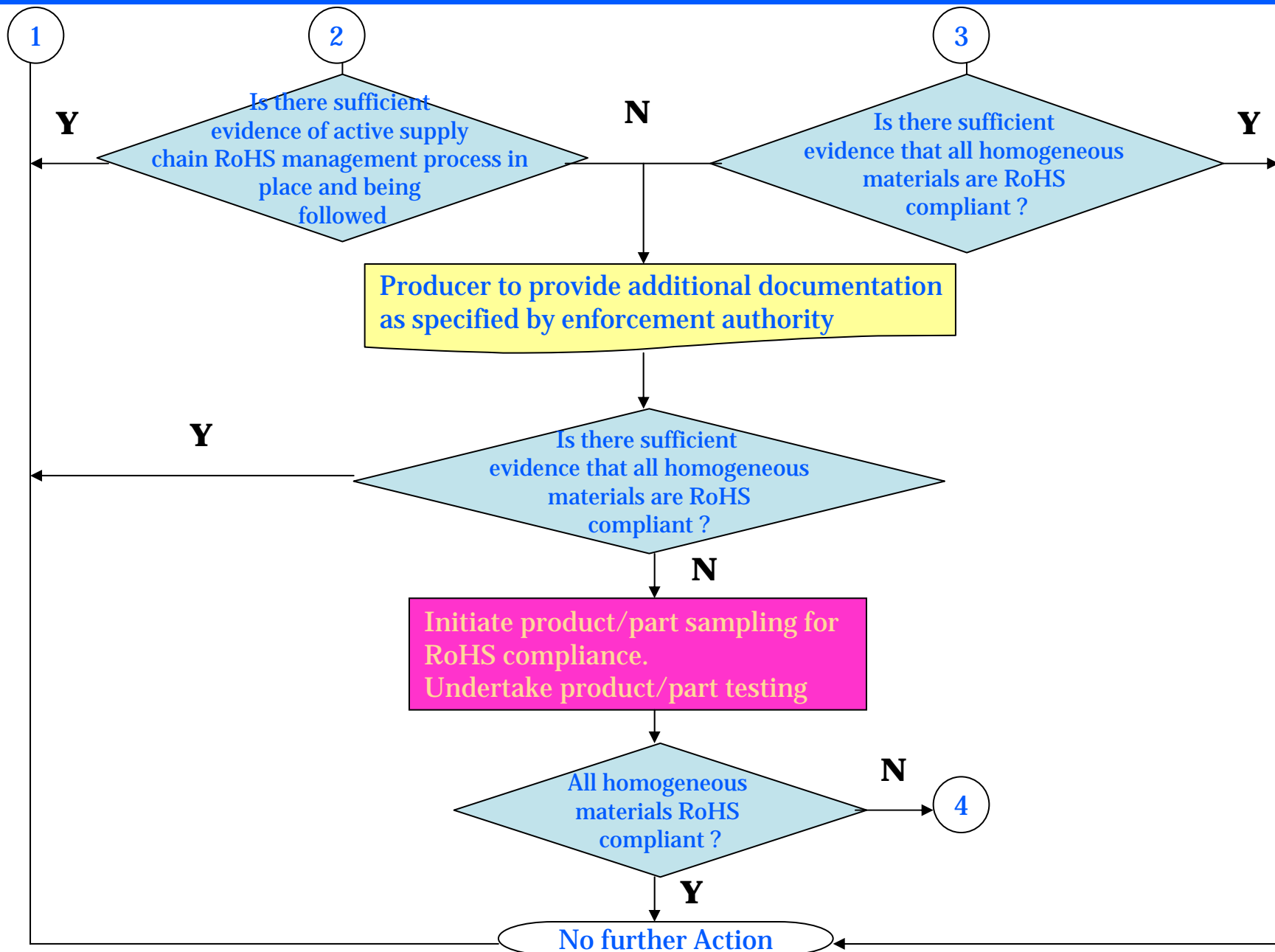
The enforcement authority may decide to submit a formal request to the producer

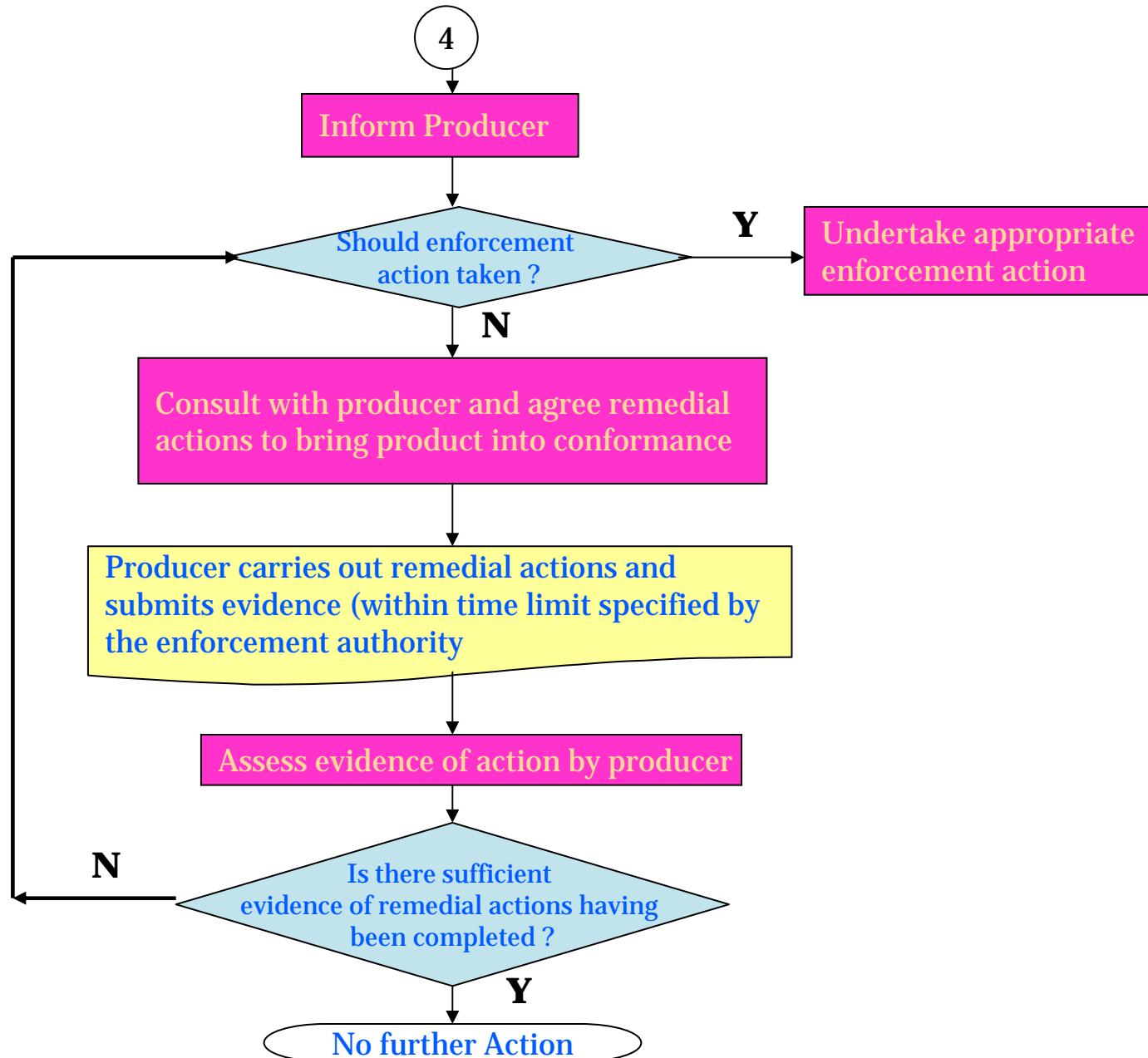
The enforcement authority may take any action appropriate to the situation, including removal of goods from the market where it is deemed necessary; they need not follow the stepwise process in this case

The enforcement authority may go for:

- a) NDT (e.g. ed XRF)
- b) Direct sampling







Route A

Producer to provide documentation including

- Items from Table 1 and
- Items 1-6 from Table 2

Route B

Producer to provide documentation including

- Items from Table 1 and
- Items 7 - 10 from Table 2

Table 1 – Typical List of Overview Documentation

Contact Information

Point of contact within the organization that will deal with the RoHS enforcement request

Company Information

This should include the size of the organization, product range and approximate levels of sales

Approach to Compliance

This should be a general overview of any compliance systems that the company has in place and which are suitable for assisting compliance with the RoHS Directive

An overview of the data quality systems, (in those cases where the producer relies significantly upon supplier information to demonstrate compliance)

This could include risk assessments, acceptance criteria, purchasing procedures and any other Relevant documentation and may be a combination of both process-based and product/part Based documentation

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Route A

Producer to provide documentation including

- Items from Table 1 and
- Items 1-6 from Table 2

Route A: Process based Technical Documentation

(Typical information relating to the producer's internal system to ensure RoHS Compliance)

Compliance Assurance System (CAS)

- 1. A definition of purpose of the system, its essential requirements and specifications. This specification should cover compliance both within the company and within the supply chain*
- 2. A formally defined process which implements the requirements of the system and is integrated within the organization's quality and management systems*
- 3. A technical documentation system (paper and/or electronic) to support the process and measures to assure conformity with the requirements of the system together with necessary training, tools and infrastructure*

Evidence of active control of the CAS

- 4. Results of internal and supplier audits to validate Compliance Assurance System and/ or Processes. i.e. supplier's ability to assure compliance*
- 5. Evidence that the system is being followed including results of product specific conformance assessments comprising items such as product assessments (including justification of RoHS categorization and use of exemptions), material declarations, procurement, inventory and production controls and substance analysis where appropriate*
- 6. Overview of any internal data system used for the management of RoHS compliance data*

Route B

Producer to provide documentation including

- Items from Table 1 and
- Items 7 - 10 from Table 2

Route B: Product/part based Technical Documentation

(Typical information relating to a product's/part's physical attributes that ensures RoHS Compliance of a specific product)

- 7. Producers' or suppliers' warranties / certificates declaring that the use of the restricted substances is within the permitted levels*
- 8. Producers' or suppliers' completed material declaration for each part (including revision for revised parts) and justification for RoHS categorization and use of exemptions. These declarations would be limited to the list of RoHS substances, not full materials declarations*
- 9. Analysis report for homogeneous materials in parts / components (which could be the producers or suppliers own internal or external test results). The test results should refer to homogeneous materials in parts/components*
- 10. Those who use approach B only (SMEs) must also provide evidence that procedure are being followed to show that materials declarations have been assessed to determine if they can be trusted. Enforcement authorities will also need to see documented compliance procedures*

Suggested approach

Producers may choose to carry out analytical testing of Homogeneous materials in their products and / or specific components – to obtain conclusive proof of compliance with RoHS Directive

- Screening may be using a energy dispersive XRF analysis (this can not be used for Cr (vi) , PBB, PBDE)

Suggested approach

Focus on “high concern” materials

- e.g. PVC (Cadmium and Lead as stabilizer and colorant)
- Polystyrene, ABS (PBDE as flame retardant)
- Red/orange/yellow plastics (Cd, Pb, Cr(vi) as pigment)
- Plated metal parts (as chromium (vi) passivation layer)
- Populated PWBs/components (lead in solder/terminal finish)
- Decorative name plates (Hg as additive, colorant, curing agent)
- Switches and relays (Hg as a component)
- Lead solder used inside components
- Cadmium used in thick film circuits

Suggested approach

Focus on samples that can be separated from the equipment using ordinary tools; That is testing of homogeneous materials

If disjointing is not possible, “homogenizing” of the components is recommended to get one “homogenized” sample for analysis.

How do we prepare ourselves for the enforcement phase ?

1. Identify RoHS as a legal requirement under 4.3.2 of ISO-14001
2. How is this legal requirement applicable to the identified aspects of products ?
3. Set up procedures under section 4.4.6 of ISO-14001 (supplier declarations, supplier audits, analysis, system audits, internal and external audits etc.) to ensure RoHS compliance in the Supply chain.
4. Set up procedures (Screening with XRF, Analysis) at the outgoing Quality stage to ensure that the EE meets the RoHS requirements
5. Implement procedures and maintain records as evidence
6. Carry out periodic Supplier Audits, Internal and External Management System audit to ensure that the system is effective

RoHS Testing Methods:

| Substance Class | Matrix | Method for Screening | Method for Verification |
|-------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cadmium & Cadmium Compounds | Plastics, rubber, paints, inks, metal coatings, metal alloys | XRF (hand held) | 1.XRF (desk top) 2.Atomic Absorption 3.ICP -OES |
| Lead and Lead compounds | Plastics, rubber, paints, inks, metal coatings, metal alloys | XRF (hand held) | 1. XRF (desk top) 2. Atomic Absorption 3. ICP -OES |
| Mercury and Mercury compounds | Inks, metal | XRF (hand held) | 1.XRF (desk top) 2.CV-AAS vapour hydride generator 3.CV-AAS with thermal decomposition and/or gold-amalgamation 4.ICP-OES with vapour hydride generation apparatus 5.(specially for fluorescent tubes) – CV – AAS with thermal decomposition |
| Hexavalent Chromium | Coating | XRF (hand held) Spot test (chemical) | 1. U.V. & Visible spectroscopy after treatment with diphenylcarbazine (540 nm) |
| Polybrominated biphenyls (PBB) Polybrominated diphenyl ethers (PBDE) | Plastics | XRF (hand held) for total bromine HPLC | 1.FT IR for identification of PBB & PBDE above 30000 ppm 2.GC / MS for quantification |

Thank you

