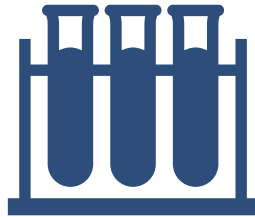




**SAFETY AND SECURITY ON
PCBs INVENTORY ACTIVITIES**



Safety and Security on PCB Inventory activities



Sampling

- Connected transformer
- Disconnected transformer
 - Stored transformer

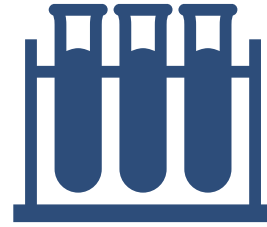


Screening and Analysis

Field test: L2000DXT or Clor-N-Oil

Laboratory analysis: Gas chromatography

Safety and Security on PCB Inventory activities



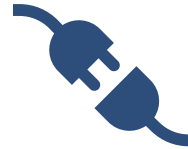
Sampling

Sam



Sampling with
transformer energized

When it is not possible
to disconnect the equipment
in service.



Sampling with
transformer disconnected

When the distance between
the energized point is less than the
safe distance admitted.



Sampling with
transformer in storage

When the transformer is in storage,
backup or in maintenance.

Risk related to electric flash (NFPA 70B)

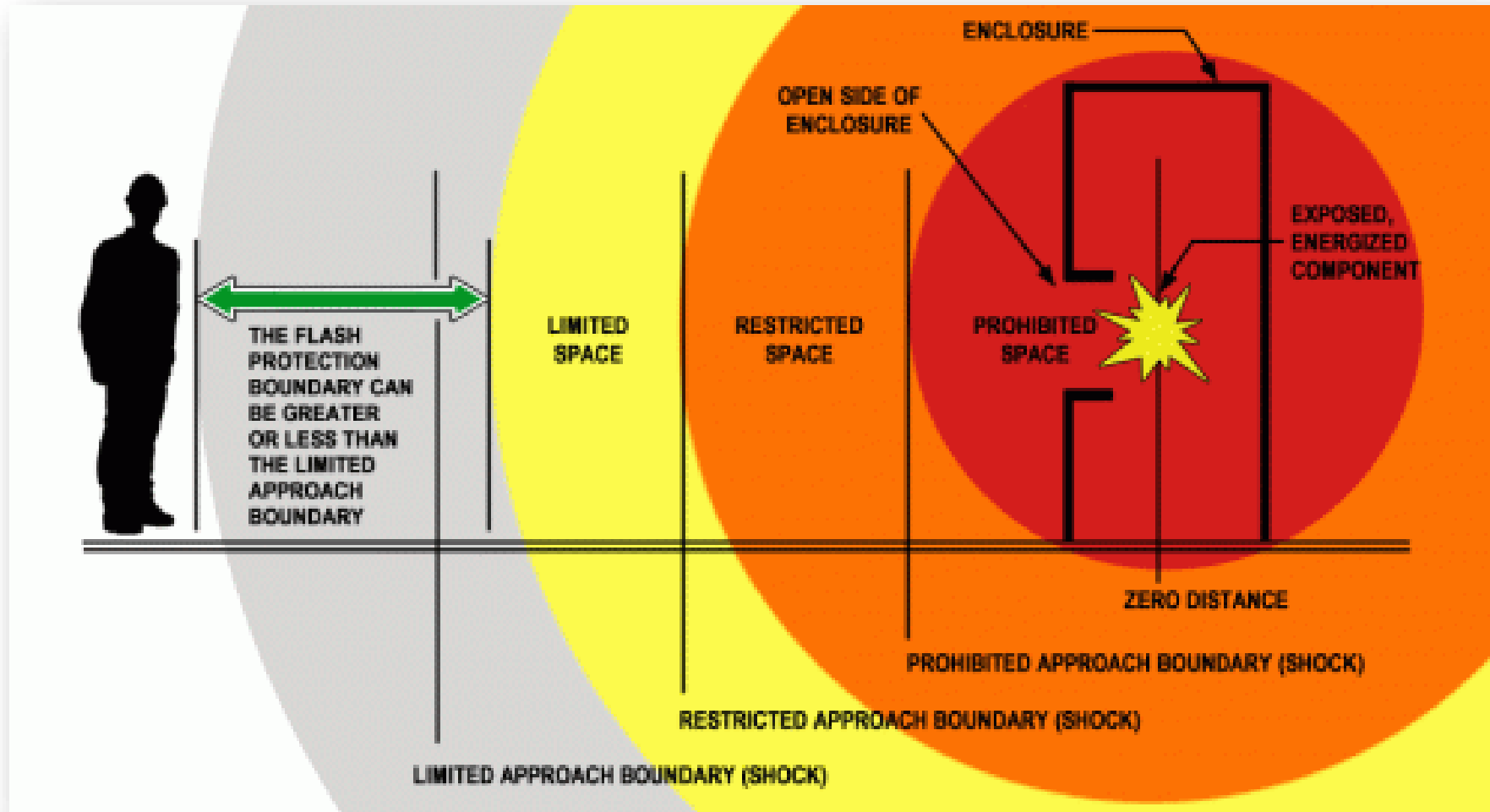


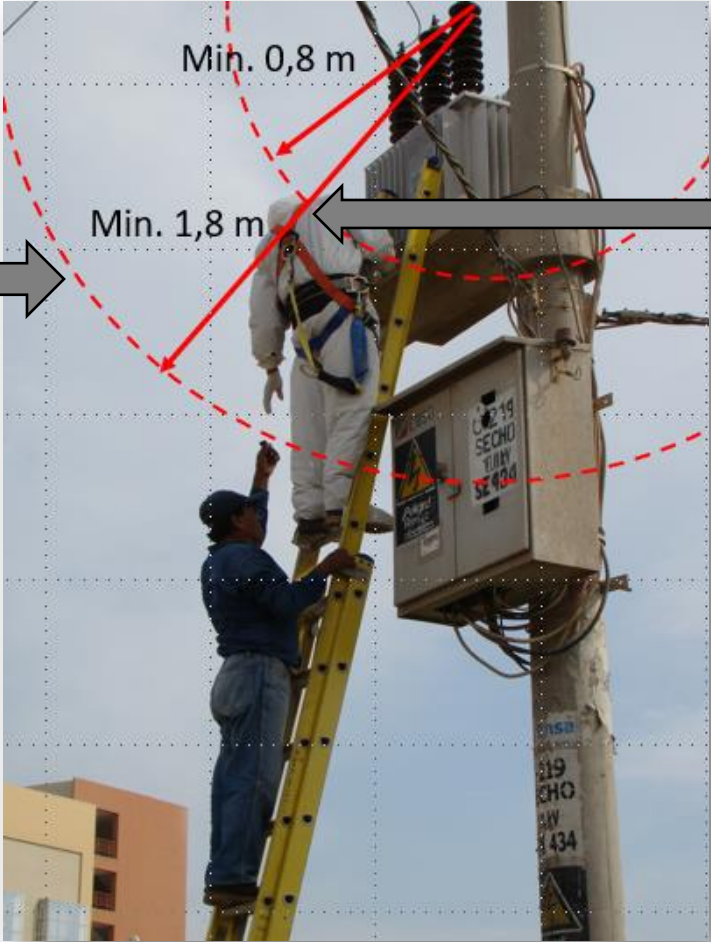
TABLE 130.4(D)(a) Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for Alternating-Current Systems

(1) <i>Nominal System Voltage Range, Phase to Phase^a</i>	(2) <i>Limited Approach Boundary^b</i>		(4) <i>Restricted Approach Boundary^b; Includes Inadvertent Movement Adder</i>
	<i>Exposed Movable Conductor^c</i>	<i>Exposed Fixed Circuit Part</i>	
Less than 50 V	Not specified	Not specified	Not specified
50 V–150 V ^d	3.0 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	Avoid contact
151 V–750 V	3.0 m (10 ft 0 in.)	1.0 m (3 ft 6 in.)	0.3 m (1 ft 0 in.)
751 V–15 kV	3.0 m (10 ft 0 in.)	1.5 m (5 ft 0 in.)	0.7 m (2 ft 2 in.)
15.1 kV–36 kV	3.0 m (10 ft 0 in.)	1.8 m (6 ft 0 in.)	0.8 m (2 ft 9 in.)
36.1 kV–46 kV	3.0 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	0.8 m (2 ft 9 in.)
46.1 kV–72.5 kV	3.0 m (10 ft 0 in.)	2.5 m (8 ft 0 in.)	1.0 m (3 ft 6 in.)
72.6 kV–121 kV	3.3 m (10 ft 8 in.)	2.5 m (8 ft 0 in.)	1.0 m (3 ft 6 in.)
138 kV–145 kV	3.4 m (11 ft 0 in.)	3.0 m (10 ft 0 in.)	1.2 m (3 ft 10 in.)
161 kV–169 kV	3.6 m (11 ft 8 in.)	3.6 m (11 ft 8 in.)	1.3 m (4 ft 3 in.)
230 kV–242 kV	4.0 m (13 ft 0 in.)	4.0 m (13 ft 0 in.)	1.7 m (5 ft 8 in.)
345 kV–362 kV	4.7 m (15 ft 4 in.)	4.7 m (15 ft 4 in.)	2.8 m (9 ft 2 in.)
500 kV–550 kV	5.8 m (19 ft 0 in.)	5.8 m (19 ft 0 in.)	3.6 m (11 ft 8 in.)
765 kV–800 kV	7.2 m (23 ft 9 in.)	7.2 m (23 ft 9 in.)	4.9 m (15 ft 11 in.)



Sample extraction with transformer energized

Limit approach boundary to 35 kV is 1,8 m (NFPA 70B)



Until 35 kV the distance shouldn't be less than 0,8 m (NFPA 70B)

Samples extraction with transformer energized

Prepare the following requirements:



1. It must be done by a qualified and trained technician.



2. Have a Plan authorized by the responsible official.



3. Use personal protective equipment (PPE) appropriately.



4. Make sure not to enter the prohibited space.



5. Make sure not to make involuntary movements to invade the forbidden space.

STANDARD OPERATING PROCEDURE	Document No.	SOP/---PM-01
	Effective date	DDMMYY
	Review date	
	Supersedes	
MAINTENANCE - TRANSFORMER	Issue No.	
	Page No.	

Prepared by	Reviewed by	Approved by	Authorized by
Name	Name	Name	Name
Post	Post	Post	Post
Date:	Date:	Date:	Date:

RECORD OF REVISION:

1.	NI
----	----

REASON FOR ISSUE:

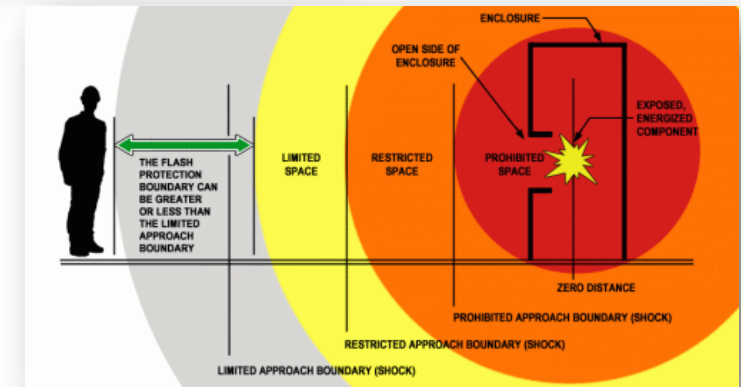
1. To have proper consistency and instructions / procedures in place for Transformer.

1.1. PURPOSE:
To describe a procedure for the maintenance of Transformer Oil servicing

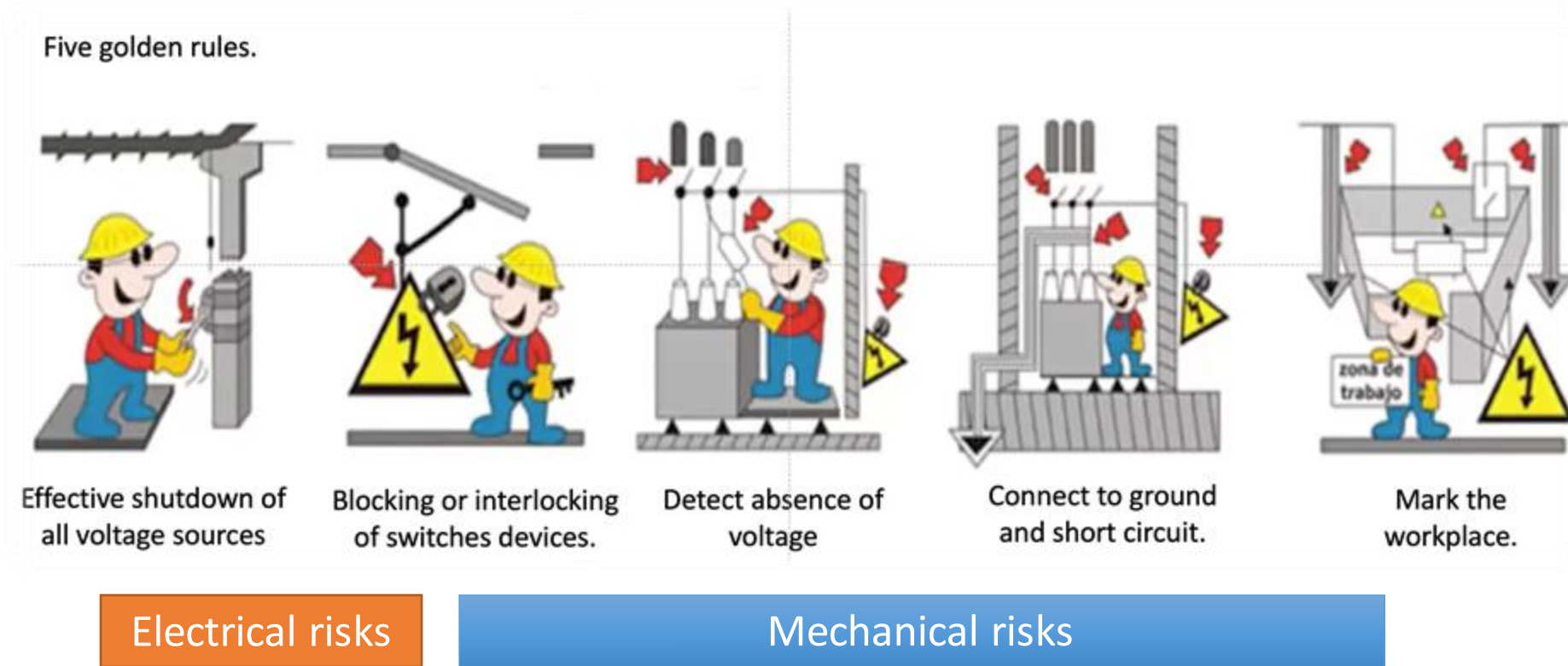
2. SCOPE:
This procedure is applicable for the maintenance of all the Transformers at --- (Location)

3. REFERENCE:
3.1.1. Utilities Monitoring
3.2. Other SOPs having reference to this SOP.
3.2.1. LOTO

4. DEFINITION:
4.1. NI



Samples extraction with transformer disconnected



1. It must be done by a qualified and trained technician.
2. Have a Plan authorized by the responsible official.
3. Use personal protective equipment (PPE) appropriately.

Samples extraction with transformer in storage



1. It must be done by a qualified and trained technician



2. Have a Plan authorized by the responsible official.



3. Use personal protective equipment (PPE) appropriately (mechanical).



Personal Protection Equipment (PPE)

Electrical risks

- Workwear (FR) (2, 3 or 4)
- Hard hat
- Dielectric footwear
- Face shield (FR)
- Dielectric Gloves
- Safety harness
- Leather gloves
- Nitrile gloves
- Voltage detector
- Insulating pole
- Grounding equipment
- Signaling

Mechanical risks

- Workwear
- Hard hat
- Glasses protection
- Foot protection
- Leather gloves
- Safety harness
- Signaling

Chemical risks

- Workwear
- Glasses protection
- Nitrile gloves
- Signaling

NFPA 70B
NFPA 70E
ASTM F1506 (to
make electrical
flash analysis to
select the wear
category)



**Thank you for your
attention !**

<https://www.pcb.unitar.org/>

