Liquid Cooled Transformers (3/11/97)

General Information

1. Building name: _____ 2. Number: _____

3. Transformer serves: ☐ entire building ☐ portion of building

4. Primary voltage: _____ 5. Secondary voltage: _____

6. Capacity (kVa): _____ 7. Class: ☐ B ☐ F ☐ H

8. Type of cooling oil: _____

9. Nitrogen gas cushion: ☐ yes ☐ no 10. Date installed: _____

Condition Assessment

	Priority 0 1 2 3 4	Comments	W P
11. Capacity	☐ ☐ ☐ ☐ ☐	_____	☐ ☐
12. Foundation	☐ ☐ ☐ ☐ ☐	_____	☐ ☐
13. Case	☐ ☐ ☐ ☐ ☐	_____	☐ ☐
14. Leaks	☐ ☐ ☐ ☐ ☐	_____	☐ ☐
15. Bushings & insulators	☐ ☐ ☐ ☐ ☐	_____	☐ ☐
16. Protective devices	☐ ☐ ☐ ☐ ☐	_____	☐ ☐
17. Tap changer	☐ ☐ ☐ ☐ ☐	_____	☐ ☐
18. Oil test	☐ ☐ ☐ ☐ ☐	_____	☐ ☐
19. Insulation test	☐ ☐ ☐ ☐ ☐	_____	☐ ☐
20. Sound level	☐ ☐ ☐ ☐ ☐	_____	☐ ☐

Oil Transformers (continued)

21. Comments: _____

_____

_____

_____

_____

22. Completed by: _____ Date: _____

Should this system be replaced? ☐ yes ☐ no

Facility Assessment - Liquid Cooled Transformers
Rating System (3/11/97)

The overall rating for the transformer will be calculated by the computer based on the age of the unit and the ten condition assessment items identified for the system. Each assessment item is assigned a relative weight of importance is assessing the overall condition of the transformer. Those relative weights are as follows:

Assessment Item	Relative Weight
Age	Low
Capacity	High
Foundation	Low
Case	Medium
Leaks	High
Bushings & insulators	Low
Protective devices	Medium
Tap changer	Low
Oil test	High
Insulation test	High
Sound level	Low

Facility Assessments - Oil Filled Transformers
Instructions (3/11/97)

This form is intended to be used with building electrical transformers that use oil for cooling. Many of the items being assessed for the systems will require the assistance of personnel who maintain the systems. Completion of this data sheet will require working with them and reviewing the historical data for the system.

If a facility has multiple transformers, complete a separate data sheet for each transformer. For each item being rated, two check boxes are provided labeled "W" and "P". If a work order is written to correct an identified deficiency, check the "W" box. If the inspector recommends that the defect be corrected through the implementation of a facility renewal project, check the "P" box.

Transformer Data

Item 1: The building name is the official name as assigned by the institution.

Item 2: If the building has been assigned a building number, enter the number.

Item 3: Identify the area of the facility served by the transformer.

Item 4: Enter the primary voltage of the transformer.

Item 5: Enter the secondary voltage of the transformer.

Item 6: Enter the rated capacity of the transformer in kVa.

Item 7: Check the appropriate box for the transformer's insulation class.

Item 8: Check the appropriate box for the type of oil used in the transformer.

Item 9: If the transformer uses a nitrogen gas cushion as part of the cooling system, check the appropriate box.

Item 10: Enter the date when the transformer was installed.

Item 11: Rate the transformer's ability to carry the connected electrical load as follows:

0 - Transformer has adequate spare capacity, no action required.
1 - Transformer occasionally peaks at 90% of rated capacity.
2 - Transformer occasionally peaks at 100% of rated capacity.
3 - Transformer occasionally peaks at more than its rated capacity.
4 - Transformer consistently runs at higher than rated capacity during peak

periods; external cooling required.

Item 12: Rate the condition of the transformer pad and mounting bolts as follows:

0 - Pad and transformer mounting bolts in good condition, no action required.
1 - Transformer pad or mounting bolts have surface deterioration; no structural damage.
2 - Deterioration extends well into the mounting pad and bolts; mounting still structurally sound; recommend replacement within 3 to 5 years.
3 - Transformer pad deteriorated and no longer structurally sound; recommend replacement within 3 years.
4 - Transformer pad deteriorated and no longer structurally sound; recommend immediate replacement.

Item 13: Rate the condition of the transformer's case as follows:

0 - Case in good condition, no action required.
1 - Case has surface rust only.
2 - Case has more extensive corrosion; can be cleaned and restored.
3 - Case is corroded beyond repair; recommend replacement within three years.
4 - Case severely corroded and posing a leaking hazard; recommend replacement within one year.

Item 14: Examine the transformer case and pads for signs of leaking of cooling oil. Rate the condition of any leaks as follows:

0 - No evidence of oil leaks, no action required.
1 - Transformer has leaked within the past five years; permanent repairs made.
2 - Transformer has leaked within the past five years; temporary repairs made.
3 - Transformed has leaked within the past year; temporary repairs made.
4 - Transformer has an on-going leak; recommend immediate action.

Item 15: Examine the bushings and insulators for cracks and signs of burning. Rate their condition as follows:

0 - Bushings and insulators in good condition, no action required.
1 - Minor cracks or discolored areas, no burned or broken connections.
2 - Major cracks or discolored areas, no burned or broken connections.
3 - Major cracks & discolored areas, or burned or broken connections; recommend replacement within three years.
4 - Major cracks & discolored areas, or burned or broken connections; recommend replacement within one year.

Item 16: Protective devices include high temperature alarms, liquid level gauges, overcurrent devices, and lightning arresters. Rate the condition of the protective devices as follows:

0 - All protective devices operating properly, no action required
1 - Protective devices appear to be operating properly, but not tested or cleaned within the past five years.

2 - Some known problems with protective devices; no testing or cleaning within the past five years.
3 - Most protective devices inoperative.
4 - Most protective devices fail testing or have been disconnected.

Item 17: If the transformer is not equipped with a tap changer, skip to item number 17. If the transformer is equipped with an automatic or manual tap changer, rate the condition of the tap changer as follows:

0 - System in good condition, no action required.
1 - System operates properly; minor corrosion or wear on mechanical parts and contacts.
2 - System operates properly; minor corrosion or wear, some bad contacts; recommend overhaul or replacement within five years.
3 - System not fully operable; recommend overhaul or replacement within three years.
4 - System inoperative, recommend replacement within one year.

Item 18: Rate the condition of the transformer's insulating oil as reported by an oil test. Rate the oil as follows:

0 - Oil tests good, no action required.
1 - Oil tests show slightly elevated levels of moisture or acid, or decreased dielectric strength; recommend increased monitoring only.
2 - Oil tests show elevated levels of moisture or acid, or decreased dielectric strength; recommend filtering oil content
3 - Oil tests show elevated levels of moisture or acid, or decreased dielectric strength; recommend replacing oil content
4 - Oil tests show transformer is at risk of failure.

Item 19: To test the condition of the transformer's insulation, a megger or comparable test is performed on the transformer's windings. Rate the condition of the transformer's insulation as indicated by that test as follows:

0 - Insulation tests in good condition, no action recommended.
1 - Insulation deteriorated but within manufacturer's recommended limits.
2 - Insulation deteriorated; just outside of manufacturer's recommended limits.
3 - Insulation deteriorated; recommend replacement of transformer within five years.
4 - Insulation badly deteriorated; recommend replacement of transformer within one year.

Item 20: The noise generated by a transformer is an indicator of the condition of the transformer's core and tightness of mountings and connectors. Noise can also be disruptive to operations in adjacent spaces. Rate the level of noise generated by the transformer as follows:

0 - Noise well within manufacturer's limits or NEMA standards, no action required.

1 - Noise slightly below manufacturer's limit or NEMA standards.
2 - Noise level exceeds manufacturer's limit or NEMA standards during periods of high loads.
3 - Noise level exceeds manufacturer's limit or NEMA standards whenever loaded beyond 50% capacity.
4 - Noise level exceeds manufacturer's limit or NEMA standards during most loads.

Item 21: Enter any comments concerning the operation of the transformer.

Item 22: Enter the name of the person rating the transformer and the date when the rating was completed.