

Lubrication **Audits**

Lubrigard Ltd.
11-4161 Sladeview Cresc
Mississauga, ON L5L 5R3
905-569-8600
Fax 905-569-8605
info.sales@lubrigard.com
<http://www.lubrigard.com/>

Audit Preparation – Audit Document Worksheet



Audit Document

Audit Checklist

- Standards, Consolidation, and Procurement
- Storage/Handling
- Sampling Techniques
- Contamination Control
- Lubricant Analysis
- Program Management
- Procedures, Training and Certification
- Program Goals/Metrics
- Safety Practices
- Continuous Improvement



Lubrication Management Element	Comments	Rating
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Audit Information

Plant Site	LubriCorp Main Refinery	Auditor(s)	John Hamill
Plant Area(s)	Base Oils, Utilities, Solvents	Date(s)	March 20-24, 2003

Standards, Consolidation and Procurement

Are general, technical standards maintained for common lubricants?	Several tech datas were apparent, however, there was not main manual, nor an area designated as such	m
Are supplier quality assurance procedures in place and monitored routinely?	Only simple procedures are in place, and products are not monitored beyond checking the packing list against the order form	m
Are lubricants for special applications properly defined and purchased with the proper documentation or purchase class?	There was good control of the synthetic products that are used on site, training had been done by the supplier	OK
Does the site employ a database linking lubricated components to standardized lubricants?	No software in place.	MNC
Are lubricants properly labeled and identified upon delivery including expiration dates?	Lubricants were labeled, however, no expiry dates are affixed to the products placed in storage.	MNC

Audit Preparation – Equipment Audit Worksheet



Equipment Survey

- Identification Information
- Criticality
- Equipment Information
- Operating Environment
- Audit Information
- General Comments
- Contamination Control
 - Air Breather
 - Filter(s)
 - Off-Line Filtration
 - Seals
 - Lube Conditiong
 - Sample Port
 - Lubrication Ports

Equipment Audit Worksheet

LUBRIGARD		PRODUCTS	SERVICES	TRAINING			
Identification Information		Include	Y	Auditor	JH	Date	March 21, 2003
Plant Site	LubriCorp Main Refinery						
Plant Area	Base Oils / Blending / Pumps						
Common Name	30-45 Standwater pump						
Unit Id	BO-04-BLND-3045-PP	System Type	Pump				
Assigned To	Hank Thomas						
Criticality	n/a	very low	low	mod low	2.5		
Equipment Information							
Make	Rexroth	Model					
Fluid Type	Shell Meropa 68						
Capacity	4.0	Gallons	Add				
Operating Environment							
Location	internal	external	Lub				
Operating Temp	20	°C	Pos				
Operating Pressure	60	PSI	Un				
Cooling System	water	inhibitor	glycol	none	other		
Audit Information							
Date	March 21, 2003						
Time							

LUBRIGARD		PRODUCTS
Contamination Control (Current – blue / Recommended – red)		
<input type="checkbox"/> Air Breather	filtered desiccating bladder stand-pipe cap none	To be installed on _____ mm / in / ft
<input type="checkbox"/> on condition	Service freq _____	days months years
<input type="checkbox"/> Filter(s)	Return Pressure Suction	Rating _____
	Brand _____	Part No _____
	Return Pressure Suction	Rating _____
	Brand _____	
	Return Pressure Suction	
	Brand _____	
<input type="checkbox"/> on condition	Service freq _____	
<input type="checkbox"/> Off-Line	filter-part other	
Filtration	Tank _____	
<input type="checkbox"/> on condition	Service freq _____	

Conducting the Audit – The Lube Room



The Lube Room is the best place to begin the lube management audit.

Most facilities will have a designated lube room. It may be inside or outside. It might be a closet, or the corner of a room. The lube room is a good starting point for your audit. Don't rush through this part of the audit. Take your time, take lots of photographs and make lots of notes. You will be looking for the following elements:

Good Practices

- Enclosed area (indoors)
- Sealed lubricant storage containers
- Bulk storage
- Air filters on bulk tanks/barrels
- Oil filters on dispensing side
- Housekeeping - Clean and tidy, good lighting
- Storage cabinets - Rags, funnels, etc. in sealed containers
- Oil used in LIFO manner (Last In First Out)

Bad Practices

- Outdoor storage
- Fiber ceilings (fire-retardant)
- Barrels with bungs left open
- Dispensing into open 20 liter pails
- Oil spills, dirty rags laying about

Conducting the Audit – Oil Dispensing



Documenting lube dispensing equipment can be quite interesting to say the least.

The Lube room will be the first place you encounter lube dispensing equipment, however, that is not the end of the story. Throughout the facility you will see many examples of lube dispensing equipment, and ports (or no ports) on equipment. Keep your eyes peeled. You will be looking for the following elements:

Good Practices

- Sealed one shot containers
- Proper oil dispensing containers (i.e. Oil Safe)
- Bulk oil fills using transfer cart (with filtration)
- Fill ports on equipment
- Labels on fill ports

Bad Practices

- Dispensing using 20 liter pails
- Galvanized tins for lube dispensing
- Bulk fills using unfiltered pneumatic pump into barrel
- Oil transferred direct from tote into equipment

Conducting the Audit – Equipment

The bulk of your time on-site will consist of auditing the lubricated equipment. The goal of a lubrication management program is to ensure that equipment is well sealed and protected against ingress of contaminants at all times, during operation, during lube fills and top-ups.

Good Practices

- Proper air breathers (10 or 3 micron)
- Quick connect for lube fill/top-up
- Lube drain port
- Sealed lube system – no open hatches, dips sticks, etc.
- Properly labeled fill/drain ports
- By-pass (kidney loop) filtration system

Bad Practices

- Missing or unrated air breather
- Leaking seals
- Missing caps, inspection ports ajar

The information you provide on the equipment audit will form the basis of the oil analysis equipment database.

Conducting the Audit – Sample Ports

Ensure that equipment have properly located sample ports and that oil analysis samples are taken from appropriate sample points at appropriate intervals and have the appropriate testing done.

Good Practices

- Labeled lubrication sampling port
- Appropriate sampling hardware installed (pitot tube, etc.)
- Sampling port properly location (in small sump, return line on large pressurized equipment, etc.)
- Multiple sample points on large and/or critical equipment.

Bad Practices

- Sampling from dead end pipes, large reservoirs
- Drop-tube sampling using a vacuum pump and tubing

At first you will be surprised at how people are taking oil analysis samples. Soon you will come to expect it.

Conducting the Audit – Safety**Safety, Cleanliness and Disposal**

- **Safety**
 - Non-slip flooring**
 - Eye-wash center**
- **Minimize Potential Back Injuries**
 - Reduce Drum Usage – Lubrication Racks**
- **Minimize Accidents**
 - Spill and Leakage containment – Drip Pans**
- **Spill Containment - Environmental Protection Agency (EPA) regulation, 40 CFR 264.175.**
- **Adherence to Disposal Laws and Regulations**
 - Environmental Protection Agency (EPA) - some oils are considered hazardous waste.**
 - Well-defined procedure**
 - Proper storage equipment and labeling**
 - Reinforcement of the appropriate policies**
- **Maximize Employee Efficiency with proper equipment, policies and directives**
 - Lubrication Containers, Lubrication Carts**

Preparing the Deliverables



These deliverables will form the basis of your presentation to the management.

The Client will Receive

- A complete audit report
 - Each item of every section detailed out
 - Includes spider diagram “report card”
- An audit presentation (PowerPoint)
 - A comprehensive summary of the audit
 - Includes images from the audit
 - Includes a vision of best-in-class for the client
- A list of recommendations
 - Listed by audit item
 - Broken down into short, medium and long term
 - Shows points to be awarded when implemented
 - Lists approximate cost of purchase/implementation
- A CD-ROM containing;
 - All audit images
 - All reports, and presentations





Audit Report

Audit Checklist

- Standards, Consolidation, and Procurement
- Storage/Handling
- Sampling Techniques
- Contamination Control
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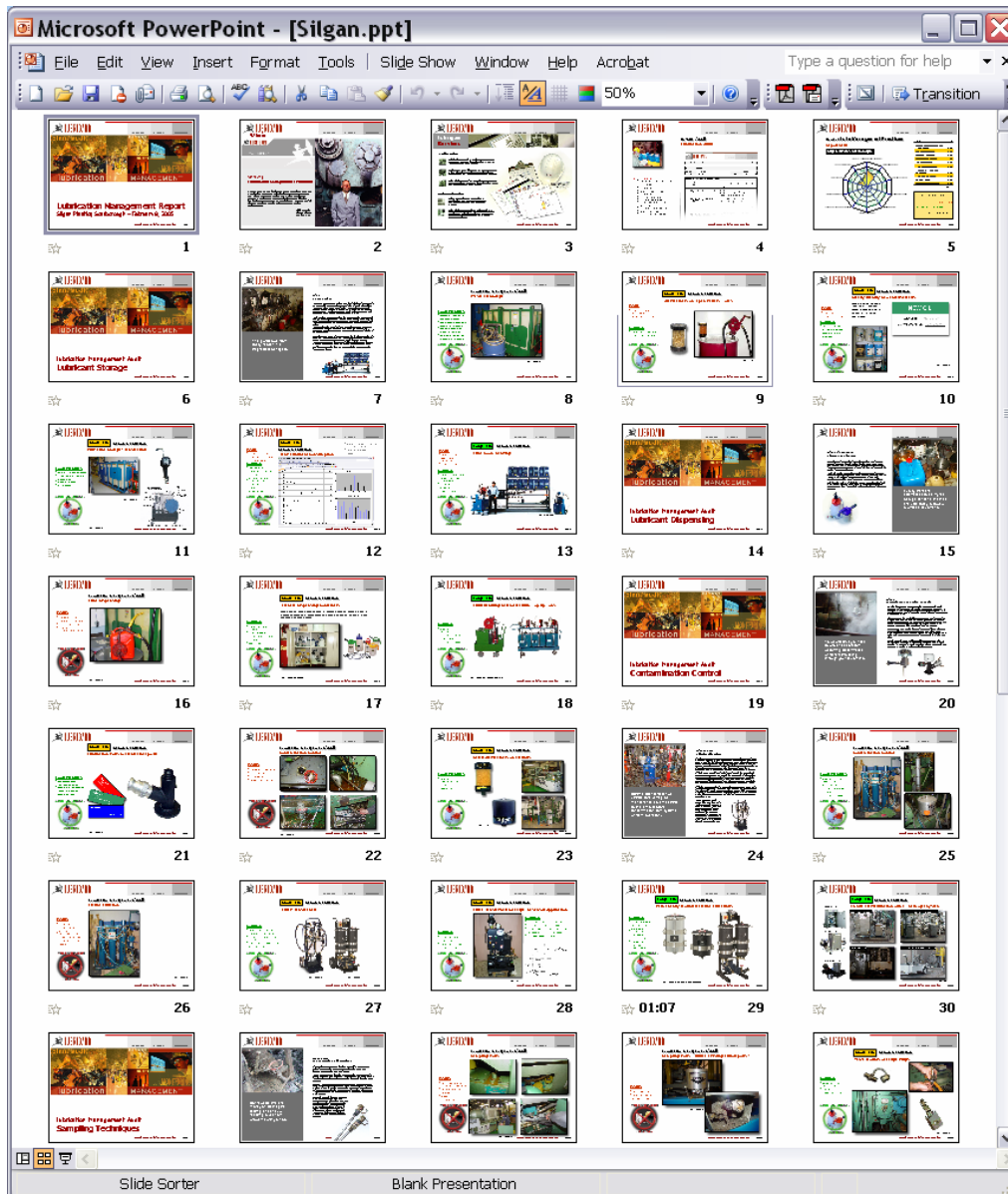
Standards, Consolidation and Procurement

Are general, technical standards maintained for common lubricants?	Several tech datas were apparent, however, there was not main manual, nor an area designated as such	m
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Audit Recommendations

Lubrigard Audit Recommendations			Petro-Canada - White Oils					
White Oils								
Refers To	Item	Recommendations	Time Period	Costs (Initial)	Initial \$	Costs (Ongoing)	Ongoing \$ / yr	Points
Standard, Consolidation and Procurement								
1.5	1	Receive all products with a approval sticker including expiration dates ("DO NOT USE AFTER: mm/dd/yyyy")	Short-term		\$100		---	1.5
1.6	2	Each lubrication area should employ a simple record keeping tracking "PRODUCT IN / PRODUCT OUT".	Short-term		\$100		---	2.0
Storage and Handling								
2.1	3	Label spent drums as "NOT FOR USE".	Short-term		\$100		---	0.5
2.2, 5.8	4	Periodic sampling of totes from lube rack (schedule to be determined).	Mid-term			20 samples @ \$30	\$600	1.0
2.8, 2.10	5	Purchase designated color-coded lube dispensing containers.	Short-term	75 x \$100	\$7,500		---	2.5
2.3	6	Do random container sampling on a semi-annual basis to confirm process.	Mid-term			20 samples @ \$30	\$600	0.5
2.5, 2.6, 2.7, 2.9	7	Transfer all lubricants directly to bulk storage rack facilities. Employ both oil and air filters on lube rack set-up.	Mid-term	3 areas x \$5,000/rack	\$15,000	Filters \$120 X 6 totes X 3 areas	\$2,160	4.5
2.11, 4.4	8	Purchase and color-code a number of transfer carts for large volume oil change/top-ups for each lube area. Also assists in "Contamination Control"	Mid-term	2 carts @ 3 areas x \$3,000	\$18,000	Filters \$100 X 3 changes X 6 carts X 4 heads	\$7,200	2.5
Sampling Techniques								
3.2	9	Include procedures for sampling for various appropriate sampling devices (i.e. gauge plugs, pitot tubes) in one comprehensive SOP	Mid-term		\$500		---	1.0
3.3, 5.8	10	Semi-annual random testing of product deliveries.	Mid-term					

June 2003



Audit Presentation

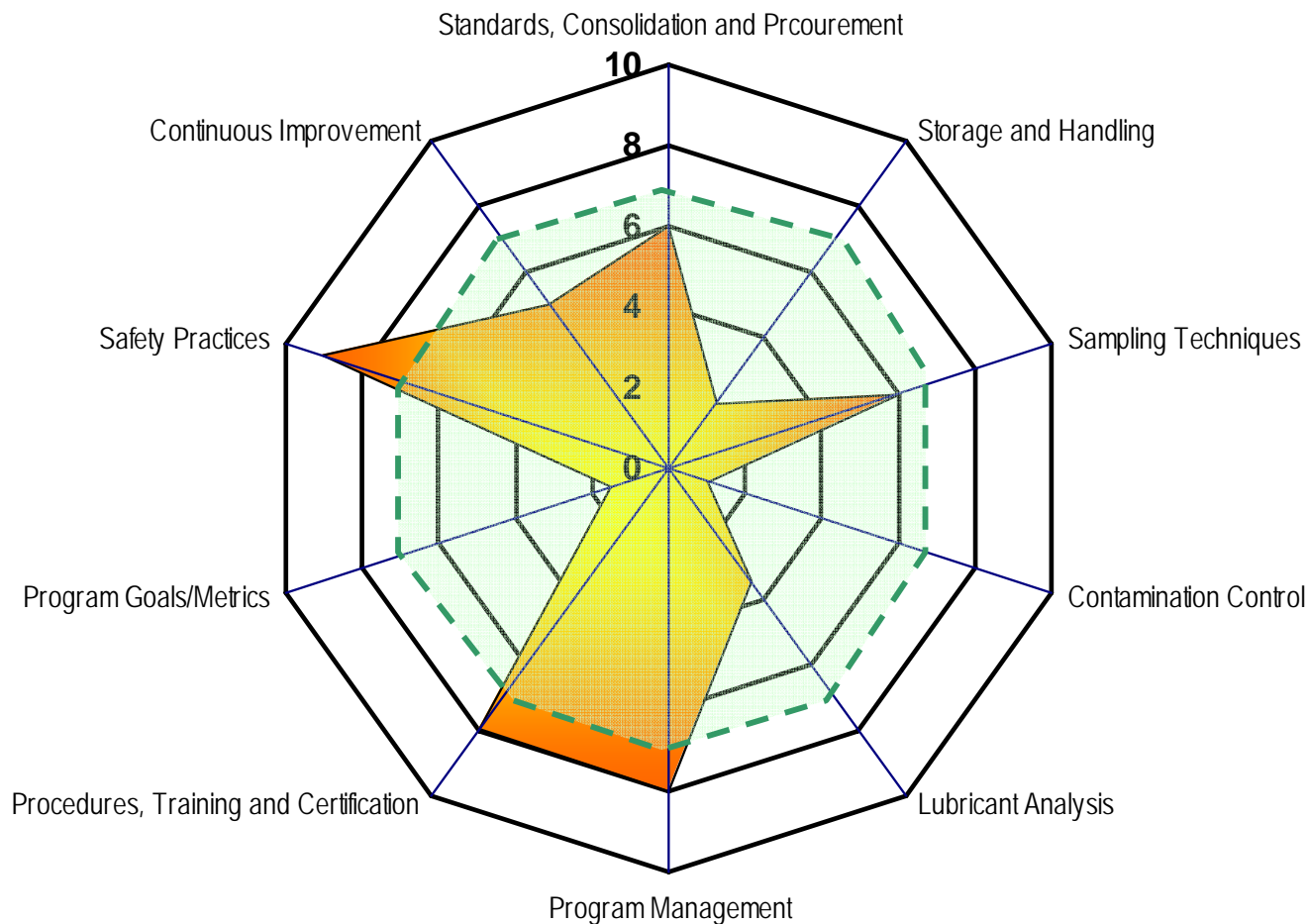
- A comprehensive summary of the audit
 - Includes images from the audit
- Includes a vision of best-in-class practices

Presented to Key Management

Audit Deliverables

Current Lube Management Practices Report Card

Your Company



Category	Score
Standards, Consolidation and Procurement	6
Storage and Handling	2
Sampling Techniques	6
Contamination Control	1
Lubricant Analysis	3.5
Program Management	8
Procedures, Training and Certification	8
Program Goals/Metrics	1.5
Safety Practices	9
Continuous Improvement	5
Total	50

Spider Diagram Scale

- 0** No policy/program in place
- 7** Target for all areas
- 10** Lubrication Excellence