Green Theme
Storage, Handling, and Recycling of Locomotive Batteries

www.ePowerRail.Com

Meeting EPA requirements


P0901

OPERATION LIFESAVER®

Battery Key Topics

- What is a Battery
- Battery Types
- Hazards & Concerns
- Transportation
- Handling
- Storage
- Recycling

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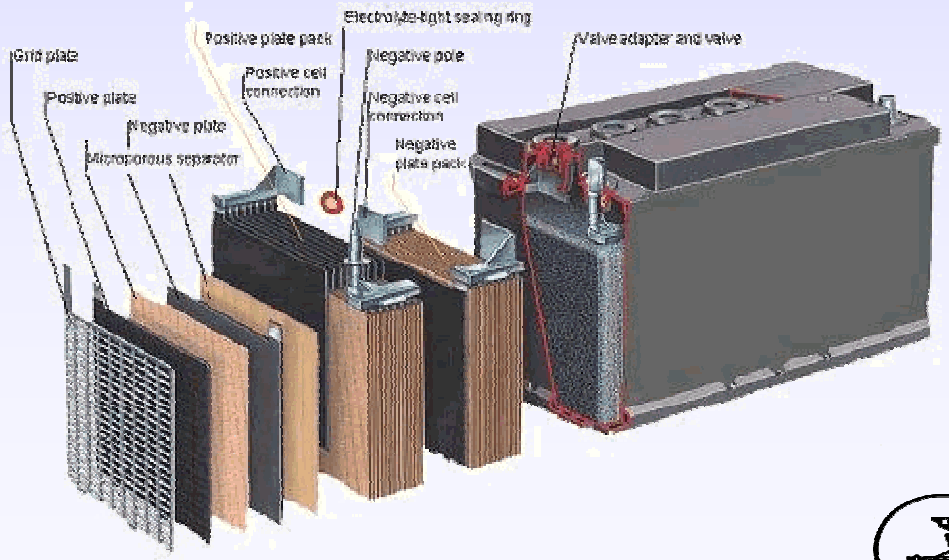
What is a Battery???

•A battery is two or more electrochemical cells connected in series which store chemical energy and make it available as electrical energy.

• Common usage has evolved to include a single electrical cell. There are many types of electrochemical cells, A battery's characteristics may vary due to many factors including internal chemistry, current drain and temperature.

• Typically, in the Locomotive Industry, our Battery has been a very old Acid/Metal Design.



Locomotive Battery Types

- **Road and Switcher Units – Flooded Lead Acid**
- **Hybrid and Gen Sets – Gel (Green Electricity) APU (Auxiliary Power Units)**

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Locomotive Battery Typical
Class 1 usages

Batteries in use on NS

- 3089 Units use the flooded lead/acid “unitized” (2 per loco)
- 416 Units use the gel style “unitized” (2 per loco)
- 116 Units use the flooded lead/acid “monoblocks” (8 per loco)

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Hazards and Concerns

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Battery Hazards

Acid Type Battery

Fire – Explosion – Spills

- **Explosion/Fire Causes**
  - **Misuse**
  - **Malfunction**
- **Locomotive Battery Failures**
  - **Short Circuits**
  - **Overcharging including Boiling and Gases**

Gel Style Batteries

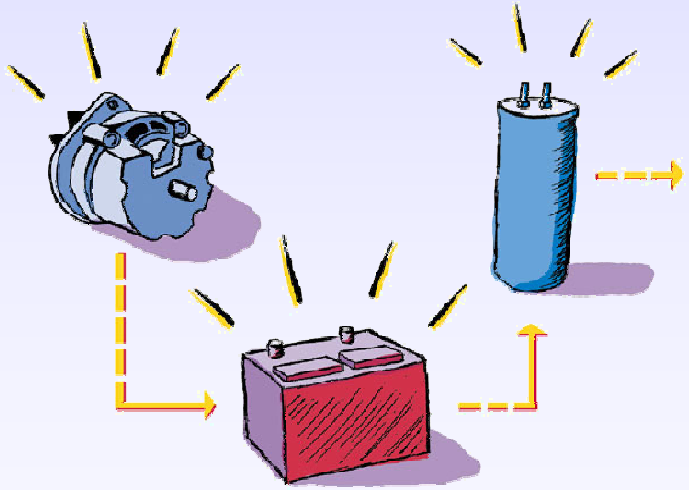
Pro's

- **Gelled/Suspended Electrolyte No liquid of any kind; completely sealed.**
- **Maintenance Free.**
- **Longer Lasting**
- **Do not need to be fully discharged before recharging**
- **Do not develop a "memory" that limits their recharging**
- **Easier to transport**

Gel Style Batteries

Con's

- **Increased Initial Purchase Price**
- **Require a different charging system**
- **Weight- about twice as much as acid batteries**



Battery Transportation Acid

- **Transportation Carriers Need…**
  - **Hazmat Placard unless……**

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Battery Transportation Acid

Hazmat Placard **unless**……

49 CFR Section 173.159e
Exemption from Hazmat Placarding

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Battery Transportation Acid

MATERIAL SAFETY DATA SHEET

SECTION I - PRODUCT IDENTIFICATION

Product identifier: Battery Acid **Product use**: Lead/Acid Battery **Chemical family**: Mineral acids.

Supplier's name and address:
Surrette Battery Co. Ltd.
P.O. Box 2020, 1 Station Road
Springhill, N.S.
B0M 1X0 (902) 597-3767

Manufacturer's name and address:
Refer to Supplier

Emergency Telephone #: CANUTEC (613) 996-6666 **WHMIS CLASS**: D1B, E
HMIS rating: Health 3 Fire 0 Reactivity 1

SECTION II - HAZARDOUS INGREDIENTS

Ingredients	CAS #	wt.%	LC_{50}, ppm (Rat,ihl.)	LD_{50}, mg/kg (Rat,oral)
Sulfuric acid	7664-93-9	35-40	510 mg/m^3/2Hr	2140

SECTION III - PHYSICAL DATA

Physical state, odour and appearance: Clear, colourless, liquid that is odourless unless heated, than odour becomes sharp and choking.
Odour threshold: n/av **Specific gravity (at °C)**: 1.265 **Coefficient of water/oil distribution**: n/av
Vapour pressure: n/av **Boiling point**: 110°C **Melting/freezing point**: 0.7°C **pH**: <1
Vapour density (Air=1.0): Low **Evaporation rate (n-BuAc=1.0)**: n/av
Volatiles, %: n/av **Solubility in water (w/w)**: 100%

SECTION IV - FIRE AND EXPLOSION DATA

Conditions of flammability: Non-flammable liquid.
Means of extinction: Use media appropriate for surrounding fire.
Sensitivity to mechanical impact/static discharge: Not susceptible to mechanical impact or static discharge.
Flash point (Method): None. **Lower/upper flammable limits (% by volume)**: n/ap
Auto-ignition temperature: n/ap
Hazardous combustion products: Refer to "Hazardous decomposition products" (next section)
Unusual fire and explosion hazards: Sulfur dioxide, sulfur trioxide, sulfuric acid fumes. Evolution of explosive Hydrogen gas on contact with most metals.

SECTION V - REACTIVITY DATA

Stability: Stable. Hazardous polymerization will not occur.
Incompatible materials: Highly reactive with materials such as metals, metal oxides, hydroxides, nitrates, amines, carbohydrates and other alkaline materials. Reactions can generate a great deal of heat as does the dilution of acid with water. Never add water to acid. Acid should always be added slowly to the water.
Conditions of reactivity: Product may decompose if exposed to high temperatures.
Hazardous decomposition products: If heated above 340°C, sulfuric acid will decompose to sulfur trioxide and water.

- **Transportation Carriers Need…**
- **MSDS (Material Data Sheets)**
- **Packaging & Skids Marked**

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Battery Transportation Acid

Stacking and Wrapping Used Batteries on Pallets

THESE GUIDELINES ARE TO ASSIST IN COMPLIANCE WITH FEDERAL DEPARTMENT OF TRANSPORTATION (USDOT) REGULATIONS[1]. PLEASE ASSIST THE DRIVER IN COMPLYING WITH THE LAW. FAILURE TO COMPLY WITH THE GUIDELINES CAN RESULT IN REFUSAL BY THE CARRIER TO ACCEPT MATERIAL. IN ADDITION, FAILURE TO COMPLY CAN RESULT IN FINES AND PENALTIES FROM FEDERAL, STATE, AND LOCAL AUTHORITIES.

INSTRUCTIONS FOR WRAPPING PALLET

All batteries must be secured to the pallet with stretch wrap. Stretch wrap works best if it is pulled tight before stretching it around the corners. Figure 4 shows a properly wrapped pallet.

1. Start with the stretch wrap turned sideways to create a rope effect (see fig. 1). Wrap around the top layer twice.*
2. Still using the rope effect, wrap the top layer twice* again, crossing over the top each time to form an "X-pattern." This will pull the batteries towards the center to prevent batteries from falling off of the pallet, a DOT requirement.
3. Hold the stretch wrap open (see fig. 2 and 3), wrap around the bottom layer twice*, being sure to catch the edges of the pallet.
4. Finally, after placing cardboard on top of the batteries, wrap around the top layer twice* with the stretch wrap in the open effect and tear at the last corner.

* Wrap as many times as necessary to stabilize the load

[1] Title 49 C.F.R. 173.159 Batteries, Wet

Figure 4

Figure 1

Figure 2

Figure 3

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Battery Transportation GEL

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Battery Handling Safety

Manufacturers & Distribution Personnel who handle require…

- **Safety & First Aid Training**
- **Spill Kits**
- **Protective Material/Gear**

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Battery Handling Lifting Safety

Monoblock Device

Sling w/hooks

Tesco Device #T54922

Tesco battery lifter

Ram/Pusher for positioning

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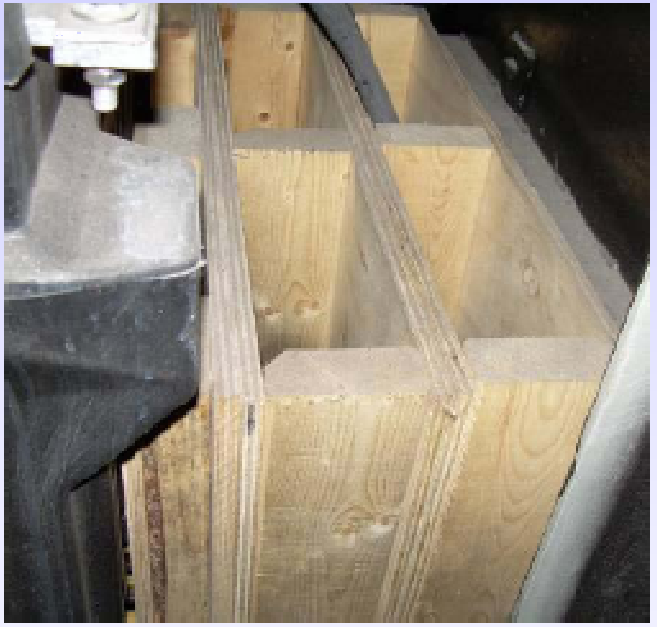
Battery Safety Installation



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Battery Safety Installation

- **EMD style**
  If this bracket is missing or unusable please see alternative method

- **GE style**
  Part # 41C621698P1

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Battery Picks

P I C K D O C U M E N T
TICKET NUMBER: 19387-001

BATCH/MUSTER LOCATION: 99 00-00
DATE/TIME: 01/12/11 14:27:11
SHIPPING WEIGHT: 3350.0
EQUIP NBR: UP 123456 WO NBR:
CONS/REQUISITION: 47127 0041787
J MIDDLETON
C/O S TALLEN MECH IN CHARG
1425 S WESTERN AVE
CHICAGO IL 60608

SHIPPING WHSE: OM07 LOCATOR: DC01
QTY: 1 ITEM: ST 020-5401 0

BATTERY, STORAGE WET, 64V LEAD-ACID
ANTIMONY TYPE/MIN. 25 PLATES 650 AMP
HR/8 HR 2 BATTERIES - 16 CELLS PER
BATTERY - UNITIZED W/SOLID
INTERCELL CONNECTORS

PICKED BY: PACKED BY:

* *

.....URGENT - PLEASE DELIVER ASAP!!!

* * * * * THIS IS REPAIRABLE MATERIAL. RETURN CORE TO OM07

CO: 01 COST CENTER: CX762
COST CODE: 4990
WO: JOB:

SEND TO: COUNCIL BLUFFS COMMS WAREHOUSE
3319 NEBRASKA AVE, STE. 5
COUNCIL BLUFFS IA 51501

* * * * * * * * * * * * * * * * LIFTING ALERT * * * * * * * * * * * * * * * *

* * * * * * * * * * * HAZMAT ALERT - AE03 DETAILS ON BACK * * * * * *

1938700102054010

0000 PICK DOCUMENT H A Z A R D I N F O R M A T I O N PAGE 2 OF 2
TICKET NUMBER: 19390-004 ITEM: 020-5401 0 SHIPPING DATE 01/12/11
HAZARD CODE: AE03
BILL OF LADING DESCRIPTION:
BATTERY, WET, FILLED WITH ACID// 8 (CORROSIVE MATERIAL)// UN2794//

PG III// HAZMAT STCC=4936556
EMERGENCY CONTACT # 1-800-424-9300
UP STOCK ITEM NUMBER 020 5401

PREPARATION FOR SHIPMENT:

PACKAGE: SECURED TO PALLET, PROTECT TERMINALS FROM SHORTS
LABEL: CORROSIVE
MARK: BATTERY, WET, FILLED WITH ACID// UN2794// ARROWS
SEPARATE 4' AND ON PALLETS FROM 1.4 EXPOLSIVE; 2.1 FLAMMABLE GAS;
2.3 POISON GAS; 4.1 FLAMMABLE SOLID; 5.1 OXIDIZER; 5.2 ORGANIC PEROXIDE
EMERGENCY CONTACT # 1-800-424-9300

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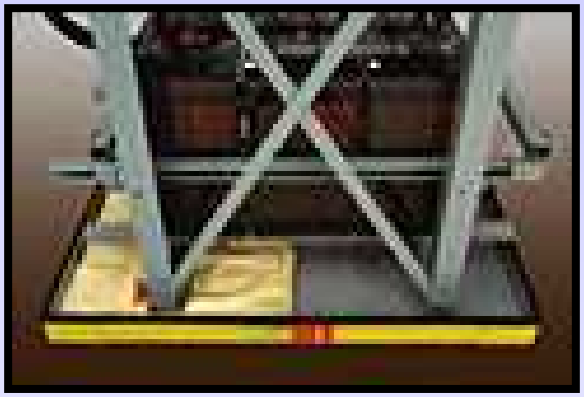
Battery Storage



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Battery Storage

- **Batteries must be protected from…**
  - **Intense Heat**
  - **Drastic Cold**
  - **Damage due to dropping and/or Stacking of Product**

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Battery Storage & Charging

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Battery Storage Concerns

- **Stored Batteries can be Undercharged**
- **Batteries Need to be Rotated**

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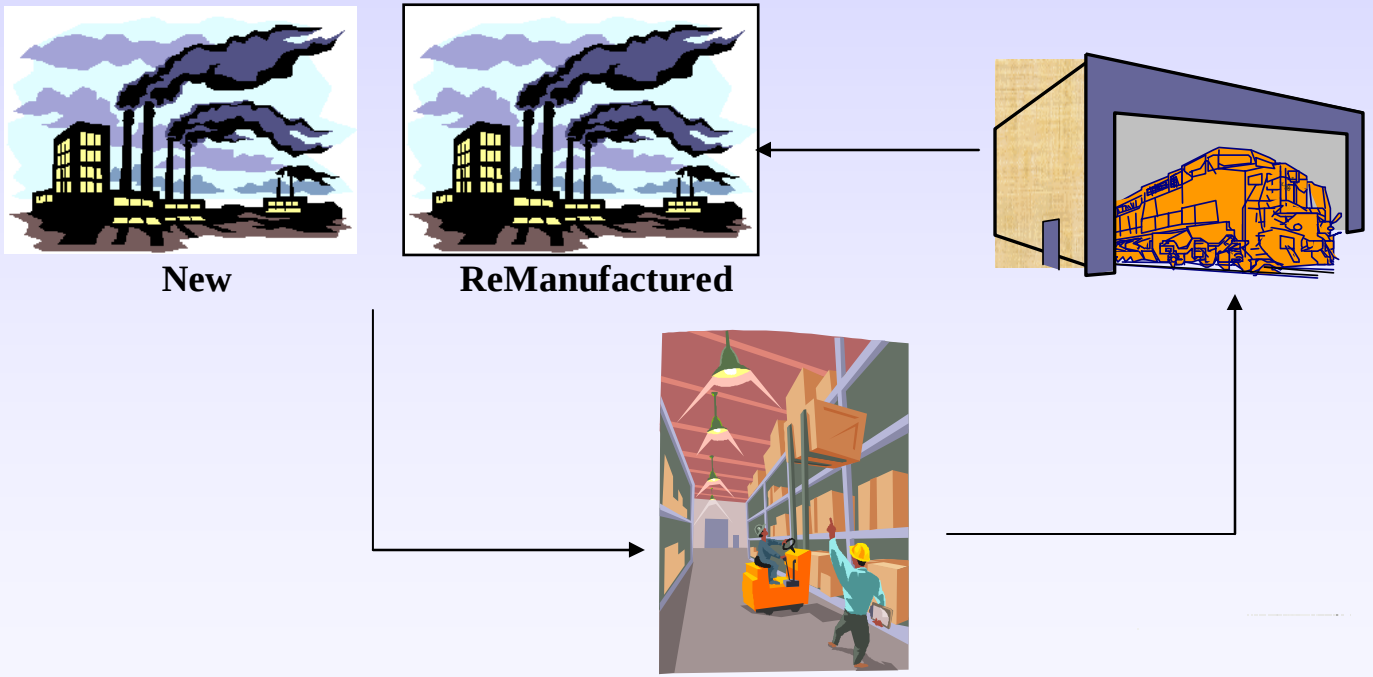
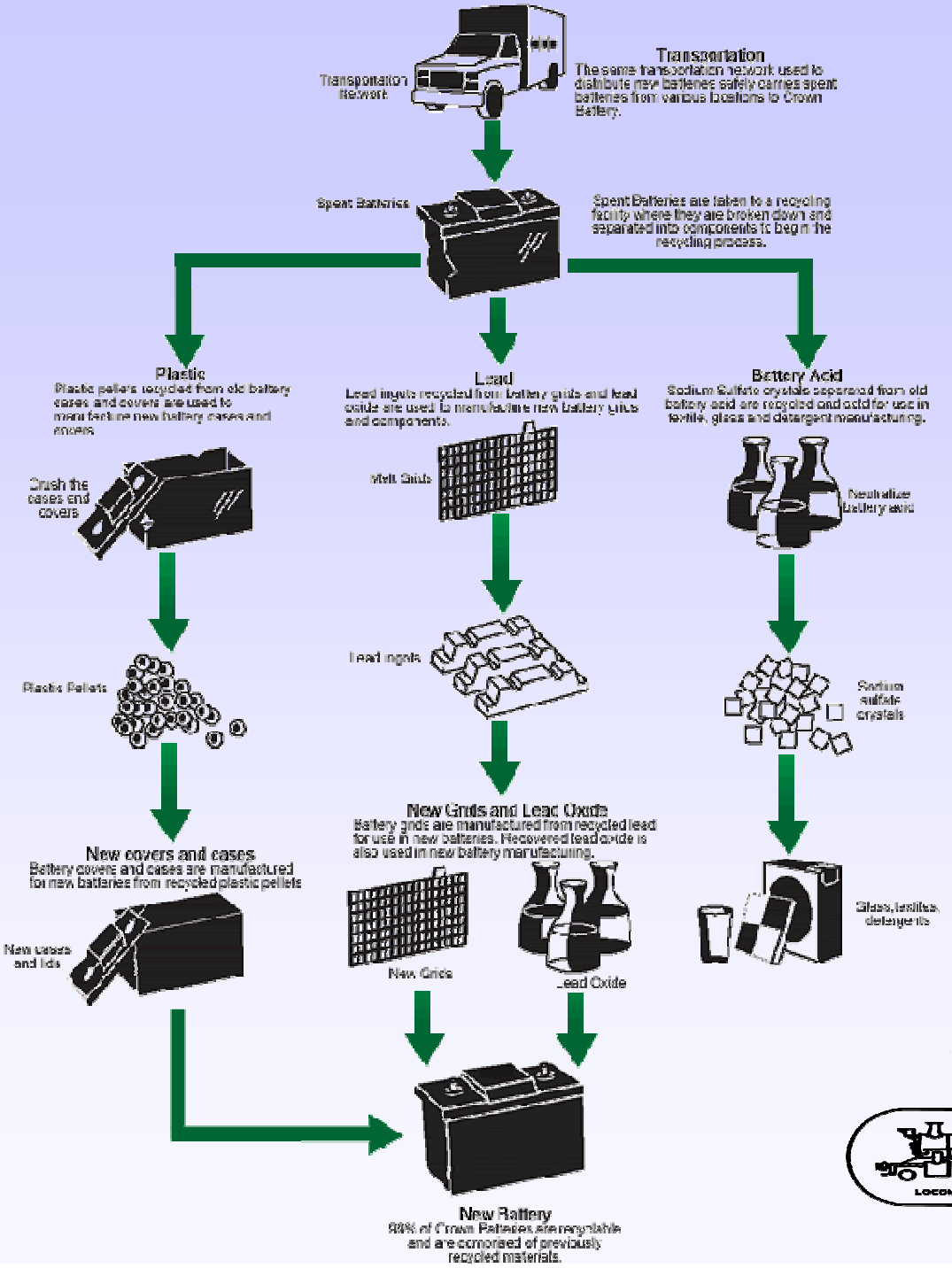
Battery Storage – Best Practices

- OEM Supply Chain Management New
- OEM Supply Chain Management Recycled



Recycling



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Best Bang For Your Buck

Maintenance Schedule

	Description	Due on	Due at
	Tune Up	09/09/05	
	New Tires	15/10/05	
	Oil Change		50000
	Radiator Flush	18/12/05	60000

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Thank You For Your Attention

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Look, Listen & Live

Be Safe!!!!

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