1.0 PURPOSE

The purpose of this document is to convey information about ways to mitigate risks associated with railcar loading, unloading, and movement at cement plants and terminals.

This document is for information purposes only. Each member company must exercise its own judgment concerning implementation of any suggestions presented herein. The Advisory is not intended or designed to establish industry standards for mitigating risks noted below.

2.0 POTENTIAL HAZARDS

Potential hazards associated with loading, unloading, and movement of rail cars at cement plants and terminals include strains, falls, contusions, hearing damage, lacerations, crushing injuries, and death.

For example, hardened cement accumulated on the tops of rail cars can dislodge at any time during car loading, unloading, or movement; damage to property or injury to people can result. Also, build up of cement sometimes affects the ability to safely open and close rail car doors. Lastly, uneven discharge of cement during unloading can cause the car to tip over unexpectedly.

3.0 RISK MITIGATION

General

3.1 Personnel involved in the movement and loading/unloading of railcars should be properly trained to manage or avoid risks associated with such activities.

3.2 A communication system should be established to ensure all employees know where the others are working around the railcars. Examples of communication systems include radio contact, air horns, or hand signals. If hand signals are used they should be consistent with your local railroad carrier/provider at your facility.

3.3 During any railcar movement, the locomotive operator should stay in constant communication with the switchman and only move the car after the “all clear” is given. Personnel should not cross-over, under or between railcars. Only cross between rail cars at designated crossings or where there is an opening of at least 20 feet between parked cars.

3.4 During any railcar movement or loading/unloading operation all personnel involved should wear a brightly colored vest or similar apparel to help ensure visibility.

3.5 Before any railcar movement and when approaching crossings, the locomotive or towing equipment should sound its horn as specified in the established communication system.

3.6 Whenever it is necessary for a person to ride on a railcar, a Job Safety Analysis (See Attachment A - Job Safety Analysis Form) should be completed to ensure safe practices are followed. If the locomotive is not in tow of a car, the switchman should ride inside of the cab or on the secured platform.

3.7 Persons engaged in dropping railroad cars down track should use a safety harness and properly sized lanyard secured to prevent employee entanglement in rail car wheels.
3.8 Fall protection, including a full body harness with a properly secured lanyard, should be used when working on top of any railcar, unless the railcar loading and unloading facility is equipped with appropriate handrails. Personnel should not ride on top of any rail car while it is in motion.

3.9 Personnel should be trained not to store or park anything closer than eight (8) feet six (6) inches from the center of a railroad track.

3.10 Post caution signs (i.e. “Caution – Close Clearance”) at locations where employees should not ride the side of the rail car due to close clearances.

3.11 Install guardrail protection where employee may cross tracks and have a restricted view of the tracks (See Attachment B- Example of Guardrail Protection).

3.12 When opening railcar doors personnel should use pneumatic car door openers, torque multiplier devices or other mechanical advantage tools to diminish the risk of injury (See Attachment C – Example of Rail Car Door Opener). Strains, cuts/lacerations, broken bones, and contusions can occur from using steel bars to open car doors.

**Locomotive Operations**

3.13 Only locomotives, trackmobiles, or other equipment approved by the manufacturer for the movement of rail cars should be used. The use of skid-steer loaders (i.e., Bobcats), standard loaders, or other equipment not properly equipped for moving railcars is very hazardous and should be avoided. (See Attachment D – Example of a Manufacturer Approved Modified Front End Loader)

3.14 The locomotive operator should do a pre-operational inspection of the locomotive prior to use. Items to be checked should include at a minimum: brakes, sanders, throttle, horn, windshield, mirrors, wipers, fire extinguisher, hose connections, strip charts, and recorders. (See Attachment E – Example of a Pre-Operational Checklist)

3.15 The operator should test run the locomotive without cars attached at the beginning of each shift.

3.16 The operator should be aware of the maximum number of empty and loaded railcars that can be attached based on the size of the locomotive.

3.17 The locomotive or other approved power equipment should be operated at a safe speed at all times.

**Loading and Unloading Operations**

3.18 The wheels of parked rail cars should be blocked at all times by approved wheel chocks provided for that purpose and the brake should be set. The use of rail spikes and chain links is very hazardous and should be avoided. Ensure the use of a “blue flag” system to denote parked rail cars.
3.18.1 Setting the brake can result in strains to the body, especially the back, if the correct body position is not used. Ensure that you bend at the knees and keep your back straight as possible. Do not overexert yourself.

3.18.2 Rail car brakes should be inspected to ensure they engage properly. The chain linkage to the mechanical brake should be tight once the hand wheel is firmly set. The brakes should have sufficient pads to make secure contact against all 8 wheels. (Note: because of close clearances between the brake pad and the wheel, it may be difficult to visually determine if the brake is set or released just by looking at the brake pad. Check the brake chain and rod linkage for tightness as well as the brake pad contact with the wheel to confirm that the brakes are set.) (See Attachments F and G – Brake Linkage and Brake Pads)

3.18.3 The proper operation of rail car air brakes should be confirmed, especially if air brakes are needed by either the locomotive or other car moving equipment (e.g. track mobile) to control the speed of loaded and/or unloaded rail cars, particularly when operating on grades.

3.18.3.1 When checking the functioning of air brakes, visually ensure that the air brake cylinder extends out over the brake rod linkage and fully engages the brakes. In some cases, it may be necessary to re-tighten the hand wheel of the mechanical brake to take up any slack created in the linkage by the setting of the air brake. (See Attachments H and I – Brake Cylinder and Brake Linkage Slack)

3.18.3.2 Note that difficulty pressurizing the air brake system could be due to a missing gasket in the “handshake” airline coupling. Replacing a missing or damaged gasket may correct this problem. (See Attachment J – Handshake Coupling)

3.18.3.3 If the air brake is faulty, the appropriate railroad or repair facility officials should be contacted and notified of the problem. The affected rail car should be “bad ordered” or marked to indicate the existence of the brake problem. Rail cars with faulty air brakes should not be loaded with cement.

3.19 Tops and sides of the rail cars should be inspected before any loading/unloading begins. Any hardened cement or other loose debris should be removed. Prior to removal of material the area around the rail cars should be barricaded.

3.20 Before unloading operations begin the rail car should be secured (i.e. chains, jacks, racks) to prevent the rail car from tipping over if it becomes unbalanced during unloading or loading. An imbalance may occur when both sides of the car are not vibrated or when the tracks are uneven. IF THIS OCCURS, THIS CONDITION IS EXTREMELY HAZARDOUS.

3.20.1 If using a whole car shaker, it should be resting on a support structure or on the ground when not in use to prevent employees from working under a suspended load. (See Attachment K – Example Rail Car Shaker Trapeze System)
3.21 When unloading rail cars, make sure pressure is off the coupling. This will keep the rail car weight fully on the tracks.

3.22 While using vibrators, the use of a positioning device (See Attachment L – Example of Vibrator Handling Device) will lessen the probability of sprains and strains. The use of hearing protection is strongly recommended if noise exposure is above 85 dBA. The use of double hearing protection is recommended when the noise levels exceed 105 dBA.

3.23 The car being unloaded should not be moved until the boot lift has been lowered, retracted as appropriate, securing devices and chocks removed, and the brakes have been release.

3.24 Railcars should be securely coupled before movement is attempted. The coupling mechanism below the knuckle should drop down when the coupling is achieved. Personnel should ensure that cars are securely coupled before final movement. (See Attachment M – Coupling Mechanism)

3.24.1 Personnel should ensure that the pin securing the heavy metal coupling is in place before attempting to set the coupling mechanism. Without the pin in place, the coupling could fall, causing serious injury. (See Attachment N – Coupling with Pin)

Cleaning Railcars

3.25 An example of a written policy concerning cleaning of rail cars before and after loading and unloading is available (See Attachment O – Rail Car Cleaning Policy). This policy will help ensure that hardened cement or any other material having the potential to dislodge during loading, unloading or movement of railcars has been removed.

3.26 In general, it is advisable to clean all cement residue from the tops and sides of all rail cars immediately before unloading, after loading, and prior to release of the car to railroad service.

3.27 If it becomes necessary to enter a railcar, then a Confined Space Entry Procedure should be followed.
4.0 OTHER PROCEDURES

4.1 It is advisable for personnel to complete a Job Safety Analysis for each location’s specific loading and unloading activities. Each location may have specific issues that may not have been addressed elsewhere in this Safety Information Advisory.

4.1.1 At a minimum, the JSA should cover such hazards as: falling tools and equipment; falling materials; exposure to dust, noise, heat; slips and falls; awkward body positions; unexpected car movement; imbalance risks during unloading; and frozen or bridged material in open topped rail cars.

4.1.2 In addition to the hazards covered in 5.1.1, pneumatic rail car JSA’s should also cover the hazards of pressurized lines and confined spaces.

4.1.3 Evaluate percent grade to determine maximum safe length and/or weight of car string and the manufacturer’s rated stopping and moving capacities of equipment used to move rail cars. Determine when and where to use derailers.

4.2 It is advisable for each facility to conduct personnel and area noise monitoring to determine employee noise exposures during the loading and unloading process. Engineering or administrative controls are suggested for employee noise level exposures above an 8-hour 90 dBA Time Weighted Average (TWA8) in order to meet the applicable MSHA and OSHA requirements. (See Attachment P – Sample Noise Control for Car Shakers)

4.2.1 It is recommended to implement a hearing conservation program (including baseline and annual hearing tests) where exposures exceed an 8-hour TWA of 85 dBA, in accordance with MSHA and OSHA requirements.

5.0 RECORDKEEPING

5.1 Consider maintaining a record that identifies rail cars received with cement build up that required cleaning.

5.2 Maintain any noise sampling data conducted during the car loading and unloading process or as specified by your company’s policy.

5.3 Maintain any Job Safety Analyses that have been conducted on the loading and unloading process for a minimum of one year or as specified by your company’s policy.

5.4 Maintain any training records for a minimum of two years or as specified by your company’s legal advice. The MSHA Part 46 requirement is a two-year retention period.
6.0 REFERENCES

6.1 Mine Safety and Health Administration On-The-Job Training Module Instruction Guide No. 42 Module No. 8 Operating and Handling Railroad Equipment, 1985. This document is available at the Portland Cement Association (PCA) Library (847) 966-6200 or through the MSHA website at www.msha.gov

6.2 Federal Railroad Administration website at www.fra.dot.gov

6.3 Association of American Railroads website at www.aar.org

7.0 ATTACHMENTS

Attachment A  Example Job Safety Analysis Form
Attachment B  Example of Guardrail Protection
Attachment C  Example of Rail Car Door Opening Devices
Attachment D  Example of Manufacturer Approved Front End Loader Modification
Attachment E  Example Daily Pre-Operational Checklist
Attachment F  Example Rail Car Brake Linkage
Attachment G  Example Brake Pads
Attachment H  Example Air Brake Cylinder Sleeve
Attachment I  Example of Slack in Brake Linkage
Attachment J  Example Airline “Handshake” Coupling
Attachment K  Example Rail Car Shaker Trapeze System
Attachment L  Example Vibrator Handling Device (This example was fabricated in-house)
Attachment M  Example Coupling Mechanism
Attachment N  Example Coupling with Pin
Attachment O  Example of Rail Car Cleaning Policy
Attachment P  Example of Noise Control for Rail Car Shaker

For More Information on the Information or Examples in this Document Contact Director of Regulatory Affairs at the American Portland Cement Alliance (APCA)
<table>
<thead>
<tr>
<th>JOB SAFETY ANALYSIS (JSA) TRAINING GUIDE</th>
<th>JOB &amp; DEPT:</th>
<th>DATE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE OF PERSON WHO DOES JOB:</td>
<td>SUPERVISOR:</td>
<td>ANALYSIS BY:</td>
</tr>
<tr>
<td>REQUIRED/RECOMMENDED PPE:</td>
<td></td>
<td>APPROVED BY:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEQUENCE OF BASIC JOB STEPS</th>
<th>POTENTIAL HAZARDS/INCIDENTS</th>
<th>RECOMMENDED SAFE JOB PROCEDURE</th>
</tr>
</thead>
</table>
The Job Safety Analysis (JSA) is an important incident prevention tool that works by identifying hazards and eliminating or minimizing them before the job is performed. The JSA can be used for: clarifying job procedures; as a guide in new employee safety orientation training, periodic refresher training, and refresher training for senior workers; as a refresher for infrequently run jobs; as an incident investigation tool; and for informing employees about specific job hazards and protective measures. Set priorities for developing JSAs: jobs that have produced many injuries; jobs that result in many incidents; jobs with a high potential for serious incident; and new jobs or operations that haven't been performed before.

**SEQUENCE OF BASIC JOB STEPS**

Break the job down into basic steps.

Each of the steps should accomplish some major task.

The task will consist of a set of movements. Look at the first set of movements used to perform a task, and then determine the next logical set of movements. For example, the job might be to move a box from a conveyor in the packaging area to a pallet. How does that break down into job steps? Picking up the box from the conveyor and carrying it to the pallet is one set of movements, and placing the box on the pallet is another set.

Be sure to list all the steps in a job. Some steps might not be performed each time, such as shrink wrapping a completed pallet load. However, the shrink wrapping task is a part of the overall job, and should be listed and analyzed as well.

**POTENTIAL HAZARDS/ACCIDENTS**

Identify the hazards associated with each of the steps listed. Examine each step to find and identify hazards, actions, conditions and accident possibilities.

Look at the entire work environment and try to identify every conceivable hazard that exists. For example, watching for forklift traffic when shrink wrapping.

List potential health hazards as well. For example, the harmful effect of inhaling glue over a long period of time.

List all potential hazards that may contribute to an accident, incident and injury/illness. It's important to distinguish between a hazard, an accident, and an injury because each of these terms has a specific meaning:

**HAZARD** - A potential danger. Oil on the floor is a hazard.

**ACCIDENT** – An unintended event that may result in injury, property loss or damage. Slipping on the oil on the floor is an accident.

**INJURY** - The result of an accident. A sprained back from the fall as a result of slipping on the oil.

You may find that it is easier to identify potential accidents first, and then work backwards to identify the potential hazards.

**RECOMMENDED SAFE JOB PROCEDURES**

Using the first two columns as a guide, decide what safe procedures are necessary to eliminate or minimize the hazards that could lead to an accident, injury or illness.

Some of the actions that can be taken to ensure safe procedures include:

1. Engineering the hazard out of the job
2. Rotating workers to reduce exposure times
3. Providing Personal Protective Equipment
4. Providing job instruction training
5. Maintaining good housekeeping
6. Implementing good ergonomics (positioning the worker in relationship to the machine or other elements in the environment in such a way to eliminate stresses and strains).

List recommended safe operating procedures on the form, and also list required or recommended personal protective equipment for each step of the job.

Be specific. Say exactly what needs to be done to correct the hazard, such as, "lift using your leg muscles". Avoid general statements like, "be careful".

Provide a recommended safe action or procedure for every hazard listed. If the hazard is a serious one, it should be corrected immediately.

The JSA should always be changed/updated to reflect any new conditions or changes in the job.
<table>
<thead>
<tr>
<th>SEQUENCE OF BASIC JOB STEPS</th>
<th>POTENTIAL HAZARDS/ACCIDENTS</th>
<th>RECOMMENDED SAFE JOB PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the die number.</td>
<td>1. Damage to die and to press if the wrong die is used.</td>
<td>1. Supervisor should recheck the die number before changing the die.</td>
</tr>
<tr>
<td>2. Move the die lift to the die bin.</td>
<td>2. (a) Injury to die setter: Struck by or caught between lift.</td>
<td>2. (a) Know the operation and controls of the lift, and stay clear of moving lift.</td>
</tr>
<tr>
<td></td>
<td>(b) Injury to another employee.</td>
<td>(b) Know the operation and controls of the lift, and clear out other employees from the area.</td>
</tr>
<tr>
<td></td>
<td>(c) Damage to property: Struck by lift.</td>
<td>(c) Know the operation and controls of the lift, and make certain that the path is clear of obstacles.</td>
</tr>
<tr>
<td>3. Remove the die from the bin</td>
<td>3. (a) Strain from transferring the die to the lift.</td>
<td>3. (a) Position lift against the bin, keep lift slightly lower than bin, and make certain that die can be removed by one person.</td>
</tr>
<tr>
<td></td>
<td>(b) Injury from a falling die.</td>
<td>(b) Same as item (a), and lock lift to prevent moving.</td>
</tr>
<tr>
<td>4. Move lift from the bin to the press.</td>
<td>4. Same as 2(a), 2(b), and 2(c).</td>
<td></td>
</tr>
<tr>
<td>5. Move die from the table to the press.</td>
<td>5. Injury to die setter.</td>
<td>4. Same as 2(a), 2(b), and 2(c).</td>
</tr>
<tr>
<td>6. Remove die from the press to the table.</td>
<td>6. Injury to die setter.</td>
<td>5. Position lift against press, keep lift slightly higher than press, and lock lift to prevent it from moving.</td>
</tr>
</tbody>
</table>
ATTACHMENT B
EXAMPLE OF GUARDRAIL PROTECTION
ATTACHMENT C
EXAMPLE RAILCAR DOOR OPENER DEVICES

This is an example of a Torque Multiplier device that is used to assist in the opening of railcar doors

Below is a pneumatic device used to open rail car doors
ATTACHMENT D
MANUFACTURER APPROVED FRONT END LOADER MODIFICATION
# OPERATOR DAILY CHECKLIST

**Unit Serial No.**______________________  **Shift**______________________________

**Machine Model**______________________  **Hour Meter Reading**_________________

**Date**______________________________  **Department**________________________

## CHECK

<table>
<thead>
<tr>
<th>CHECK</th>
<th>CONDITION</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRAKES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRAKE FLUID LEVEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAND BOX LEVEL (20 Mesh Sand)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OIL COUPLER PLUNGER (1 or 2 drops daily)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRAIN WATER FROM AIR RESERVOIR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAIL WHEEL RETAINING BOLTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYDRAULIC HOSES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGINE OIL LEVEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WATER and/or ANTI-FREEZE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRANSMISSION FLUID LEVEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Check before and after starting engine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYDRAULIC OIL LEVEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Check before and after starting engine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALTERNATOR CHARGING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALL OUTSIDE LIGHTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPERATION OF SANDERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALL CONTROLS FOR PROPER OPERATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSTRUMENT PANEL GAUGES/WARNING LIGHTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMPLETE MACHINE VISUAL CHECK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### REPAIRS NEEDED OR OTHER COMMENTS

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

Signature of Operator____________________________________________________________
ATTACHMENT F

EXAMPLE RAIL CAR BRAKE LINKAGE
ATTACHMENT G
EXAMPLE BRAKE PADS
The air brake cylinder sleeve should be fully extended.
ATTACHMENT I

EXAMPLE OF SLACK IN CHAIN LINKAGE

With the Air Brake Set, Slack May Develop in the Chain Linkage. Remove the Slack by Tightening the Brake Hand Wheel.
ATTACHMENT J

EXAMPLE OF AIRLINE “HANDSHAKE” COUPLING

Gasket is Missing from the Coupling.

Gasket has been Replaced in the Coupling.

Gasket should be inserted here.

Proper gasket placement.

Gasket has been Replaced in the Coupling.
ATTACHMENT K
EXAMPLE RAIL CAR SHAKER TRAPEZE SYSTEM
ATTACHMENT L
EXAMPLE VIBRATOR HANDLING DEVICE
(This device was fabricated in-house)
When the knuckles are coupled, the coupling mechanism below the knuckle will drop down.
EXAMPLE OF COUPLING WITH PIN

Pin holding knuckle in place.
ATTACHMENT O

SAMPLE COMPANY POLICY
RAIL CAR CLEANING

(Company Name) has adopted the following policy on cleaning rail cars:

1. The tops of all rail cars will be cleaned immediately after loading and prior to release.

2. Cars that are being prepared for loading will be cleaned prior to loading of cement.
   a. Cars that have been in service in other than (Company Name) service and require cleaning will be recorded and reported to the applicable railroad for reimbursement.
   b. Cars having been in (Company Name) service and require cleaning should be reported to the applicable (Company Name) department so that the responsible parties can be contacted and corrective action initiated.
Note the rubber lining on the grips to the rail car shaker. After the liners were added the noise level was reduced by approximately 14 dBA. Urethane liners have also been used and achieved a 6 dBA reduction and lasted three years.