# STOCKPILE AND SURGEPILE SAFETY

## MASHA Resources

Information for any of the following MASHA products may be obtained by contacting Jean Chadbourn at jeanchadbourn@masha.on.ca, or (705)474-7233 ext. 279.

### Stockpile Safety Guidelines

"This manual was produced at the request of MASHA's Aggregate Technical Advisory Committee. It covers all aspects of working safely around stockpiles of unconsolidated materials, including angle of repose, stockpile hazards, barriers and notices, laying out and building stockpiles, loading, operations on top of stockpiles, surge piles, dumping, sampling, emergency procedures and legislation."

Non-Members: $30.00
Members: $10.00

### Online

- MSHA
    - Avoid Dump-Point Hazards (Miner's Tip)
      http://www.msha.gov/accident%5Fprevention/tips/dumpshort.htm

      This is a concise reference on how to prevent accidents at dump-point sites.
    - Dump-Point Inspection Handbook
      http://www.msha.gov/readroom/handbook/ph01%2Di%2D6.pdf

      "This handbook provides guidance to assist inspectors in performing safety inspections of the conditions and practices at points where material is dumped from trucks."
    - Dump-Point Safety
      http://www.msha.gov/techsupp/techexchange/dumppoint/dumppointsafety.pdf

      Describes the types of accidents that can occur at dump-point sites, as well as those practices that should be observed when working around stockpiles.
    - Safe Dump-Point Procedures (Safety Ideas)
      http://www.msha.gov/Accident_Prevention/ideas/dumpshort.htm

      A brief guide to safe working methods at dump-point sites.

- Stockpile Safety: Poster
  http://www.msha.gov/webcasts/coalspring2004/posters/stockpile%20safety.pdf

  This printable poster lists a series of best practices for stockpile safety.

- Suggested Safety Measures for Operating Equipment on Surge Piles (MSHA Job Safety Tips)
  http://www.msha.gov/s%26hinfo/safety/hcard/surge.htm

  These "safety suggestions apply to surge piles where equipment, normally a dozer, operates directly on the stockpiled material, to push the material to the feeder openings."

- Surgepile Safety
  http://www.msha.gov/techsupp/techexchange/surgepile/surgepilesafety.pdf

  Provides information related to surge pile hazards, accidents, and best practices.

- Pennsylvania Department of Environmental Protection—Bureau of Deep Mine Safety

  - Stockpile and Surgepile Recommendations
    http://www.dep.state.pa.us/dep/deputate/minres/dms/guidelines/stockpiles.htm

    The recommendations in this guideline include: identification of feeder locations; identification of operating feeders; lighting; mobile equipment requirements; communication; cross-shift reporting; and task training.

**Journal Articles and Research Papers**

Camm, Thomas. 2000. *The Economics of Safety at Surface Mine Spoil Piles*. Spokane, WA: NIOSH, Spokane Research Laboratory, 15 p.

Also available at:
http://www.cdc.gov/niosh/mining/pubs/pdfs/ri9653.pdf#search='spoil%20pile%20and%20safety'

"This study was done to evaluate the costs of various dumping operations at waste and spoil piles."

Quinn, B.A., and A.C. Partridge. 1995. "Geotechnical factors contributing to stockpile slope stability." In *Adding Value to Our Resources – Our Future. Proceedings: AusIMM Annual Conference,* 91-98. Newcastle: AusIMM.

Ruff, Todd M., and Thomas P. Holden. 2003. "Preventing collisions involving surface mining equipment: a GPS approach." *Journal of Safety Research* 34 (2): 175-181.

"A final system was demonstrated using one off-highway haul truck, three smaller vehicles, and various stationary structures at a surface mining operation. The system successfully displayed the location of nearby vehicles and stationary structures and provided visual and audible warnings to the equipment operator when they were within a preset distance."

Sonmez, H., and R. Ulusay. 1999. "Modifications to the geological strength index (GSI) and their applicability to stability of slopes." *International Journal of Rock Mechanics and Mining Sciences* 36 (6): 743-760.

"Determination of the strength of closely jointed rock masses is difficult since the size of representative specimens is too large for laboratory testing. This difficulty can be overcome by using the Hoek–Brown failure criterion. Since its introduction in 1980, the criterion has been refined and expanded over the years, particularly due to some limitations in its application to poor quality rock masses. In the latest version, the geological strength index (GSI) was introduced into the criterion by its originators."

Tesarik, D.R., and R.W. McKibbin. 1999. *Material Properties Affecting the Stability of a 50-Year Old Rock Dump at an Active Mine*. Pittsburgh: Pittsburgh Research Laboratory, 22 p.

Also available at: http://www.cdc.gov/niosh/mining/pubs/pdfs/ri9651.pdf

"Material properties affecting slope stability were measured in a large 50-year-old, partially consolidated rock dump located in an active open-pit mine. Field tests included single-ring infiltration and density. In addition, a nuclear depth-moisture gauge was used to measure water content in six stainless-steel-cased drillholes on the crest and an upper bench of the rock dump. Precipitation, evaporation, wind speed and direction, and temperature data were collected at a weather station installed on the dump's crest. Laboratory tests included particle-size distribution, specific gravity, Atterberg limits, and water content. By measuring material properties of a rock dump presumed to be stable, the safety of miners working on or at the toe of old rock dumps constructed of similar material and located in a similar climate can be assessed."

Turin, Fred, et al. 2001. *Haulage Truck Dump Site Safety: An Examination of Reported Injuries*. Pittsburgh: Pittsburgh Research Laboratory, 29 p.

Also available at: http://www.cdc.gov/niosh/mining/pubs/pdfs/2001-124.pdf

In this information circular, serious injuries involving haulage trucks working at dump sites are examined for the period 1988 to 1997.

Ulusay, R, and H. Aksoy. 1994. "Assessment of the failure mechanism of a highwall slope under spoil pile loadings at a coal mine." *Engineering Geology* 38 (1): 117-134.

**"**The design of a highwall in coal mining involves the consideration of many factors. The evaluation of a lignite strip coal mine at Yatağan in Southwest Turkey has provided an opportunity to combine both qualitative and quantitative factors in highwall design. In this paper an attempt has been made to illustrate an instability problem that occurred in a highwall externally loaded by a spoil pile in the southern part of the pit."

Ulusay, R., Caglan, D., Arlkan, F., and M. Yoleri. 1996. "Characteristics of biplanar wedge spoil pile instabilities and methods to improve stability." *Canadian Geotechnical Journal* 33 (1): 58-59.

Also available at: http://pubs.nrc-cnrc.gc.ca/cgi-bin/rp/rp2_abst_e?cgj_t96-024_33_ns_yf_cgj1-96

"This paper outlines the results of field and laboratory investigations performed to describe the causes and mechanism of pile instabilities threatening production along the highwalls."

**Other**

MSHA. 2001. *Stockpiling Safety.* Beaver, WV: National Mine and Safety Academy, 54 p.

"Deals with the safe operation of mobile equipment on and around stockpiles. Discusses the hazards associated with stockpiles and reviews the procedures that can be used to minimize the occurrence of accidents."