ROAD MAINTENANCE CRITERIA

Regardless of how meticulously a haulage road is planned and constructed, its surface is bound to be deformed by the constant pounding of haulage vehicles. Although deterioration may be controlled to a great extent by the type of surface material employed, the mine operator must still regard a road maintenance schedule as necessary to safety and economics.

Dust, potholes, ruts, depressions, bumps, and other poor surface conditions can and will occur on any road surface. If left uncorrected, they may impede vehicular control and damage haulage machinery.

When a rolling tire encounters a surface scar, there is a tendency to deflect from its normal direction of travel. Thus, the driver is forced to compensate for the abnormality by increasing his steering effort. If surface deformation is too great or if the driver is not aware of it before impact, complete loss of control may result. Often, even though the driver is able to negotiate a surface irregularity by steering, the tendency to overcompensate immediately after the danger has passed could again result in loss of control.

In addition to degrading safety, road deterioration can be costly from a maintenance standpoint. Although surface mining equipment is designed to accept considerable abuse, its life can be increased if rough handling is kept to a minimum. The wear on virtually every component is increased significantly when a vehicle travels rapidly over a rough surface. If the vehicle must constantly brake to negotiate poor areas, unnecessary lining wear occurs as well.

When machinery must operate in dusty areas, the maintenance problems are compounded. Dust may infiltrate brakes, air filters, hydraulic lifts, and other critical components. The abrasive effect of this fine material is apt to result in frequent and costly cleaning or replacement of these items.

Essentially, the items related to deterioration of road surfaces are weather, haulage vehicles consistently following a similar path in the haulage lane, and spillage. Because these factors are definable, road maintenance should begin with an intensive effort to incorporate preventive rather than corrective procedures.

Roadside ditches and culverts should be periodically inspected and cleaned to insure that no obstructions are present. If not cleared, the drainage facilities may overflow in wet weather and cause erosion of the road surface or saturation of subbase materials. Maintenance crews equipped with hand tools or machinery such as dozers, loaders, and scrapers should be deployed at predetermined intervals to see that all ditch flow lines are free of debris.

If heavy haulage vehicles continue to use the same path in their respective haulage lanes, the concentration of load will eventually create ruts or furrows. To prevent this condition, mine operators should encourage drivers to use different areas of the haulage lane.

Spillage of material from overloaded haulage vehicles is a significant problem at many mines. If spillage is not prevented or if the material is allowed to remain on the haulage route, unnecessary bumps or mounds will exist. Therefore, every effort must be made at the loading point to prevent equipment from being heaped beyond the limit that can be held within the containing vessel.

During periods of dry weather, or in consistently dry environments, dust may become a problem, especially on gravel or crushed stone surfaces. To alleviate this situation, water trucks fitted with special sprinkler systems should be employed. If dust problems are severe, the operator should consider applying chemical additives. The incorporation of chloride salts with gravel or crushed stone surfaces will enhance moisture retention and eliminate the need for frequent road wetting.

Adherence to the preventive measures discussed can significantly reduce haulage road maintenance problems. However, they are not a complete solution. Abnormal surface conditions will occur periodically that require additional road maintenance procedures.

On more permanent surfaces such as asphaltic concrete, surface depressions should be corrected with asphaltic patches and either hand-tamped or rolled into place. When severe depressions occur on well-packed gravel surfaces, the surrounding area should be scarified, filled, and recompacted to an even consistency.

A motor grader should be used continually to maintain cross slopes, remove spills, and to fill and smooth surface depressions as they occur. Whenever the motor grader is used, care must be taken to avoid pushing waste into drainage facilities and the protective faces of safety berms. Accumulated material from the procedure should be removed to specially designated areas.

Ice and snow, whenever they occur, must be completely removed from the haulageway using a motor grader or other appropriate equipment. Special attention to the removal of snow and ice is required on asphaltic concrete and other smooth surfaces. The close-knit texture of these materials make them susceptible to rapid glazing in freezing weather. Consequently, they become slick and a definite hazard to vehicle controllability. Measures such as salting or cindering must be implemented immediately under these conditions.

All areas where loose material is employed to increase rolling resistance and vehicle retardation (escape lanes, median berms) should be periodically checked for loose consistency. If these areas become compacted, a bulldozer equipped with scarifying equipment should be used to break the surface.

VEHICLE MAINTENANCE CRITERIA

Mine haulage costs often represent up to 50% of total mining costs and sometimes as much as 25% of the overall operating, overhead, and other costs