Examining an unstable stream bank

III. Land Resources

III-a. Soil Characteristics

The entire lower reach of NMR bordered by Squirrel Hill, Commercial Avenue, Swisshelm Park, and the Monongahela River is complicated by the dumping of steel mill slag. The upper reaches are typically defined as a shale soil.

III-a1. Geology of the Nine Mile Run Area

The rock and soil materials observed at the NMR slag study area fall into four major categories and formation time periods. The oldest features are the nearly horizontal beds of sedimentary rocks deposited about 300 million years ago, followed by abandoned river channel deposits of sand and gravel with an age of about 100,000 years. After a period of erosion, following the major ice ages (about 10,000 years ago) NMR has been depositing clay, sand, and gravel in its floodplain up to the present time. Starting in 1923, and ending in the 1970s, a large volume of steelmaking slag was dumped in the NRM valley.

The bedrock in the NMR area consists of nearly horizontal beds (or layers) of **shale**, sandstone, claystone, limestone, and coal. These strata were deposited in an environment that was very different from that of present. Continental drift processes have changed the local climate from tropical, during the Pennsylvanian Period of geological history (300 million years ago), to more temperate at the present time. Pittsburgh is now positioned about 40 degrees north latitude, but was only two to five degrees north latitude during the Pennsylvanian Period. The fossil record in the sedimentary rocks indicate a near-shore river delta environment with a hot, steamy, tropical climate. The resulting plant material from the vast swamps resulted in thick coal beds that contributed to the development of the steel industry in Pittsburgh. The sandstone layers represent meandering river channels, and the shales were once delta and tidal muds. An occasional thin limestone bed, some with abundant marine fossils, was deposited when the sea covered the deltas.

After these sedimentary rocks were deposited and hardened there was a long period of erosion. About 100,000 years ago, when some of the topographic features of the area were starting to form, there was a major glacial ice advance from the north. These ice sheets dammed the northward flowing Monongahela River and the water ponded in the Pittsburgh area, resulting in valley sand and gravel deposits. These flat areas can still be seen at about 920 ft elevation.

During the last 10,000 years before the present time, NMR has cut and eroded its valley from 920 ft elevation down to 720 ft, which is the present level of the Monongahela River. During the erosion process, much floodplain material has been deposited, consisting of mud, sand, gravel, and boulders.

Starting in 1923, steelmaking slag was dumped in the NMR valley floodplain. Enough material was dumped to fill the entire lower floodplain area and to alter the course of the stream.

shale: rock formed in layers by consolidated clay, mud, or silt that can be easily split apart

Addendum on slag:
According to the (November 1996) Phase II Environmental Site Assessment conducted by Groundwater Technology for the Urban Redevelopment Agency (p. 33):

> 1. The test drilling program confirms that the slag area is of relatively uniform composition without significant amounts of extraneous material. There is some construction/demolition debris and possibly some clearing and **grubbing** material on the northwest side of the site. There was no evidence of deleterious industrial wastes.
> 2. The slag contains elevated but non-leachable concentrations of chromium derived from refractory brick. The concentrations are typical of carbon steel slags and do not represent an environmental concern. The slag pH is typically alkaline with pH values in excess of 11. Although the total chromium in the slag exceeds the December 1993 DER Cleanup Standard, it should not represent an environmental limitation of the site. The standard is based on long-term ingestion by a child. It is assumed that the final residential landscaping of the site will require the placement of a soil cover over the slag to allow for the development of vegetation. This will limit any ingestion potential.

Note: A subsequent report has been commissioned by the URA at the request of various community groups. Summary of Environmental Resources Management, Review of the Environmental Investigatio Conducted at the Nine Mile Run Site:

> Environmental Resources Management (ERM) completed a review of the environmental investigation conducted at the NMR site. They concluded that no environmental issues that would halt residential development of the site have been identified in the preliminary investigations completed to date. However, ERM believes additional studies are required prior to finalization and implementation of the residential development plans.

Community Input

Various reports on the development are available in area libraries.

- Phase I Environmental Site Assessment of Ninemile Run Slag Area. Prepared for the Urban Redevelopment Authority of Pittsburgh. (January 1996).
-Phase II Environmental Site Assessment, Ninemile Run Slag Area, Pittsburgh, Pennsylvania. Prepared for the Urban Redevelopment Authority of Pittsburgh. (November 1996).
-Urban Redevelopment Authority of Pittsburgh, Report on Clean-Up Plan for Ninemile Run Slag Area, City of Pittsburgh, Allegheny County, PA (June 1997).
-Environmental Resources Management, Review of the Environmental Investigation Conducted at the Nine Mile Run Site (1998).

Peggy Charny suggested we need to look at the slag pile in a more positive way. Assuming it is safe, the slag pile can be used as an education resource. There is already some new vegetative growth near the Parkway and the site can be used for people to gain an appreciation of successional growth. The slag is evolving if you pay close attention.

III-a2. Discussion of Slag as a Growing Medium

Since our focus is the creation of public space and the health of NMR, we will confine our discussion of slag to the subject of revegetation, but acknowledge the various studies which are available on the viability of slag to support construction.[1] The most important feature of slag at NMR is that it is not toxic to plants (phytotoxic). Slag's utility as a growing medium can be expanded by identifying and ameliorating some of its inherent limitations as a growing medium and some limitations related to the setting of slag. Inherent limitations of slag can be divided into physical, chemical, and biological components. These limitations, as well as slag assets as a growing medium and opportunities for improvement, are discussed below.

Physical limitations of the slag as a growing medium include:

- Coarse texture and associated low water holding capacity.

grubbing: the digging up or clearing of roots and stumps

Unvegetated slag slope meets a vegetated slag slope. Same exposure, same angle of repose, different grain size. More construction debris on the right slope.

- Dark colored slag absorbs excessive heat in direct sunlight, dehydrating seedlings before they become established.
- Fused (cemented) slag makes a poor seedbed, is difficult for roots to penetrate, and it is difficult to amend (mix with soil amendments)

Chemical limitations include:

- High pH (typically pH 9-10 before weathering) and associated low nutrient (e.g., phosphorus, iron, manganese, copper, zinc) solubility, and tendency for **ammoniacal** form of nitrogen to **volatilize**.
- Lack of plant-available nitrogen (ammonium, nitrate).

Biological limitations include:

- Shortage of seed source (low production except at site fringe and robust pockets of vegetation).
- Shortage of soil enzymes that facilitate nutrient cycling.

Limitations of the site setting include:

- High wind and sun exposure of large expanses of unvegetated surface. Winds dry out and "sand blast" seedlings.
- Lack of mulch from on-site plant production.

Assets of the slag as a growing medium include:

- High porosity permits excellent air exchange and deep rooting.
- Plants can potentially intercept adequate amounts of water by rooting deeply into slag; this compensates for the poor plant-available water storage of slag.
- Slag weathers to a stable pH between 7 and 8.3.

Opportunities to improve the performance of slag as a growing medium abound. The strategy for successful revegetation of slag consists of the following:

- Improve nutrient availability. Add manure, compost, biosolids, and/or fertilizers. A veneer of organic amendments or soil over slag will perform as well (and sometimes better than) amendments mixed into slag.
- Provide a sheltered seedbed with adequate improved water availability by mulching with compost, straw/hay, and/or manure. These amendments will help sustain seedlings as they germinate and root into the underlying soil, and will provide sources of soil microbes and enzymes.
- Seed/plant fast-growing species that will quickly cover the surface, produce mulch in-situ, and break the wind at ground surface.
- Seed/plant deep-rooting species, including **leguminous** species: plants in the pea family (Fabaceae or Leguminosae), many of which have the capacity to fix nitrogen.
- Build or plant windbreaks (snow fence, earthen windrows, planted or seeded woody plant hedgerows) to reduce wind stress on downwind plants.

It is important to note that, depending on available resources and the level of landscaping intensity, the above measures can be used to

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ammoniacal: having properties of ammonia

volatilize: to facilitate the change of a substance into a vapor

leguminous species: plants in the pea family (Fabaceae or Leguminosae) many of which have the capacity to fix nitrogen

improve the growth of plants on slag with or without the use of imported cover soil. Use of cover soil will generally improve the speed of establishment and diversity of plants established in the long run. Use of soil will also tend to increase surface water runoff and decrease, but not eliminate, percolation of water through slag. Even with thick soil cover, it is reasonable to expect that about one third of annual precipitation will percolate into and through the slag.

III-b. Ownership

The vast majority of the land in this watershed is privately owned, on a parcel by parcel basis. Public ownership ranges from 0 up to 5% of the parcels. However, there are two significant portions of public ownership: Frick Park and the development site for Summerset at Frick Park (currently the Nine Mile Run slag dump) which account for approximately 700 acres or 15% of the land area.

III-c. Critical Areas

The critical land areas in the NMR watershed can be defined as either areas with habitat value, areas with infiltration or detention potential for surface water, and land areas which are broad, flat, and accessible enough to qualify for playing fields.

III-c1. Habitat Value

Lands with habitat value can be found throughout the watershed. There are upper watershed valleys with remnant creeks and relatively diverse urban vegetation, although they are often islands cut off from contact with any larger, more functional ecosystem. The area with the largest habitat value is in the lower watershed. Frick Park has the largest interior forest in the watershed, with a total of 87 acres, plus a supporting 368.5 acres of upland forest, and about 11 acres of wetland/floodplain (See section V-d). The NMR slag site is a 240-acre site of which 158 acres are upland forest and 0.1 acre is interior forest. The habitat value of these contiguous properties are not fully realized, however, until we consider the relative value of connecting these two urban habitats to the greater riparian corridor of the Monongahela River. Industrial development on the north shore of the Monongahela was spotty, with remnant patches of secondary growth beginning to link with dormant brownfield properties, knitting the riparian edge back together again. This provides a significant source of biological diversity in both plant and wildlife. Since the NMR slag site is the link between the Monongahela and Frick Park, it is important to give careful consideration to habitat value and ecosystem function during its assessment and design phases.

Note: The planned Mon-Fayette Expressway for the north shore will have a detrimental affect on this ecosystem connection.

III-c2. Land with Infiltration or Surface Detention Potential

One of the challenges of an urban watershed is that so much of the land has been filled, asphalted, and covered with houses that the water which once soaked slowly into the ground now forms sheets in the streets, disappearing down storm sewers. This develops raging torrents in the stream in the lower watershed. Because of these conditions, it is impor-

Community Input

Bob Hurley suggested that the Conservation Plan should take a harder look at recreational uses. We need to plan for active uses such as bicycles and soccer. (There are not enough fields in Pittsburgh.)

This is important for the strategy of keeping young people in the city.

If the plan identifies a need to take away one field to expand the wetland, the plan should be to replace it (somewhere in the city or region, if not in the valley). He said that the area is a regional park.

Peggy Charny reminded the table that there is a flat spot near the radio towers—on the Swisshelm Park side.

Lois Liberman suggested we look at baseball fields/schools.

Bob Hurley replied that size and demand prevent the schools from having much effect on the issue.

Elizabeth Barrow suggested that the report should include the specific recommendation that any recreational use taken away needs to be replaced. The table concurred.

tant to identify and protect open space in the upper watershed.
It is also important to reconsider building codes for large parking lots to insure detention and infiltration whenever possible.

III-c3. Broad Flat Lands for Playing Fields

Section VII outlines the need for organized sports use of Frick Park. It is important to recognize this need, as well as the land forms that are likely to provide the most affordable means to realize this goal. The NMR slag site and its steep slopes and single field may not be ideal for playing fields and their attendant parking needs; the single site worth considering is only three acres without parking.

III-d. Landfills

The entire lower reach of the NMR floodplain bordered by Squirrel Hill, Commercial Avenue, Swisshelm Park, and the Monongahela River has been filled by the dumping of steel mill slag. NMR still flows between the piles with typical slopes of 1.5-1. The slag dump covers 238 acres consisting of steel making by-products dumped randomly on either side of the banks of NMR. These dump sites are up to 100 feet in height with less material on the Swisshelm Park side and additional isolated piles on the Squirrel Hill side of 30 feet or more.

III-e. Hazard Areas

III-e1. Waste Sites

There are no DEP identified waste sites existing in this region.

III-e2. Abandoned Mines and Quarries

Abandoned mines and quarries are identified on
Map III-e2