



- EXPLANATION**
- ARTIFICIAL FILL—Triangles identify known solid-waste landfills. Other fills might also contain solid waste. All contain more or less common earth material. Engineers' embankments, highway, railroad grades, ditch banks, and earthen dams are omitted.
 - 1 Arapahoe County sanitary landfill
 - 2 Mile H sanitary landfill
 - 3 Arapahoe Bay Dump
 - 4 Lowry Bombing Range landfill
 - 5 Rooney Road sanitary landfill
 - 6 Layden Road sanitary landfill
 - 7 Property Improvement sanitary landfill
 - 8 Landfill Incorporated
 - 9 Urban Waste Resources sanitary landfill

Discussion

Most landfills in the Greater Denver Area, Co. have been operated with the dual purpose of land reclamation and solid-waste disposal. Some such fills consist almost entirely of common earth material, "fill dirt," but most of them contain varied amounts of solid-waste material, and some consist almost entirely of solid waste beneath a thin covering of earth or soil. The purpose of this map is to show at a synoptic scale the locations of known solid-waste disposal sites, landfills, and miscellaneous artificial fills of negligible size in the Greater Denver Area and to thus help the community to better cope with problems that might arise from the sequential use of filled lands. Engineers' embankments such as highway and railroad grades and earthen dams are excluded, because they are free of the problems generated by landfills and they seldom are subject to sequential use, although they are shown on most detailed surficial geologic quadrangle maps of the area published by the U.S. Geological Survey. Quite a few old landfills undoubtedly have been overlooked because of difficulties in locating and identifying old fill deposits in built-up areas.

Nowadays, most large landfills are being operated with three main objectives: (1) to cover the solid waste daily with soil to discourage the proliferation of vermin, control wind scatter, and minimize offensive odors and visual blight; (2) to confine the liquid-waste byproducts or leachates to the landfill site; and (3) to provide a land surface suitable for alternate sequential use after completion of the fill (Hansen, 1976, p. 24; 1977, p. 45). Much high-value real estate in the Greater Denver Area has been developed on old landfills, including major shopping centers, municipal facilities, warehouses, light industries, sports arenas, and parks.

Some environmental problems have arisen as a result of past waste-disposal practices. A first step toward forestalling or mitigating such problems is to identify and map the old fills so that land users and planners can learn where they are and what remedial measures are needed. Foremost of these problems are the contamination of water resources and the generation of noxious chemicals and explosive or poisonous gases. In addition, gradual decomposition and compaction of fill material may cause slow differential settlement of the landfill and possible damage to structures built thereon.

Incineration of solid waste was discontinued in the region following passage of the National Environmental Policy Act of 1969. Since that time urban solid waste landfills in the Greater Denver Area have consisted chiefly of combustible and biodegradable cellulose products, including waste paper (newsprint, magazines, grocery bags, cardboard cartons), yard trimmings, grass cuttings, wood and tree limbs, garbage, rags, and so forth. Many older landfills also contain large proportions of these products. In the area served by the Denver Regional Council of Governments, 80 percent of the solid waste now being generated is estimated to consist of organic materials (Ralph H. Parsons Company, 1976, p. 7-26). Such materials have commonly been dumped into any convenient hollow in the ground, particularly into old worked-out gravel pits that often extended down to or below the water table. Such fills, therefore, are more or less continuously saturated.

The interaction of these and other waste materials with water generates leachates and gases that may be harmful to the adjacent environment. In Denver's semiarid climate, many landfills produce little if any leachate or gas, but fills that are in contact with natural or artificial sources of water, such as surface runoff or ground water, can cause problems. The accompanying map does not differentiate wet from dry landfills, but most fills in low-lying areas are wet most of the time, and some are constantly saturated.

In an aerobic environment one of the more common reactions is the production of carbon dioxide from the breakdown of cellulose. In the presence of water, the carbon dioxide produces carbonic acid, which further reacts with other components of the fill, such as various metals and calcareous constituents, raises the hardness of the water, and greatly increases the content of dissolved solids. Where decomposition is caused by bacterial action, the resulting leachate has a high biochemical oxygen demand, often higher than raw sewage (Schneider, 1970, p. 74). Organic material such as cellulose or garbage decomposing under anaerobic conditions generates methane, carbon dioxide, ammonia, and (or) hydrogen sulfide (Thomas and Schneider, 1976, p. 28). Ignition of landfill gases, especially methane, can cause dangerous explosions. Some communities have installed piezometers into landfills to detect any buildup of hydraulic pressure and have installed detection wells to monitor gas generation (McCollough and Pacey, 1971, p. 55).

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SCALE 1:100,000

CONTOUR INTERVAL, 100 FEET
ADDED CURVES, SURVEYED ADJUST CONTOURS
10-11 IN 1000 FEET LEVEL

LEGEND

- Dissected heavy duty highway
- Secondary highway
- Street and other paved roads
- Light duty road
- Unimproved dirt road
- Railroad
- Utility station
- Canal
- County boundary
- Municipal boundary
- Topographic line
- Contour, water, and recreation area
- Airport and other public areas
- Feature of primary importance
- Area subject to modification
- Wetland

SECTIONED TOWNSHIP

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40

POPULATION KEY

DENVER	more than 1,000,000
AURORA	600,000 to 999,999
ENGLEWOOD	100,000 to 599,999
Golden	5,000 to 99,999
Box Elder	500 to 4,999
Palmer	500 to 4,999
Wentworth	500 to 4,999

POPULATION BY TOWNSHIP

REVISIONS

1 1978

2 1979

3 1979

4 1979

5 1979

6 1979

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10 1979

11 1979

12 1979

13 1979

14 1979

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MAP SHOWING ARTIFICIAL FILLS IN THE GREATER DENVER AREA, COLORADO EXCLUSIVE OF ENGINEERED EMBANKMENTS

By
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1978