

environmental sciences

Gathered at the 5th International Conference on Water Pollution in San Francisco

PETROLEUM WASTES

Disposal on land

Oil industry wastes, including petroleum sludges, pose a serious disposal problem. If dumped into waterways, they cause pollution; spreading them out on land upsets conservationists and sometimes results in eventual water pollution from seepage.

But the latter approach, if conducted carefully, can be nearly harmless ecologically, reports a Federal Water Quality Administration team headed by Dr. George K. Dotson.

In experiments, the team discovered that heavy applications of crude oil to coarse, porous or shallow soil would result in eventual water pollution. Deep, firm-textured clay or silt, on the other hand, retained repeated applications of five-inch layers of sludge.

The team also discovered that soil is eventually benefited for crop production. Petroleum fractions are harmful to plant life, but after they are broken down by more than 100 species of bacteria and fungi, they release valuable organic materials. Soil is also improved in nitrogen content, porosity and moisture-holding capacity, the group says.

WATER POLLUTION

Cattle and groundwater

Liquid runoff from the rapidly growing cattle feeding industry in the Texas Panhandle may seriously contaminate the Ogallala Water Table, the only water source for the Panhandle's plains, says a group of researchers from Texas Tech University headed by Dr. Donald M. Wells.

A typical cattle-feeding operation in the area contains 30,000 head of cattle on 400 to 500 acres of land. The daily liquid runoff from their body wastes is nearly half a ton per acre; the wastes have already seeped into a lake and may soon pollute the groundwater, the researchers say. After four years of experiments, they state that economically feasible sewage treatment processes are not in sight.

The solid wastes dehydrate quickly in the semi-arid climate, but the residues remain to be carried into the soil by spring and fall rains. Varying the cattle feed does not help, and removing solids for composting is too expensive. Using liquid runoff as fertilizer is not practical because commercial fertilizers are cheaper.

The team suggested the cattle-feeding industry would probably continue to grow until the entire production of grain sorghum is utilized for feed, its most economic use; the pollution problem will grow proportionately, perhaps to double its present level.

THERMAL EFFECTS

Damage claimed to be minimal

The controversy over hot water from power plants grows more heated (SN: 8/1, p. 98). A British biologist, Dr. R. S. Beauchamp of England's Central Electricity

Generating Board, says conservationists have much exaggerated the harmful effects.

According to him, the heating of water, in England at least, actually improves the quality and quantity of aquatic life. He says current limits on effluent temperatures—25 degrees C. in small rivers and 30 degrees in large rivers and estuaries—may be too low; carp, he says, tolerate temperatures of up to 33 degrees C. and perch 32 degrees.

He concedes, however, that trout and salmon are more sensitive to heat. Also, he says, some smaller and slower fish are unable to avoid spurts of heat from generating plants that fluctuate in power output, and thus they are damaged. He insists, however, that such effects are minimal and that fish of all varieties are found in above average numbers in warmer water up to 26 degrees C.

SEWAGE SLUDGE

Treatment for animal feed

Activated sludge is left over after secondary treatment of sewage. The sludge is a residue of cellular material in a gel-like mass composed of microbes that digest sewage, as well as other matter, in the secondary process. Disposal costs are high since oxidizing, settling or filtering the sludge is difficult.

Dr. R. B. Dean of the Federal Water Quality Administration and Dr. R. K. Bouthilet of the meat-packing firm Foster D. Snell, Inc. believe they have found a way to manufacture animal feed from the sludge.

The process involves heating the sludge with sulfur dioxide, a common food processing technique called sulfur dioxide hydrolysis. The SO₂ breaks up large molecules and cellular debris. Filtering the mixture removes leftover solids for disposal and leaves soluble amino acids and polysaccharides which can be concentrated into an organic, molasses-like substance. This substance has proved to be an adequate substitute for cane molasses and cornstarch in animal feed. Dr. Bouthilet estimates it could be sold for \$40 to \$100 per ton.

SEWAGE TREATMENT

Tertiary treatment improved

Conventional tertiary treatment of sewage with activated carbon absorption removes soluble matter having a molecular weight of 400 or less. This leaves about five parts per million of higher-molecular-weight substances in the leftover water, making it not quite fit to drink.

Drs. A. R. Molof of New York University and M. M. Suckerman of Ecolotech Research, Inc. of New York City report that a two-part hydrolysis-absorption process reduces organics to two parts per million, about the level of New York City drinking water.

In the process, heavier protein and carbohydrate molecules are hydrolyzed with lime and broken down into simpler and lighter substances that can then be absorbed easily with the activated carbon. The process is actually cheaper than conventional tertiary treatment, says Dr. Molof.