Phosphogypsum has potential uses in industry, particularly in construction materials (gypsum), and as an additive in cement and concrete blocks (Eisenbud and Gesell, 1994). It is particularly useful as a supplement to supply Ca and S to nutrient impoverished soils, or to soils with low exchange capacities (Guidry et al., 1990). The Ca and S from phosphogypsum is more readily soluble, and are released more quickly to the crops than is the calcium from limestone or dolomite additions, or via elemental sulfur. Over time, the Ca-gypsum has potential uses in industry; particularly in construction materials (drywall), and as an additive in concrete and concrete blocks. (However, as the Israeli PG contains radioactivity, it cannot be used in food products or in contact with food products.) Phosphogypsum has even been used as a feed supplement for cattle and pigs (Golushko, 1982). Potential ways that the radioactivity of the PG stacks might adversely affect the environment 

The stacks are far removed from the population concentrations, thus the release of radionuclides emanations poses a much smaller health risk at present.

Radionuclides transferred to plants and forage do not cause radiological or chemical harm. Uranium and daughters added to soils do not present radiological hazards.

Phosphogypsum residue rich in the various daughter radionuclides being blown off from the stacks and distributed by the winds which could further add to the internal dose rate.

Gamma-radiation is another environmental hazard, but this is a more minor concern. When the radionuclides decay, their energy is converted to heat energy, which is released into the atmosphere. This energy is dispersed over time, and becomes less of a concern.

The stacks, containing the radioactivity, are stored at two places. In the Negev desert, 36 piles, or stacks, are currently situated near the Dead Sea and two are near Kibbutz Yadayeh, which are the closest to the residences for long periods of time. Likewise, the fission products may be ingested, which could further add to the internal dose rate.

The most important pathway from PG stacks to humans may be via their consumption of contaminated plants. The potential for radiocarbon releases from the stacks, particularly U, Pb, and radium, and the plants is the monitoring of the radionuclides transferred to the plants and forage. Therefore, monitoring of radionuclides transferred to the plants and forage is an important step in the reduction of exposure to PG. Radium within phosphogypsum is transferred to plants and forage in the following manner: 

The current practices of phosphogypsum storage in Israel are not hazardous to population centers. Radionuclides transferred to plants and forage do not cause radiological or chemical harm.

Uranium and daughters added to soils do not present radiological hazards. 

The practice of storing PG as a waste by-product is expensive. An economic alternative may be extracting the U from the PG before storing it. This could be done by leaching the PG with water to remove the radionuclides, using a suitable chemical to remove the radionuclides, and then reusing the PG as a material. This would provide a new use for the PG and reduce the costs of storing it.

Conclusions:

- Uranium and daughters added to soils do not present radiological hazards.
- Radioisotopes transferred to plants and forage do not cause radiological or chemical harm.
- PG stacks in Haifa Bay region are not hazardous to population centers.
- PG storage is expensive. An economic alternative may be extracting the U from the PG before storing it. This would allow U to be used for fuel, and the PG to be used in agriculture and building materials.
- Radio-metal leakage from stacks can be prevented by controlling groundwater by natural changes in pH, redox, and bromide: (a) waste formation that sequesters radium.

Potential pathways that the radioactivity of the PG stacks might adversely affect the environment

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The practice of storing PG as a waste by-product is expensive. An economic alternative may be extracting the U from the PG before storing it. This could be done by leaching the PG with water to remove the radionuclides, using a suitable chemical to remove the radionuclides, and then reusing the PG as a material. This would provide a new use for the PG and reduce the costs of storing it.

Conclusions:

- Uranium and daughters added to soils do not present radiological hazards.
- Radioisotopes transferred to plants and forage do not cause radiological or chemical harm.
- PG stacks in Haifa Bay region are not hazardous to population centers.
- PG storage is expensive. An economic alternative may be extracting the U from the fertilizers. This would allow U to be used for fuel, and the PG to be used in agriculture and building materials.
- Radio-metal leakage from stacks can be prevented by controlling groundwater by natural changes in pH, redox, and bromide: (a) waste formation that sequesters radium.