

Navajo Vats

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Harry Allen, Ph.D., Environmental Scientist / ERT: Back in the 1930's, the Bureau of Indian affairs recommended that the Navajo nation treat their sheep and cattle for ticks and other parasites in concrete dip tanks, commonly called sheep dip tanks. The vats were about 2 feet wide and 4 feet deep and 30 to 50 feet long and the animals were driven through the tanks and allowed to drip off at the other end. This was a way of controlling these parasites

Narrator: The technique worked and was common practice until about 1986 when the EPA banned the use of toxaphene, an effective agent against ticks. The problem is that there are now some 250 pits, or sites where the insecticide was left to sink into the ground.

Diana Malone, Program Director, Navajo Superfund Program: The problem probably started when toxaphene was banned in 1986. In 1987 there was a Navajo individual that did some studies at the dip vat site and found that the dip vats are pretty contaminated at a high level with toxaphene, and since then it became uh, a big issue.

Harry Allen, Ph.D., Environmental Scientist / ERT: Roughly 20,000 gallons of this toxaphene solution were placed into the tank and the animals were driven through. Every day that uh tank was emptied and uh, refilled. And the toxaphene con-, uh contaminated liquid was pumped out of the tanks and onto the ground, usually into a pit, uh, sometimes into a ditch. But uh as a result since the material does not degrade very well under the conditions of dryness that you have out here, the toxaphene lay in the ground for many, many years.

Narrator: Acting on the problem, the Navajo Superfund office contacted the U.S. EPA's Region IX. Having had experience with similar soil treatment studies, Region IV contacted the Environmental Response Team, and together they settled on an approach.

Robert Mandel, On Scene Coordinator, US EPA Region IX: Well in terms of looking at the, at the types of sites and the problems, uh, we decided to get the ERT involved early on because they could provide uh, a lot of assistance to us in terms of the treatability studies and they could also help design uh systems that would be appropriate for use at the Navajo Nation.

Harry Allen, Ph.D., Environmental Scientist / ERT: We had heard that bioremediation, using bacteria to degrade this toxaphene in the soil was an effective way of dealing with this uh, this problem. So we embarked on a, laboratory scale studies which would demonstrate toxaphene degradation. We believe the results of our toxaphene degradation laboratory work gave us enough

of a positive chance of success, that we decided to come out and begin this fieldwork.

Narrator: Two sites were chosen for the field experiment; Nazleny and Whippoorwill. Because of the remote location of the sites spread throughout the reservation, the treatment solution needed to be one which did not require a lot of special equipment or manpower. One practical advantage of bioremediation is that the bacteria does all the work as long as the proper conditions exist.

Harry Allen, Ph.D., Environmental Scientist / ERT: The toxaphene pesticide that we're dealing with is a chlorinated camphor material. Uh, researchers have found that, that in order to degrade a chlorinated material, the first step necessary is to de-chlorinate it. And uh, that's best, that best takes place under anaerobic conditions, which is bacteria acting without oxygen present.

Narrator: To facilitate the test pits were dug in the nearby soil to accommodate 4 large plastic tanks. Two of the tanks were controls for the experiments where no amendments to the contaminated soil would be added. The remaining 2 tanks hold a mixture of the contaminated soil and 10% by weight of manure, [blood meal], and limestone. The addition of these fertilizers increases biological activity which quickly consumes any oxygen present. To further limit the amount of oxygen and to enhance the anaerobic conditions, water is added until the level is 3 to 6 inches above the soil. Water will also be added to the control tanks. In lab tests toxaphene was degraded by up to 80% using this anaerobic method. For a

period of 3 months the mixture will be left to ferment. In that time sampling will be the only site activity performed.

Harry Allen, Ph.D., Environmental Scientist / ERT: We sampled after 30 and 60 days and this is the 110th day of this project. The final round of sampling of the anaerobic chambers is being conducted today. The preliminary evidence indicates that we are getting excellent toxaphene degradation so we expect the 2nd phase, which will be the aerobic phase to uh, to put the icing on the cake, so to speak.

Narrator: During the aerobic phase the mixture is removed from the tanks and is spread out within specially designed treatment beds. Here the soil will be exposed to air and the degradation process allowed to continue.

Harry Allen, Ph.D., Environmental Scientist / ERT: This contaminated soil will then be covered with a uh, a geo-textile covering and hay, an irrigation system will be installed and the whole thing will be covered with a nylon net to protect it from blowing away. Each chamber will be, be further protected by a uh, little roof or building which will be covered by a sun guard-type fabric to help prevent further excess evaporation.

Narrator: Ultimately only time will tell if the efforts undertaken here have been a success.

Robert Mandel, On Scene Coordinator, US EPA Region IX: Where we hope this is leading is that at, at the end of this uh, this study period we'll have some

techniques that work, that definitely work uh, at the Navajo Nation and we would hope to see 20, 30, 40 of their worse sites cleaned up uh, effectively and fairly economically so that they, their land can be restored.

Diana Malone, Program Director, Navajo Superfund Program: There are plans in place at other sites to, for this particular bioremediation project. At this point in time we are working with U.S. EPA uh and BIA to get uh, some funding. I guess the only problem we have is getting funding to uh get these projects going but we do have plans to uh, carry out these projects at other locations also on the Navajo Nation.