



# Gravel Gertie

## Introduction

What happens when you combine an accidental conventional explosion with the possibility of radiological contamination? You get a gigantic health and safety hazard. That health and safety hazard motivated the Sandia Corporation, now Sandia National Laboratories, to create a specialized structure in 1957 known as the Gravel Gertie, designed to prevent the release of radioactive particles into the atmosphere.

The assembly cells, which have 12-inch thick concrete walls, are called Gravel Gerties after a 1950s Dick Tracy comic-strip character, because the roof is overlaid with over 15-feet of gravel, which is said to resemble the original Gravel Gertie's curly gray hair.



*Sandia National Laboratories conducts its fourth test of the Gravel Gertie concept on November 20, 1982, in Area 5 at the Nevada National Security Site. It was called 'Gravel Gertie' because it resembled the Dick Tracy comic book character, Gravel Gertie.*

## How It Works

The unique structure was designed by Mason & Hanger-Silas Mason Co., Inc., and was distinct due to the 15-foot gravel covering used instead of a solid conventional roof. The gravel was supported by steel cables strung from two-foot thick reinforced concrete walls surrounding a round room. In addition, layers of steel wire mesh were used to further contain the gravel. If an accidental explosion occurred within the Gravel Gertie, the gravel roof would lift then fall back filtering most of the nuclear material out of the escaping gasses, preventing the escape of radioactive particles into the atmosphere.

## Testing the Design

To validate the Gravel Gertie design, three tests on the structure were conducted in 1957. The first test used 120 pounds of high-explosives and tested the integrity of the structure. No tracer was used so no material release data was obtained.

The second test was the first in a series to measure the amount of fallout produced from an explosion inside the Gravel Gertie. During this test, the door was open. The detonation of a 550-pound high explosive uranium device generated a uranium oxide aerosol which was the tracer for the experiment. Uranium fallout was measured by means of a large array of fallout trays. Winds before and immediately after the test explosion were measured by tracking meteorological balloons. The test produced only one quarter of the fallout that would have been produced if the explosion occurred in the open.

Test three was similar in all respects to test two, except that the entrance to the staging area of the Gravel Gertie was closed with a blast proof door. The high explosive charge was 550-pounds, with metallic uranium as a substitute tracer for plutonium. The only measurement was uranium fallout by means of fallout trays. The test yielded no significant release of radioactive material. The Gravel Gertie design was a success.



## Yesterday's Concepts are Today's Reality

In 1982, a fourth test was conducted in the same Gravel Gertie structure used for the first three tests. This test was to establish the feasibility of Gravel Gertie for use at the Pantex Plant in Amarillo, Texas. The Pantex Plant is America's only nuclear weapons assembly and disassembly facility. For this test, the roof was replaced and a staging area was built from a 10-foot diameter metal culvert to simulate the volume of the staging areas for the design of the Pantex Plant.



*Gravel Gertie was instrumental in the design of the Pantex Plant in Texas and the Device Assembly Facility at the Nevada National Security Site.*

The test used 423 pounds of explosives closely coupled to eight kilograms of metallic uranium as a substitute for plutonium. The concentrations of airborne uranium oxide particles were recorded inside the Gravel Gertie just after the explosion. Outside the Gravel Gertie, the concentration of released airborne uranium oxide particles were measured by means of aerosol collectors and analyzers on masts and an array supported from a balloon. The results of the test showed the containment of radioactive material, and seven Gravel Gerties were constructed at the Pantex Plant, and five were constructed as part of the Device Assembly Facility at the Nevada National Security Site.

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