



DEPARTMENT OF THE ARMY  
PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL  
COMMERCE CITY, COLORADO 80022-1748

March 18, 1999

Remedy Execution

REPLY TO  
ATTENTION OF:

Ms. Laura Williams  
U.S. Environmental Protection Agency  
Region VIII  
Mail Code 8EPR-F  
999-18th Street, Suite 500  
Denver, Colorado 80202-2466

Dear Ms. Williams:

Enclosed is the U.S. Army's response to the e-mail entitled "Buried Treasure at Rocky Mountain Arsenal (RMA)" forwarded by U.S. Environmental Protection Agency (EPA) on November 28, 1998. EPA requested that the Army address concerns stated in the e-mail regarding previously buried biological agent, TX, or Wheat Stem Rust. An e-mailed interim response was provided to EPA on December 18, 1998.

All archived background documents referring to TX operations here at RMA were researched and pulled for reference in this response. Documents from as early as 1970 were located.

The point of contact for this matter is Ms. Lorri Harper at 303-289-0411.

Sincerely,

Charles T. Scharmann  
RMA Committee Coordinator

Enclosure

Copies Furnished:

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# HISTORY OF BURIED BIOLOGICAL AGENT, WHEAT STEM RUST (TX), AT ROCKY MOUNTAIN ARSENAL

## 1.0 INTRODUCTION

On November 28, 1998, the Environmental Protection Agency (EPA) forwarded an e-mail entitled "Buried Treasure at RMA". The EPA requested that Rocky Mountain Arsenal (RMA) address concerns conveyed in the e-mail regarding the biological agent, TX, or Wheat Stem Rust, previously buried at RMA. An interim response was provided to EPA on December 18, 1998. e-mailed

All archived documents referring to TX operations here at RMA were researched for development of this paper (See Documents Reviewed). Documents from as early as 1970 were located. In several instances, later documents reiterated earlier reports' contents as well as provided new information on investigations and findings.

## 2.0 BACKGROUND

In January 1962, the Department of the Air Force established a project to produce TX, Wheat Stem Rust, an anticrop biological agent. The organism, Puccinia graminis, sp. tritici, is the causal agent of stem rust of wheat, or TX. The agent material consists of fungus spores of the obligate parasite. Six sites located in various western states were selected as growing sites including the Arsenal. The Arsenal was also selected as the site to process the raw material and to maintain the storage facility. It was routinely produced in the field at RMA from 1962 until 1969. The agent is not a human pathogen and presents no hazard to either personnel or any form of wildlife. With proper controls, hazards to host plants can be eliminated. Further, the fungus pathogen is endemic in the Rocky Mountain Arsenal area, and natural occurrences of the disease are not uncommon. other 5 sites?

## 3.0 TX AT RMA

### 3.1 Production and Disposal (1962-1969)

The stockpile quota of TX was first achieved at RMA on December 28, 1964. The material was collected during the calendar years 1962, 1963, and 1964. Some unprocessed material was first buried in 1964. During the last half of 1965, some of the stockpile material decayed to a point where it could no longer meet the required specifications, and it was withdrawn and buried. Records available indicate some quantities of reject material, process waste, and unprocessed material had been disposed by burial each year since that date until the fall of 1969. During the 1964 to 1969 time frame, in excess of 144,000 lbs of TX or TX-contaminated material was buried in an estimated 30 trenches in Section 24 of RMA (See Figure 1). All known burial sites lie within a 30-acre area of Section 24 which was selected for two main reasons: First, since the area was low-lying and generally very wet at the time, it could not be used for field production;

dep th?

Second, it was assumed that the wetness of the land would enhance the decomposition of the product. The trenches were dug either in a north-south or in an east-west direction.

Process waste containing anti-crop agent TX was discarded into three wells in Section 24 between 1962 and 1964. An additional well in Section 23 was used to dispose of hardware and possibly tailings from the processing plant (See Figures 1 and 2). The hardware included classified parts from the harvesting machines. Water was present (approximately 5 feet) in the bottom of all wells during disposal operations, and it was anticipated that this would induce spore germination and subsequent death of the fungus. All wells were closed (1962 to 1964) by filling them in with dirt and collapsing the upper six feet of concrete lining inward to form a cap. The diameter and depths of the wells were as follows: 47 ft deep and 48 inches in diameter, 34 ft deep and 48 inches in diameter, 34 ft deep and 24 inches in diameter, 20 ft deep and 60 inches in diameter. The wells were lined with brick and concrete casing.

wells  
\*

Prior to 18 February 1969 when the Standard Operating Procedure (SOP) for TX disposal was approved, no standard method of disposal was followed. Trenches were dug approximately three to four feet deep, the material was spread preferably in a thin layer, and the trench saturated with water. Soil was then placed over the saturated TX and the trenches filled in. Depositions from personnel associated with the project indicate that TX layers and depths of trenches varied. The February 1969 SOP called for rendering the material inert prior to placement in burial trenches. Prior to 1969, routine inerting of the TX was not carried out except in experimental quantities. With the exception of inerting of the TX material prior to burial, the SOP burial process was essentially the same as pre-1969 operations.

live materials  
<1969

### 3.2 Waste Quantities

Table 1 identifies the source of TX waste, method, year, and quantities. The total quantity of material buried was 144,318 lbs. Of this amount, 25,205 lbs were considered trash, with a very small percentage of TX present; the remainder, 119,113 lbs, was essentially all TX waste. Early in the operations, 33,190 lbs of process waste were disposed by chemical sewer which discharged into former Basin F.

Basin  
F

Three types of material were discarded. The process waste consisted largely of soil particles, chaff, weed seeds, and tailings from the purification operations. This discarded material contained a very low level of TX spores upon burial. The second type material discarded was field-grade TX which was rejected for processing due to a high content of other types of spores present, or for unfavorable physical properties such as high moisture content. This material contained 40%+ TX spores at the time of burial. The principal material discarded was stockpile TX which had deteriorated to an unsuitable viability level during the stockpile operation. It was replaced with good quality material as a part of the normal stockpile operation. This material was essentially all TX spores (See Table 1 for quantities and years of disposal) at the time of burial.

### 3.3 Demilitarization Program of Stockpiled TX

On 18 September 1972, the destruction of stockpiled TX at RMA was certified complete. Final inspection of the production sites, storage areas, disposal facilities, and ash repositories for the TX demilitarization program was conducted by Drs. Louis P. Reitz and Warren C. Shaw, independent observers from the US Department of Agriculture. The inspection was completed 18 June 1973 which concluded the TX demilitarization program at RMA. This certification was for the destruction of stockpiled TX only and did not include previously buried TX waste.

On 30 May 1974, Mr. Eugene E. Berg, Assistant Secretary of the Army, responded to Mr. John Stencil, President of the Rocky Mountain Farmers Union regarding TX disposal on the RMA. This paragraph is a synopsis of Mr. Berg's letter. Mr. Berg confirmed the destruction of all stockpiles of TX in accordance with the Presidential Announcement of November 1969. The destruction was conducted during the period of July 1971 through October 1972 and accomplished without incident. Destruction was accomplished following detailed plans approved by the Secretary of Defense and the Surgeon General of the US Public Health Service. In addition, draft environmental impact statements (EIS) were prepared and circulated in accordance with National Environmental Policy Act (NEPA) to federal, state, and local agencies. Following receipt of comments, a final EIS was filed with the President's Council on Environmental Quality. Notification of filing was publicized in the Federal Register. Mr. Berg concluded the letter by stating that verification of the condition of buried anticrop waste would be accomplished during the long-term cleanup efforts at the Arsenal. The certification of destruction was for stockpiled TX only.

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has this  
been done?

### 3.4 Burial Site Investigations

*Subsequent*  
In September 1969, six burial sites were investigated. TX agent was identifiable in all six sites. In four of the burial sites, the agent was bluish-black. In the remaining two burial sites, the color of the agent was identical to that of the original product. Material which had retained the color identical to the original product was viable (5-6%) after being buried for more than two years, and buried at a thickness much in excess of one inch. Material which was bluish-black in color was not viable, buried anywhere from months to more than two years, and buried in a thickness of one to three inches. The trenches were covered with 18 to 48 inches of soil.

On 6 February 1970, a test trench was dug. The trench was 9 inches wide, 18 inches deep, and 45 feet long. Three burial trenches were identified and soil borings taken into the trenches. TX material was discovered 2-3 inches below the floor of the trenches and was in excess of 30 inches thick. The differentiation between the soil (yellow) and the TX (black) was clearly visible. No data was provided from this test as to whether or not the recovered TX was inert or viable. However, due to the color, it is assumed that the TX was non-viable.

not  
tested

Another plan for locating and evaluating buried biological waste at RMA was developed 12 March 1973. The plan was written because it was deemed necessary to determine whether or not discarded viable material remained in the soil. This operation was developed as part of the long-

page 4  
missing!

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term RMA clean-up program, and not as a part of the TX demilitarization program completed earlier. Data collected from this operation, if implemented, would have been evaluated to determine whether any additional work was required to demilitarize the buried anti-crop agent, TX. An October 1977 document reports that prior to finalizing the March 1973 plan, a test sampling effort was performed in February 1973. Thirty-one core samples were taken and analyzed. All spores found in the core samples were inert. Due to the findings of the February 1973 sampling effort, the March 1973 plan was never implemented.

One month after the February 1973 test sampling had been performed and concurrent with finalization of the plan for locating and evaluating TX at RMA, a letter dated May 1, 1973 was sent from Colonel Warner S. Goodwin, Jr., Deputy Director of Systems, General's Staff, Department of Army to Program Manager for Demilitarization of Chemical Materiel. Colonel Goodwin stated that the buried TX material at RMA, undisturbed, presented no hazards. Furthermore, there appeared to be no urgency in initiating this phase of an overall cleanup program ahead of other cleanup areas on the Arsenal. Colonel Goodwin recommended that further action on subject material be suspended. Colonel Goodwin's recommendation was accepted by higher headquarters (letter dated 8 June 1973).

Upon suspension of the March 1973 Plan sampling effort, Program Manager for Demilitarization of Chemical Materiel requested methods be developed which would cheaply and simply locate the buried waste. Two methods were suggested: the portable differential magnetometer (PDM) and the modified Forward Looking Infrared (FLIR) system. The PDM was used to survey the burial site November 1973. Approximately 16 sites were designated as potential trenches with this instrument. Cores (three samples per core) were removed from these sites through March 1974. Varying concentrations of spores were found in all samples, however, all spores were inert.

In June 1974, a specially instrumented aircraft using a modified FLIR system surveyed the suspect area at RMA. The results of these flights revealed 10 potential site areas. No coring of the 10 sites was performed at that time due to Department of Agriculture restrictions on sampling until spring 1975. In February 1975, responsibility for further investigations moved from Program Manager for Demilitarization of Chemical Materiel to Rocky Mountain Arsenal. In October 1975, Colonel Byrne, Commander RMA, certified that a thorough inspection of RMA had been conducted and that no viable biological agents of toxins were found.

In 1975, the Army Surgeon General published a statement indicating that there appeared to be no hazard to wheat crops due to the buried waste at RMA. In 1977 the Army Inspector General indicated that some action should be taken to verify the absence of any hazard from this material. As a result of the events described above, on 18 July 1977, The Acting Secretary of the Army, Alan J. Gibbs sent a letter to Robert S. Bergland, Secretary of Agriculture, requesting the assistance of experts in the agricultural field to evaluate the hazard, and make recommendations regarding future sampling and final disposition of the TX wastes. Drs. Leland W. Briggie and Warren C. Shaw from the Department of Agriculture (USDA) were briefed 16 September 1977 and performed an inspection of the sites at RMA on 20-21 October 1977. As a result of this

Warren C. Shaw from the Department of Agriculture (USDA) were briefed 16 September 1977 and performed an inspection of the sites at RMA on 20-21 October 1977. As a result of this inspection, the USDA representatives drafted a letter for the Secretary of Agriculture's signature stating that no hazard exists from the TX wastes buried at RMA and recommending no further action be taken to sample for viability.

On 28 November 1977, a letter from Richard L. Duesterhaus, Acting Deputy Assistant Secretary of USDA was sent to then Secretary of the Army, Clifford L. Alexander, Jr. The final recommendation was as follows:

"The Department of the Army has conducted a commendable program in disposing of these spores in such a manner as to avoid any current or potential risk to agriculture or to the environment. Our scientists are convinced that no further research or any further action of any kind is justified in relation to this project. Further, it is our suggestion, based on all the experimental data reviewed by our scientists and based on the lack of any evidence of agricultural and environmental risks, that the project and all matters related to it be permanently terminated."

On 8 December 1977, Major General Lee E. Surut, Director of Strategy, Plans, and Policy, directed an internal letter to Project Manager, Chemical Demilitarization and Installation Restoration. Major General Surut forwarded the USDA report and directed that based upon this report, no further effort would be expended to determine the viability of the buried TX waste nor remove it from its current site. The Army considers the subject matter closed.

#### 4.0 SUMMARY

In summary, TX wastes interred at RMA are inert and pose no hazard to the surrounding community. TX, which clinically has a half-life of less than one month, has been interred at RMA for a minimum of 30 years. TX was routinely produced in the field at RMA from 1962 until 1969. During the 1964 to 1969 time frame, in excess of 144,000 lbs of TX or TX-contaminated material was buried in an estimated 30 trenches in Section 24 of RMA (See Figure 1). The location of the burial sites are known, were investigated and sampled on at least four previous occasions: 1969, 1970, 1973, and 1974. In the last three investigations, all spores were found to be inert. The 1969 investigation had viable spores discovered in only two of the six trenches sampled. On 18 September 1972, the destruction of stockpiled TX at RMA was certified complete. This certification was for the destruction of stockpiled TX only and did not include previously buried TX waste. Periodic inspections by the USDA from 1971 to 1977 resulted in the recommendation that no further studies to determine viability of spores were warranted. The Army is confident that no viable TX spores exist at the Section 24 burial site and therefore no hazard remains.

## Documents Reviewed

1. [Report] Location of Discarded TX, April 30, 1970.
2. Disposal of Buried Material at Rocky Mountain Arsenal, Phase I Plan, June 4, 1970.
3. Plan for Location and Evaluation of Buried Biological Waste at Rocky Mountain Arsenal, March 12, 1973.
4. Letter on Buried Biological Waste at Rocky Mountain Arsenal, May 1, 1973, from Colonel Goodwin, GS, DA, Washington, D.C., to Program Manager for Demilitarization of Chemical Materiel, US Army Materiel Command.
5. Standard Operating Procedure for Buried Waste (TX Cleanup), Rocky Mountain Arsenal, Revision 1, May 25, 1973.
6. Letter on Buried Biological Waste at Rocky Mountain Arsenal, June 8, 1973, from Colonel Aaron, GS, DA, Special Assistant for Chemical and Biological Affairs to Program Manager for Demilitarization of Chemical Materiel, US Army Materiel Command.
7. Letter on TX Demilitarization Program, June 20, 1973, from 1LT John F. Wardell, Cm1C, Director, Special Projects, RMA to Dr. Louis P. Reitz, Staff Scientist.
8. DA Form 2496, Disposition Form, Excavation of Equipment Buried in Wells, June 28, 1973.
9. Fact Sheet on Biological Waste Material at Rocky Mountain Arsenal - Wheat Rust Spores, May 8, 1974.
10. [Report] Buried Waste, May 15, 1974.
11. Letter on Destruction of Anti-Crop Agent at Rocky Mountain Arsenal, May 30, 1974, from Eugene E. Berg, Assistant Secretary of the Army, DA, to Mr. John Stencel, President, Rocky Mountain Farmers Union.
12. Action Memorandum on Request for Assistance of Department of Agriculture Technical Personnel, June 10, 1974.
13. Letter on Buried Biological Waste, February 20, 1975 from Brigadier General Sampson H. Bass, Jr., PM for Demilitarization of Chemical Materiel to Commander, RMA.
14. Status Report of Biological Materials/Toxins on Band, October 1975, from Commander RMA to BGD Colonel Byrne.

Table 1

## Poundage of TX Buried at Rocky Mountain Arsenal

## Part 1. Documented Poundages from 741.

Source Method of Disposal	Process Waste		Rejected, Demil, and Downgraded Material		Never Lotted or Processed	
	Chem Sewer	Field Burial	Chem Sewer	Field Burial	Chem Sewer	Field Burial
Production Year						
1963	6,503.7	-----	-----	-----	-----	-----
1964	13,789.7	-----	-----	-----	-----	1,116.5
1965	12,098.6	-----	-----	-----	-----	6,066.0
1966	-----	11,223.8	-----	29,634.2	-----	-----
1967	-----	10,199.7	-----	33,632.5	-----	8,962.9
1968	-----	1,811.7	-----	5,992.7	-----	-----
1969	-----	-----	-----	398.1	-----	-----
Subtotal	32,392.0	23,235.2	-----	69,657.5	-----	16,145.4
Misc.	-----	108.5	-----	309.7	-----	-----
Subtotal	32,392.0	23,343.7	-----	69,967.2	-----	16,145.4

## Part 2. Nondocumented Poundages.

All Years	798.1	1,862.1	-----	-----	-----	33,000.0
Total	33,190.1	25,205.8	-----	69,967.2	-----	49,145.4

Total Sewer and Scattered - 33,190.1 - This figure represents a net weight loss and was trash. This amount includes tailings, soil, and various other debris. Probably only a very small percentage was TX.

Total Buried - 144,318.4 - This figure is a net weight buried, of this amount 25,205.8 was in the trash class with only a small percentage of TX. The remaining 119,112.6 was essentially all TX.