



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

February 2, 2006

Docket No. 99990001

License No. Not Applicable

Dale Jakoby  
Superintendent  
Wastewater Treatment Facility  
Borough of Royersford  
300 Main Street  
P.O. Box 188  
Royersford, PA 19468

SUBJECT: INSPECTION 99990001/2006001, WASTEWATER TREATMENT FACILITY,  
BOROUGH OF ROYERSFORD, ROYERSFORD, PENNSYLVANIA

Dear Mr. Jakoby:

On January 10, 2006, Michael Reichard, Farrah Gaskins, and Betsy Ullrich of this office conducted a safety inspection at the above address. The inspection consisted of surveys and collection of samples for analysis by Oak Ridge Institute of Science and Education. The results of the analysis will be forwarded as soon as they are available.

Within the scope of this inspection, no violations were identified.

Current NRC regulations are included on the NRC's website at [www.nrc.gov](http://www.nrc.gov); select **Nuclear Materials; Medical, Industrial, and Academic Uses of Nuclear Material**; then **Toolkit Index Page**. The current NRC Enforcement Policy is included on the NRC's website at [www.nrc.gov](http://www.nrc.gov); select **What We Do, Enforcement**, then **Enforcement Policy**. Or you may obtain these documents by contacting the Government Printing Office (GPO) toll-free at 1-888-293-6498. The GPO is open from 7:00 a.m. to 9:00 p.m. EST, Monday through Friday (except Federal holidays).

No reply to this letter is required. Your cooperation with us is appreciated.

Sincerely,

***Original signed by John D. Kinneman***

John D. Kinneman, Chief  
Security and Industrial Branch  
Division of Nuclear Materials Safety

cc:

David Allard, Pennsylvania Department of Environmental Protection  
Terry Derstine, Pennsylvania Department of Environmental Protection  
Michael Fuller, UniTech Services Group  
Daniel R. Neeley, UniTech Services Group  
Commonwealth of Pennsylvania

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**SISP Review Complete: MReichard**

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DATE	02/01/2006		02/01/2006		02/01/2006		02/02/2006	

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U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

INSPECTION REPORT

Inspection No. 99990001/2006001  
Docket No. 99990001  
License No. Not applicable  
Licensee: Borough of Royersford Wastewater Treatment Facility  
Address: 300 Main Street  
P. O. Box 188  
Royersford, Pennsylvania 19468  
Locations Inspected: First Avenue, Royersford  
Inspection Dates: January 10, 2006

Inspectors:	<i>/RA/</i>	<b>02/01/06</b>
	_____ Farrah C. Gaskins Health Physicist	_____ date
	<i>/RA/</i>	<b>02/01/06</b>
	_____ Michael Reichard Health Physicist	_____ date
	<i>/RA/</i>	<b>02/01/06</b>
	_____ Betsy Ullrich Senior Health Physicist	_____ date
Approved By:	<i>/RA/</i>	<b>02/02/06</b>
	_____ John D. Kinneman, Chief Materials Security and Industrial Branch Division of Nuclear Materials Safety	_____ date

## EXECUTIVE SUMMARY

### Borough of Royersford Wastewater Treatment Facility NRC Inspection Report No. 99990001/2006001

NRC Region I inspectors conducted a limited, announced, safety inspection at the Borough of Royersford Wastewater Treatment Facility (RWTF) on January 10, 2006. This inspection was limited to collecting sludge and reed samples from the reedbed, and assisting RWTF employees to collect primary digester sludge samples and effluent water samples. Samples of secondary digester sludge were collected by the employees at the RWTF at a later date. (Inspection Report No. 99990001/06-001)

From 1986 through January 2004, the RWTF received influent from an NRC-licensed nuclear laundry, and radioactive materials released by the nuclear laundry were re-concentrated at the RWTF. The NRC has provided environmental monitoring using dosimeters and analysis of samples from the RWTF during this time, and is considering if continued monitoring is needed. During the summer of 2004, the RWTF cleaned the wastewater treatment facilities to remove residual radioactive materials. Samples collected during the period February 16 through March 4, 2005, identified some residual radioactivity in primary and secondary digester sludges, although at significantly lower levels than prior to 2004. This inspection was conducted to collect additional samples from the RWTF to verify if residual radioactive materials remain in the wastewater treatment systems, and to determine the current concentrations of radioactive materials in an onsite reedbed.

No violations were identified. Samples were transferred to Oak Ridge Institute for Science and Education for analyses. Results of analyses will be forwarded separately when available.

## REPORT DETAILS

### **I. Organization and Scope of Activities**

#### a. Inspection Scope

Inspectors reviewed the history and current status of the re-concentration of radioactive materials received by the Royersford Wastewater Treatment Facility (RWTF) from an NRC-licensed nuclear laundry.

#### b. Observations and Findings

The Royersford Wastewater Treatment Facility (RWTF) in the Borough of Royersford, Pennsylvania formerly received effluent water containing radioactive material released by the Interstate Nuclear Services (INS) Corporation nuclear laundry, now known as UniTech Services Group, Inc, (UniTech), also in Royersford. The RWTF processes about 400,000 gallons of incoming material per day, of which UniTech effluents were a significant fraction. During the period of 1986 through January 2004, UniTech released from 5,000 to 30,000 gallons of effluent per day to the RWTF. Although the UniTech releases were made in compliance with the allowable concentrations which may be released to the sanitary sewerage system as described in 10 CFR 20.2003, much of the radioactive material was reconcentrated during wastewater treatment processing at the RWTF. Material received by the RWTF is not considered to be licensed material, and the RWTF is not an NRC licensee. However, the NRC agreed to perform monitoring at the request of the Borough of Royersford in 1986, and continued monitoring when the re-concentration of material was identified.

During 1986 through 1989, liquid sludge from the secondary digester was used as fertilizer on farms or was mechanically de-watered. Beginning in 1990, an onsite reedbed was used for drying about half the liquid sludge from the secondary digester, resulting in an accumulation of radioactive materials at the RWTF. The remainder of the sludge was mechanically dewatered about once each year, and disposed of to a municipal landfill. In about 2004, use of the onsite reedbed was discontinued, and some of the liquid sludge from the secondary digester was transferred to other wastewater treatment plants for tertiary treatment and release.

A large amount of data is available regarding the radionuclides released by UniTech and the re-concentration at the RWTF. UniTech provided reports of all effluent water releases made to the RWTF each quarter since 1986. The NRC contracted Oak Ridge Associated Universities (ORAU) to perform studies in 1987, 1988, and 1989 of the re-concentration at the RWTF and the use of the sludge as farm fertilizer. The NRC also had analysis performed by the Oak Ridge Institute for Science and Education (ORISE) of samples of sludge from the secondary digester and materials from the mechanical de-watering process each year. Samples of primary digester sludge, effluent water released to the river, and reeds were collected less frequently. In 1990 when the reedbed was built, the NRC provided environmental dosimeters which were exchanged quarterly. Results of all

monitoring by the NRC were provided to the Borough of Royersford, UniTech, and the Commonwealth of Pennsylvania Department of Environmental Protection (PADEP).

UniTech has not released radioactive materials in effluent to the RWTF since January 2004. During the summer of 2004, the RWTF systems were thoroughly cleaned in order to remove remaining radioactive materials, with the exception of the reedbed. Doses measured by environmental dosimeters decreased since that time. Primary digester and secondary digester sludge samples collected in March and April 2005 contained measurable radioactivity, but at levels significantly lower than in prior years.

The NRC is considering if continued monitoring is needed at the RWTF. The sludge in the reedbed will be removed and disposed of when the RWTF is able to determine a method and location for its disposal. The RWTF is working with the PADEP to review acceptable options.

c. Conclusions

No violations were identified. The RWTF no longer receives radioactive materials from the NRC-licensed nuclear laundry.

## II. Facilities and Equipment

a. Inspection Scope

Inspectors reviewed the facilities to determine from which systems samples would be collected, and to determine the equipment needed for sample collection and shipment, and surveys.

b. Observations and Findings

Based on past surveys and analysis, inspectors decided to collect samples of sludge from the primary digester, sludge from the secondary digester, sludge and reeds from the reedbed, and of effluent water prior to release to the river. Attachment A shows the location of the facilities at the RWTF.

The RWTF processes about 400,000 gallons of influent wastewater each day. Liquids from the settling tanks are processed through the bio-filters (trickling tanks) and other treatments prior to release to the river. Very little radioactivity was identified in liquid waste streams in past sampling. Sludge from the settling tanks is transferred to the primary digester daily, where it may be contained over periods of hours to days before it is moved to the secondary digester. Sludge in the secondary digester may be held there for weeks to months until (1) it is transferred to another facility for further disposal, or (2) mechanically de-watered and the solid sludge disposed of to a landfill, or (3) in the past, was applied to the reedbeds for drying. In the past, radioactivity was found in primary digester sludge, with increased re-concentration in secondary digester sludge, and the highest concentrations in de-watered sludge and reedbed sludge. The primary radionuclides of concern in sludge were cobalt-60 and cesium-137.

The re-concentration of cobalt-60 and cesium-137 in the onsite reedbed resulted in measurable radiation levels above background in the vicinity of the reedbed. At the time of the inspection, only the reedbed was expected to contain significant concentrations of radioactive materials. The reedbed was built in 1990 for the purpose of dewatering sludge from the secondary digester by growing reeds in an enclosed area. It has concrete walls approximately 6 feet high, and is 72 feet long by 50 feet wide. A wall about 30 feet from one end of the reedbed divides it into Cell 1 (smaller) and Cell 2 (larger). Openings into each cell, located on the long wall nearest the fence, were boarded shut as the level of sludge increased in the cells. Sludge was dewatered as the reeds took up liquid for growth, and bacteria surrounding the reed root system further decompose the solids. Personnel at the RWTF monitored the solids content of the secondary digester sludge (typically 4-6% solids) in order to control the amount of sludge that could be applied to the growing reeds. The useful lifetime of the reedbed was estimated to be 10 years, when the depth of the sludge was expected to approach the height of the surrounding walls. Because less sludge was able to be applied than hoped, the height of the sludge in the reedbed was at about 5 feet when applications were discontinued in 2004, and was about 4 feet high at the time of the inspection.

In November 2005, inspectors requested that ORISE provide the RWTF with containers for 8 liquid samples and for 6 solid sludge samples, and instructions for sample handling and shipment. Supplies from ORISE included nitric acid to adjust the pH of the liquid samples, packaging materials, and chain-of-custody forms. Inspectors provided bags for reed samples, and tools for collecting sludge and reed samples from the reed bed. Additional equipment as needed was obtained from the RWTF. RWTF employees packaged and shipped materials several days after the NRC inspection.

Inspectors performed surveys using a Ludlum Model 19, Serial Number 44422, calibrated on April 21, 2005.

c. Conclusions

No violations were identified. Sample containers and shipping materials were provided by ORISE as requested. Additional equipment used during sampling was obtained from the Region 1 office and the RWTF.

### **III. Radiation Surveys and Sample Collection**

a. Inspection Scope

Inspectors documented the conditions at the RWTF where samples were collected.

b. Observations and Findings

At the time of this inspection, the reedbed was dormant. Reeds were mature with some reeds up to 9 feet high. Sludge was estimated to be about 4 feet deep. Because of the wet fall weather, many areas of the reedbed were wet. The surface of the reedbed on the day of this inspection appeared to be a soft, black paste which had cracked as it dried in

some areas, but was still quite fluid in other areas. The reed root system was extensive throughout the sludge, so roots were clearly present in the sample. At a depth of a few inches, the sludge was brown with a clay-like consistency. When possible, inspectors removed the top layer of sludge and obtained a sample approximately 6 inches below the surface using a post-hole digger, attempted to collect a composite sample from different depths of the same hole, mixed the material from the composite in the collecting bag, removed roots and other debris, and transferred the sample into a screw-top plastic container for shipment to ORISE. Inspectors collected 2 sludge samples from Cell 1 and 4 sludge samples from Cell 2.

Inspectors collected reed samples using typical pruning shears to cut the reeds immediately above the level of the sludge. Inspectors obtained one composite sample of reeds from Cell 1 and two composite samples from Cell 2. Inspectors chopped the reeds from each composite sample into separate collection bags, first using the pruning shears and then using a leaf-blower on its reverse setting.

The RWTF superintendent collected two effluent water samples and two primary digester sludge samples on the day of the inspection. Inspectors acidified these samples to the required pH and sealed the containers. However, sludge in the secondary digester needed to be mixed for about a 24-hour period prior to sampling, so the 4 secondary digester samples were collected by the RWTF superintendent several days later.

Final preparation of the samples for shipment, and the completion of the chain-of-custody forms was completed by the RWTF superintendent. ORISE notified the Inspectors on January 18 that samples were received. Attachment B contains a list of the sample descriptions.

Radiation levels in the reedbed ranged from 300 to 500 microR per hour. Radiation levels at the edge of the reedbed were about 100 microR per hour, and dropped off rapidly. Radiation levels at other areas of the RWTF were not distinguishable from background (about 5-10 microR per hour).

c. Conclusions

No violations were identified.

#### **IV. Exit Meeting**

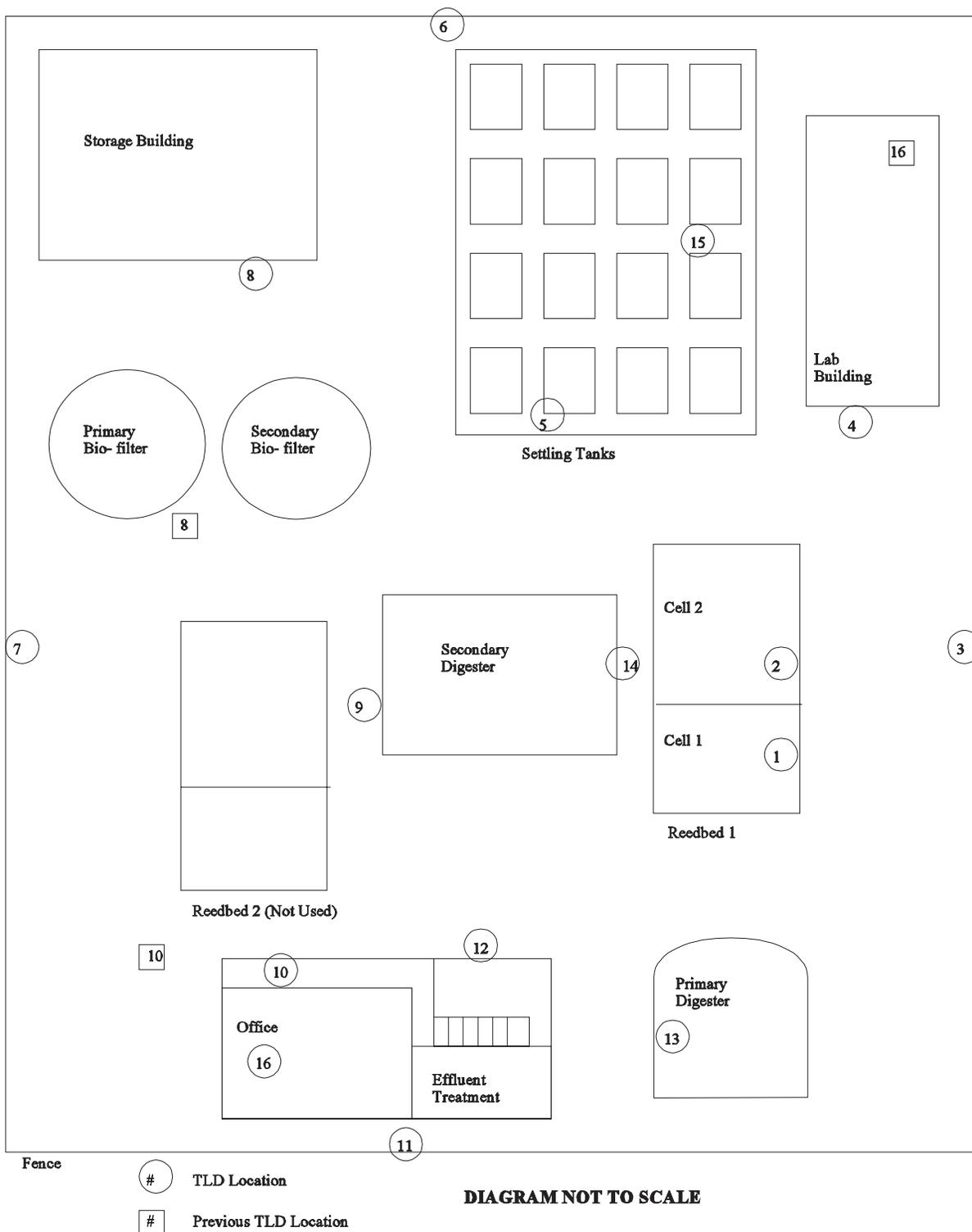
Inspectors reviewed the type and number of samples with the RWTF superintendent prior to leaving the site. Inspectors also reviewed with him the information on the chain-of-custody form. He confirmed that he would collect the secondary digester samples later in the week, complete the chain-of-custody form, and ship the samples to ORISE for analysis.

**PARTIAL LIST OF PERSONS CONTACTED**

Licensee

Dale Jakoby, Superintendent, RWTF

ATTACHMENT A: DIAGRAM OF THE RWTF



ATTACHMENT B: SAMPLE DESCRIPTION

TYPE	SAMPLE	LOCATION/DESCRIPTION
SLUDGE	1	Reedbed 1, Cell 1
SLUDGE	2	Reedbed 1, Cell 1
SLUDGE	3	Reedbed 1, Cell 2
SLUDGE	4	Reedbed 1, Cell 2
SLUDGE	5	Reedbed 1, Cell 2
SLUDGE	6	Reedbed 1, Cell 2
WATER	1	Effluent water
WATER	2	Effluent water
SLUDGE	1	Primary digester
SLUDGE	2	Primary digester
REED	1	Reedbed 1, Cell 1
REED	2	Reedbed 1, Cell 2
REED	3	Reedbed 1, Cell 2