

Annual Audit of the WRT Radiation Protection Program

March 2015



Water Remediation Technology LLC

A handwritten signature in black ink, appearing to read "T. G. Adams". The signature is written in a cursive style and is positioned above a solid horizontal line.

Theodore G. Adams, PMP
Corporate RSO

March 2, 2015

Annual Audit of the WRT Radiation Protection Program

March 2015

1.0 Overview

An annual audit of the Water Remediation Technology, Inc., (WRT) Radiation Protection Program was performed by Mr. Ted Adams, WRT Corporate Radiation Safety Officer (CRSO). The audit consisted of an ongoing review of various WRT activities that were supported by the Radiological Protection Group throughout the calendar year 2014.

The audit included an evaluation of various WRT drinking water treatment facilities and WRT onsite activities (media exchanges, packaging/shipping, internal/external inspections, postings, placement of dosimetry, radiological controls, house keeping, waste storage), as well as, an evaluation of the status of training, dosimetry, surveys, instrument calibration, and related documentation. The audit also included interviews with various WRT personnel and reviews of records/documentation supporting the WRT Radiation Protection Program. The audit also evaluated the effectiveness of the WRT Radiation Protection Program.

2.0 Surveys

Surveys performed by WRT during 2014 included baseline surveys, media exchange surveys, inspection surveys, packaging/shipping surveys, maintenance/operational surveys, and miscellaneous surveys for other needs.

A review of selected surveys that were performed by WRT radiological personnel during media exchanges or facility inspections/visits in 2014 was performed as part of the audit. The following surveys were reviewed:

1. Aqua NC, Cliffdale/Copeland Acres – January 20-22, 2015- Media Exchange)
2. Aqua NC, Cliffdale 14-March 31-April1, 2014- (Media Exchange)
3. Lawrenceville, GA-August 3, 2014- (Resin Exchange)
4. Grand Island, NE- February 17, 2015- (Pre-Job Survey)
5. Oswego, IL Well 7- June 23-27, 2014- (Media Exchange)
6. Pewaukee, WI, Well 2- September 29-Oct 2, 2014- (Media Exchange)
7. UWTR NJ, Whitesville – June 5-7, 2014- (Media Exchange)
8. Brookfield, WI- May 16, 2014-(Media Exchange)
9. Denton, NB- March 7, 2014- (Maintenance)
10. Lawrenceville, GA Ezzard Rd- August,12-13, 2014- (Resin Exchange)
11. Elburn, IL Well 4- July 8-10, 2014- (Media Exchange)
12. Sycamore, IL Well 9- July 14-16, 2014- (Media Exchange)
13. Grand Island, NE- February 17, 2015- (Pre-Job Radiation Survey)
14. Golden State Water- January 22-23, 2014- (Media Exchange)
15. NJ American Water Temp System, NJ Well 13- August 20, 2014- (Baseline)
16. Oswego, IL Well 4- July 8-10, 2014-(Media Exchange)
17. IPE, IL Well 1- October 9-10, 2014-(Media Exchange)

**Annual Audit of the WRT Radiation Protection Program
March 2015**

18. Elburn, IL Well 5-July 28-31, 2014 - (Media Exchange)
19. Zavala County, TX-April 14, 2014 (Site Visit)
20. New Underwood, SD Well 2-December 2-3, 2014- (Maintenance)
21. New Underwood, SD, Well 2-Ocotbert 20-23, 2014- - (Media Exchange)
22. Hollywood Heights, NC Well 60-January 22-24, 2015-(Media Exchange)
23. Grand Island, NE Central Basin Train 2- July 22-23, 2014- (Resin Exchange)
24. Mountain Water, SD- January 28, 2014 - (Media Exchange)
25. Grand Island, NE Central Basin Train 1- August 4-7, 2014- (Resin Exchange)
26. Lawrenceville, GA Ezzard Rd-February 24, 2014- (Media Exchange)
27. Bartlett, IL Well 4- May 5, 2014-(Media Exchange)
28. Oswego, IL Well 10-November 7, 2014- (Media Exchange)
29. Grand Island, NE Central Basin Train 1- August 11-12, 2014- (Resin Exchange)
30. Upper Deerfield, Love Lane- November 21, 2014- (Media Exchange)
31. Vineland, NJ Well 12- September 21, 2014-(Media Exchange)
32. United Water, NJ Parkway- December 15, 2014-(Media Exchange)

These surveys were reviewed/signed off by the CRSO. The review of the all of the surveys listed above found the related survey documentation complete, legible, and appropriately reviewed.

3.0 Inspections

Both internal (WRT performed) and external (responsible regulatory agency performed) inspections were reviewed.

3.1 Internal Inspections

The following WRT internal inspections were reviewed:

1. Semi-annual inspections of the Wisconsin treatment systems (Pewaukee Well 2, Arbors Trust Well 1, Ethan Allen Well 3, and Brookfield Well 1) performed on May 19, 2014 and October 1, 2014 by Mr. K. Stovall, RSO.
2. Quarterly inspections of the treatment systems performed by the responsible WRT field service representative (Mr. Mike Hubler, NJ/NY: Mr. Sam Parrot NC/SC/VA/GA: and Mr. Josh Joiner and Mr. Jim Etheridge, IL/WI/MO).
3. Periodic inspections conducted by Mr. Ted Adams, WRT Corporate RSO and other WRT personnel.

Annual Audit of the WRT Radiation Protection Program March 2015

Semi-Annual Inspections

The review of the semi-annual inspections (May 19 and October 1, 2014) of the Wisconsin treatment systems by Mr. Stovall found the inspection/survey documentation in order, complete, legible, and prepared in a timely manner.

Quarterly Inspections

WRT requires that its treatment systems be inspected at least quarterly by the WRT field service representatives. The review by the auditor of the quarterly inspections performed by the WRT field service representatives found the inspection/survey documentation for the most part, to be in order, complete, legible, and being completed in a timely manner. Awareness training regarding the importance of these inspections and related inspection documentation continues to be provided to the WRT field service representatives.

There was one gap in the quarterly inspections during 3Q 2014. This gap involved the inspections of those systems (NC and VA) that were the responsibility of the WRT South/East coast service representative. This individual's employment was terminated during this time, and although the radiation group identified the need for this inspection, no one was assigned, following the departure of this individual, to perform the subject inspections of those systems in the 3Q of 2014.

The overall responsibility of ensuring that the quarterly inspections and related inspection documentation are performed continues to be the responsibility of Mr. Dave Melancon, Operations Manager. Mr. Dan DeBello and Mr. Rick Blaes, System Specialist/ Operations have done an outstanding job of ensuring that these inspections are being carried out and maintaining the tracking system for these inspections current.

Periodic Inspections

The following selected internal inspections performed by the CRSO, RSO, and other WRT personnel during 2014 were reviewed:

1. Lawrenceville, GA Ezzard Road- February 24, 2014- Inspector- T. Adams, CRSO
2. Farmington, MO – February 6, 2014- Inspector- T. Adams, CRSO
3. Canoncito, NM – March 27, 2014 - Inspector – J. Maestas
4. New Underwood, SD- October 20, 2014- Inspector – K. Stovall, RSO

During the inspections, attention was placed on postings, housekeeping, surveys/survey documentation, instrumentation and related daily checks/ calibration, radiological control practices, and personnel awareness of radiological safety. The inspections of the Lawrenceville, GA, Canoncito, NM, and Grand Island, NE facilities resulted in no deficiencies being identified.

**Annual Audit of the WRT Radiation Protection Program
March 2015**

3.2 External Inspections

There were a number of external inspections at the WRT drinking water treatment sites that were performed by state regulators during the 2014 period. These included, but are not limited to:

1. Illinois Emergency Management Agency (IEMA):

Illinois Prairie Estates during media exchange– October 9, 2014 - Mr. K. Grahn

No findings were identified by the IEMA inspector as a result of this inspection.

2. New Jersey Department of Environmental Protection, Bureau of Environmental Radiation

Aqua NJ Southern/Erial- Well 14 and 15- June 18, 2014 - Inspector- Ms. Sarah Staab

Upper Deerfield Township– August 13, 2014 - Inspector – Ms. Sarah Staab

Vineland- Vineland 12- October 16, 2014- Ms. Sarah Staab

NJ American Water Temporary- August 19, 2014- Ms. Sarah Staab

No findings or recommendations were identified by the NJDEP inspector.

3. Texas Department of State Health Services

Zavala, TX, - April, 25, 2014-- Inspector- Mr. R. Winkelmann

No findings or recommendations were identified by the TXDHS inspector

4 Colorado Department of Health and Environment

Schwartzwalder Mine site- December 12, 2014- Inspector- Mr. E. Etherington

A Notice of Apparent Violation (NOAV) was issued by the inspector for failure of WRT to maintain the required documentation at the site as required by the current WRTCO

**Annual Audit of the WRT Radiation Protection Program
March 2015**

license/license condition. WRT addressed the NOAV by requesting a license amendment to delete this license condition.

4.0 Notices of Violations

There were two (2) Notice of Violations (NOVs) issued to WRT in 2014. One was issued by Mr. E. Etherington of the Colorado Department of Public Health and Environment, Radiation Control Unit. See Item 4 above. The second NOV was issued by the Nebraska Department of Human Health Services on July 25, 2014 by Mr. B. Miller for failure of WRT to provide a timely notice of a resin exchange as required by the WRT NE license.

5.0 Postings, Signs and Notices

During the various internal/external, inspections/audits performed during 2014 there were no issues identified related to postings, signs, or notices (Notice to Workers). Many of the regulatory agencies update/revise their "Notice to Employees" without notification to the licensee. This requires the licensee to continuously go to the regulatory agency's website to identify any changes in the radiation protection regulations including revised notices. Both the CA and NRC "Notices to Workers" were found to be outdated and in need of updating. Actions were taken by Mr. K. Stovall, RSO to update the subject notices during the time of the audit. The auditor recognizes this challenge of maintaining current regarding the most recent notice and regulations. (See Section 15.0)

6.0 Radiological Instrumentation

Condition

Radiological instrumentation used by WRT to support media exchanges and other related work was evaluated both during onsite use and offsite storage (WRT Corporate Offices). All instrumentation was found to be in good working condition and in calibration. Daily instrument source and background checks were performed by the WRT RSO prior to use and appropriately documented. A review of the daily instrument source and background forms found the documentation to be complete.

Calibration

A review of the instrumentation (listed in Attachment 1) currently being stored at the WRT Corporate Offices in Arvada, Colorado was performed on March 2, 2015 and found to be in good working order and in current calibration. A review of the calibration certificates for all of the instruments in use by WRT (either by WRT field service representatives, WRT RCT, or the WRT RSO were found to be complete, appropriately filed, and available to the auditor for inspection. The status of the

**Annual Audit of the WRT Radiation Protection Program
March 2015**

instrumentation is managed and maintained by the RSO via a database/matrix (Survey Meter and Detector Head Inventory) which presents all of the instrumentation, model and serial numbers, status of calibration, and copies of calibration certifications.

WRT currently uses Ludlum Instruments, Sweetwater, Texas and Griffin Instruments, Kingston, Tennessee as their calibration vendors. As part of their service, Griffin Instrument provides the RSO with a notice of calibrations due which serves as an independent check on the status of the calibration of the instrument(s).

Instrument Check Sources

Check sources used to perform daily instrument performance checks are maintained by the RSO in a locked box which is located in lockable file cabinet located in the RSO's office. The main WRT building is also locked after hours. An inspection of the check sources demonstrated that all of the check sources were inventoried/listed and accounted for.

7.0 Media Exchanges

Media exchanges performed during 2014 are presented in Attachment 2.

8.0 Training

The auditor reviewed documentation in support of WRT personnel and CWS/HOA personnel radiation safety training. See Attachment 3.

WRT Personnel Training

Training documentation of WRT personnel was reviewed during the audit. In general, is a relatively clear paper trail to confirm that appropriate WRT individuals have received the required training (Radiation Worker, DOT HazMat, etc).

CWS/HOA Personnel Training

The audit found that a strong effort was made to ensure that appropriate initial and refresher Radiation Safety Awareness Training was provided to the CWS Utility Operators and Managers and HOA personnel. However, there appeared to be a small number of CWS personnel that may have not received the subject refresher training since a number of the required reading sign-off sheets were not returned as requested.

**Annual Audit of the WRT Radiation Protection Program
March 2015**

The auditor recognizes that maintaining the training of CWS/HOA personnel current is a challenge. CWS/HOA personnel staff are continuously changing (many times without WRT's knowledge) at any given CWS/HOA and some CWSs and/or individuals failed to return the required reading sign-off sheets.

Attachment 3 lists the Radiation Safety Awareness Training that was provided to CWS/HOA personnel in 2014. During the audit, it was discussed with the RSO to continue with the preparation of a simplified "required reading" for the refresher training of the CWS/HOA personnel that would be included as part of the annual dosimetry reports issued to the CWA/HOA personnel. It was also discussed that consideration be given to the evaluation of the current training presentation/content in light of reducing the amount of information contained in the training program and revising it commensurate with the CWS personnel activities while complying with list of training topics identified in CWS training program presented in the Client/WRT license applications.

9.0 Dosimetry

The WRT Dosimetry Program consists of dosimeters issued for WRT personnel, CWS personnel, and for System (Primary and Secondary stages vessels) and Areas (a distance away from vessel), and specifically for NJ, the placement of a dosimeter on all vessels, area, and fence line.

WRT Dosimetry

The Dosimetry Program which involves WRT personnel appeared to be well executed and maintained. Results of doses are provided to WRT personnel on an annual basis. The CRSO reviews/signs-off on all quarterly and annual dosimetry reports.

CWS/HOA Dosimetry

A review of the CWS/HOA portion of the WRT Dosimetry program revealed that the execution and maintenance of the program is satisfactory. There were still some instances that occurred in 2014 (delayed installation/return, lost badges) that demonstrate that continued attention to these instances are warranted. .

With the increase in the number of systems being installed and operated, and hence, an increase in the number of dosimeters to be managed, it is important that close attention be placed on this item to minimize the identified issues. This is especially important since WRT's long term goal is to reduce the number of dosimeters that will be required to be issued. A database has been established to track the status of dosimeter exchanges and results. This will assist in monitoring the execution of the dosimetry program.

Copies of dosimetry reports for the NJ CWSs (personnel, vessel, and area) are being sent to the NJDEP within the 15-day requirement specified in the CWS license conditions. Quarterly and annual dosimetry

**Annual Audit of the WRT Radiation Protection Program
March 2015**

reports are being reviewed by the CRSO. Annual dosimetry reports are being sent to the CWS/WRT personnel.

10.0 Radiological Protection Plan and Field Procedures

The WRT radiation protection program is described in detail in the various WRT license applications. However, this Program is not readily available to WRT personnel for their use or to regulatory personnel who may want to review the Program during their routine audits of the WRT Radiation Protection.

The existing radiological field procedures were found to be signed off by the CRSO but not by the WRT President. Action should be taken to obtain the required signature and issue the subject procedures.

There is a need to incorporate the WRT Radiological Protection Program described in the various license applications into a separate stand-alone document. Action should be taken to complete the preparation of this document as soon as possible.

11.0 License(s) Status

The current WRT licenses were reviewed. The status of the licenses is provided in the following section.

WRT Licenses

A number of license/amendments/renewals were prepared and or obtained in 2014. These include but are not limited to:

WRT, Eden, Texas- October 22, 2014- License Amendment 6 issued

WRT, Grand Island- October 20, 2014 – License Amendment 3 issued

Bridgeton, NJ – May 21, 2014 – License Renewal issued

Bridgeton, NJ- May 27, 2014- License Amendment issued

WRT, Canoncito, New Mexico– February 13, 2014- License Renewal issued

Aqua NJ, Central/Hamilton- August 13, 2014- License Amendment issued

Aqua NJ, Southern/Erial- July 17, 2014- License Amendment issued

NJ American Water, NJ – July 29, 2014 - Initial License issued

**Annual Audit of the WRT Radiation Protection Program
March 2015**

12.0 Records

Records documenting surveys, training, dosimetry, instrument calibration, and shipping/manifest were evaluated during the audit. Documentation of such is maintained in both hard copy (Central File) and electronic version ("P Drive").

Surveys

Documentation of all surveys reviewed was found to be complete, legible and well maintained. Daily instrument performance check logs were reviewed and found to be complete, legible, and well maintained.

Training

The audit reviewed documentation in support of the Radiation Safety Training provided to WRT personnel and the Radiation Safety Awareness Training provided to CWS/HOA personnel in 2014. See Attachment 3. The audit found continued improvements in the documentation of training records for the various CWS personnel, as well as, WRT personnel.

WRT Personnel Training

Training documentation of WRT personnel was reviewed during the audit. In general, the documentation provides a relatively clear paper trail to confirm that appropriate WRT individuals have received the required training (Radiation Worker, DOT HazMat, etc).

CWS/HOA Personnel Training

The audit found that a strong effort was made to ensure that appropriate initial and refresher Radiation Safety Awareness Training was provided to the large number of CWS Utility Operators and Managers and HOA personnel. However, there are still a small number of CWS personnel that have not received the subject initial training. The auditor identified 9 CWS individuals from Brookfield (6) and Pewaukee (3), WI; 2 CWS individuals from Oswego, IL; and 1 individual from Elburn, IL treatment sites that have not yet received their initial Radiation Safety Awareness Training.

While WRT System Specialists are responsible for the handling of any of the radioactive material and CWS personnel are not involved in any radioactive material handling activities, such voluntary training is more for "awareness/peace of mind" for the CWS personnel rather than health and safety, and it is not directly required for the performance of the CWS personnel tasks in and around the treatment systems.

The auditor recognizes that maintaining the training of CWS/HOA personnel current is a challenge. CWS/HOA personnel staff are continuously changing (many times without WRT's knowledge) at any

**Annual Audit of the WRT Radiation Protection Program
March 2015**

given CWS/HOA. Furthermore, the cost and time required to provide a classroom training opportunity for the subject training is increasing.

Based on the above, continued priority attention needs to be given to providing initial and refresher Radiation Safety Awareness Training to CWS personnel and to ensure the implementation and maintenance of this training.

During the audit, it was discussed with the RSO the success of the simplified "required reading" for the refresher training of the CWS/HOA personnel that is included as part of the annual dosimetry reports issued to the CWA/HOA personnel. The result of this approach has shown promise and is working relatively well. It was also discussed the need for streamlining the initial CWS Radiation Safety Awareness Training.

Dosimetry

Documentation of dosimetry records was found to be complete and well maintained (with continued effort). Reports are being submitted to the NJDEP for NJ CWSs within the required 15 day period specified in the CWS license condition. Annual dose reports are sent to all CWS/HOA personnel.

Instrument Calibration

Documentation of instrument calibrations was found to be complete and well maintained. No issues were identified during the audit. See Attachment 2A for instruments which calibration certifications were reviewed and Attachment 2B for daily instrument check documentation.

Shipping Documentation

Documentation of shipping records/waste manifests in support of media/resin exchanges were found to be complete and well maintained. No issues were identified during the audit.

13.0 Staffing

The auditor in previous audits of WRT Radiation Protection Program identified that staffing of the radiation protection group was adequate, but being strained. License applications/amendments were being prepared and submitted in timely manner; media exchanges were being supported; semi-annual inspections were being performed; baseline surveys and other surveys were being completed and reviewed; dosimetry records were being maintained and issues resolved; and training was being provided and training records maintained. However, signs of weaknesses/deficiencies in the administrative function of maintaining the training, dosimetry, and quarterly inspection data bases were apparent.

**Annual Audit of the WRT Radiation Protection Program
March 2015**

The maintenance of the various data bases/records in support of the WRT Radiation Protection Program was being performed by the RSO. Because the RSO was also the primary individual responsible for the support of the media exchanges and since the number of media exchanges had continued to increase, the RSO has had to dedicate more of his time to support these media exchanges and had less time to support the administrative effort required to maintain the data bases. As additional treatment systems become operational, and more training, dosimeters, media exchanges and support surveys were required, the administrative needs to maintain these data bases was becoming even greater.

With the responsibilities and roles of the radiological staff increasing, especially the need to support more and more media exchanges, the need for meeting the administrative needs of the program more often than not took second priority. This situation provided increased opportunities for “missing” a number of important administrative requirements such as timely notification to the regulatory agency of the scheduled media exchanges. This lack of attention to the administrative requirements of the WRT license conditions (and license conditions of the CWS licensees who WRT provides radiological support to), may lead to unwanted notices of violations from the regulatory agency.

As identified in the previous audits, more and more systems are coming on line, and the frequency for media exchanges is increasing. This increase is requiring the CRSO and the VP Government Affairs radiological support personnel to be out of the office several weeks a year. Furthermore, as was the case in 2010-2013 and continued in 2014, several exchanges were scheduled back to back or within a relatively short time frame between exchanges.

Discussions with the WRT Operations Manager revealed that additional WRT operation personnel will continue to be hired to address the increase in the number of systems requiring media exchanges, maintenance, and more recently the need for conversion from upflow to downflow configuration, and to address the number of systems requiring installation/startup. The increase in startup and media exchanges and other field support work more than likely will require that two operation teams be out in the field simultaneously. This will require that radiological support (perform baseline surveys for start up and radiological control and survey support for the media handling, packing, transport, disposal including the related survey and shipping documentation be provided to each of these teams, as appropriate.

In light of the above, the auditor recommended that WRT management consider providing administrative/radiological support to the radiological group to assist in their implementation and maintenance of the various radiological support responsibilities.

In June of 2014, WRT hired Mr. Paul Tschida, a Sr. Radiation Control Technician, to provide support to the radiation group. Mr. Tschida has over 25 years of experience in the radiation field. Mr. Tschida's acquisition is a step in the right direction for providing the administrative/technical/field support to the radiological group that was sorely needed. In the short time that Mr. Tschida has been “onboard” he has been able to assist

**Annual Audit of the WRT Radiation Protection Program
March 2015**

14.0 ALARA

A review of the WRT and CWS personnel dosimetry records revealed that doses were maintained reasonably low. There were no unusual doses recorded. The program is being implemented effectively and thus, no modifications are necessary at this time to the WRT ALARA Program. WRT personnel and CWS personnel doses were reported to be less than 4mRrem/yr.

15.0 Changes in Agreement State/NRC Radiation Protection Standards and Requirements

A review of the various Agreement States (New Jersey, New York, North Carolina, Virginia, Colorado, Nevada, California, Texas, Nebraska, Illinois, Georgia, Wisconsin, New Mexico, South Carolina, South Dakota, Missouri, Nevada) and NRC where WRT has a license or has a uranium/radium and/or uranium/radium removal system/pilot system operating in 2014, radiation protection standards and requirements were performed. Based on that review, no changes or modification to the WRT Radiation Protection Program are necessary.

However, the auditor does recognize that certain changes such as the revisions of the "Notice to Employees", NRC Safety Culture Policy, and General Notices are a challenge to being able to stay current with these types of changes without going onto each and every regulatory agency website frequently. At the time of the audit, both the NRC and the California "Notice to Employees" posted by WRT were found to be out of date. Copies of the most recent version of the notices were posted at the appropriate locations. Continued effort will be made to keep as current as practical.

16.0 Miscellaneous

As part of the audit, a walk through inspection of the vessel fabrication/storage area of the WRT Facilities located in Arvada, Colorado was conducted. During the inspection the following items were noticed:

1. There are several 5-gallon buckets of resin being stored in the area. Some of the resin appears to be "clean/used resin" while other buckets appear to contain some level of uranium loading due to the fact that exposure rates taken in and around these buckets were between 2-3 times background using a L 19. The buckets were not marked or stored in a protective manner. No radiological controls are being implemented for those buckets which appear to contain loaded resin.
2. There are several "pilot test" units that are stored on the floor with other materials. These units appear to be in various states and conditions. Some appear to be clean of resin/media, others contain media/resin, although it was not determined if the media/resin was used in an actual

**Annual Audit of the WRT Radiation Protection Program
March 2015**

test, and others contained solid residuals of unknown material(s). Not radiological surveys have been performed on these units and no radiological controls are being implemented for those units that may contain loaded resin/media.

17.0 Issues

As a result of the audit, the no specific major issues were identified.

18.0 Personnel Interviewed

The list of WRT Personnel interviewed during this audit is presented in Attachment 4.

19.0 Conclusion and Recommendations

Conclusion

As a result of the audit, the WRT Radiation Protection Program including the ALARA Program was found to be effectively implemented. However, a number of items/areas have been identified that need attention to ensure that the Program continues to be efficiently and effectively maintained and implemented.

Recommendations

Based on the results of the audit, the following recommendations are presented:

1. The WRT radiation protection program is described in detail in the various WRT license applications. However, this Program is not readily available to the WRT personnel to use or to regulatory personnel who may want to review the Program during their routine audits of the WRT Radiation Protection. Hence, there is a need to incorporate the WRT Radiological Protections Program described in the various license applications into a separate stand-alone document. Therefore, it is recommended that action be taken to complete the preparation of the WRT Radiation Protection Plan.

The existing WRT radiological field procedures were found to be signed off by the CRSO, but not by the WRT President. Thus, the procedures have not been issued for implementation. Therefore, it is recommended that the subject procedures be signed off by the President and issued for implementation.

**Annual Audit of the WRT Radiation Protection Program
March 2015**

2. The 5-gal buckets full of resin currently stored in the WRT "Shop" are not properly marked or stored and the radiological control needs undetermined. Therefore, it is recommended resin buckets be evaluated as to the need for appropriate labeling, radiological controls, storage controls, and ultimate disposition of the material, as necessary.

3. The "pilot test" units currently stored in the WRT "Shop" are in various states and conditions and the radiological conditions of the units undetermined. Therefore, it is recommended that the units undergo radiological surveys to determine the radiological conditions and need for the appropriate labeling, radiological controls, storage controls, and disposition, as necessary.

4. Initial (and Refresher) Radiation Safety Awareness Training is to be provided to CWS personnel as a voluntary action. WRT has elected to provide such training to all CWS/HOA personnel. There are 12 CWS personnel that need to have initial Radiation Safety Awareness Training. It is recommended that the subject training provided to these individuals as soon as reasonably possible. It is suggested that the training be provided to the WI CWS personnel during the upcoming semi-annual inspections/surveys of the WI treatment system which will take place before June 30, 2015. Other appropriate arrangements should be made with the IL CWS personnel.

**Annual Audit of the WRT Radiation Protection Program
March 2015**

Attachment 1A Radiological Instrumentation- Calibration

<u>Instrumentation</u>	<u>Serial Number</u>	<u>Calibration Date</u>	<u>Calibration Due Date</u>
Ludlum 19	238786	05/30/14	05/30/15
Ludlum 19	244979	02/11/14	02/12/15
Ludlum 19	238715	09/10/14	09/10/15
Ludlum 19	253077	05/30/14	05/30/15
Ludlum 19	282718	08/04/14	08/04/15
Ludlum 19	282794	08/21/14	08/21/15
Ludlum 19	244979	02/11/14	02/11/15
Ludlum 3030	247403	10/13/14	10/13/15
Ludlum 43-10-1	263693	10/13/14	10/13/15
Ludlum 2241-2	243225	12/02/14	12/02/15
Ludlum 44-9	262082	12/02/14	12/02/15
Ludlum 43-5	262385	12/02/14	12/02/15
Ludlum 2401-P	181421	12/02/14	12/02/15
Ludlum 2401-P	188826	09/10/14	09/10/15
Ludlum 2401-P	190956	09/30/14	09/30/15
Ludlum 2401-P	190859	09/10/14	09/10/15
Ludlum 2401-P	200608	09/10/14	09/10/15
Ludlum 2401-P	200614	11/13/14	11/13/15
Ludlum 2241-2	254723	Stolen	Stolen
Ludlum 44-9	271879	Stolen	Stolen
Ludlum 43-5	272560	Stolen	Stolen
Ludlum 2241-2	298489	06/27/14	06/27/15
Ludlum 44-9	325643	06/27/14	06/27/15

**Annual Audit of the WRT Radiation Protection Program
March 2015**

Ludlum 43-5	325345	06/27/14	06/27/15
Ludlum 2241-2	237687	07/25/14	07/25/15
Ludlum 44-9	251821	07/25/14	07/25/15
Ludlum 43-5	252521	07/25/14	07/25/15
Ludlum 3030	328279	09/25/14	09/25/15
Ludlum 43-10-1	337586	09/25/14	09/25/15
Ludlum 2241-2	255639	01/14/14	01/14/15
Ludlum 44-10	273154	01/14/14	01/14/15
Ludlum 2241-2	313893	10/16/14	10/16/15
Ludlum 44-9	334312	10/16/14	10/16/15
Ludlum 43-5	342622	10/16/14	10/16/15

**Annual Audit of the WRT Radiation Protection Program
March 2015**

Attachment 1B Daily Performance Check Logs

<u>Instrumentation</u>	<u>Serial Number</u>
Ludlum 2241-2	255639
Ludlum 44-10	273154
Ludlum 3030E	328279
Ludlum 43-10-1	337586
Ludlum 3030E	247403
Ludlum 43-10-1	263693
Ludlum 2241-2	313893
Ludlum 43-5	342622
Ludlum 44-9	343120
Ludlum 2241-2	298489
Ludlum 43-5	262385
Ludlum 44-9	325643
Ludlum 2241-2	243225
Ludlum 43-5	262385
Ludlum 44-9	262082
Ludlum 19	244979

Note: the serial numbers for the detectors are preceded by a "PR"

**Annual Audit of the WRT Radiation Protection Program
March 2015**

Attachment 2 Media Exchanges 2014

A list of the media exchanges performed in 2014 is presented in Attachment 2.

Water Remediation Technology LLC

Spent Media Exchanges and Shipments - Annual Tracking Form

Reporting Year: 2014

Media Exchanges in State: All

Container Codes: 1 = 96-cu-ft Bag 2 = 96-cu-ft Reinforced Bag (+500 pCi/g) 3 = 42-cu-ft Reinforced Bag 4 = 96-cu-ft B-25 Metal Box 5 = 55-gal Drum
6 = PES Vessel 7 = Rolloff Box 8 = Industrial Bulk Container, IBC (plastic tote) 9 = 570-cu-ft Hopper Tanker(s) 10 = 30-cu-ft fiberboard box

Waste Shipment Date	Contaminant	CWS and Well Site	Container Code	Container ID	Est. Media Volume (cu ft)	Spent Media Weight (lb)	Activity - Parent Radionuclide (mCi)	Shipping Manifest Number	Disposal Site; Notes
1/23/2014	U	CA - Golden State Water, Murango Valley Wells Y2,Y3,V2	3,10	WRT-01 to -02	72	4,000	--	14-0225-01	USE ID Grand View, < 500 ppm
1/28/2014	U	CO - Mountain Water SD	8	WRT-01	14	620	4.8	14-0218-01	Cameco Crow Butte NE, 16,800 pCi/g, 17 lb U
2/12/2014	Ra	MO - Farmington, W13, W17	3	WRT-11 to -20	420	25,490	8.5	14-0211-01	USE ID Grand View, 1,400 pCi/g
			3	WRT-01 to -10	420	25,440	5.5	14-0207-01	USE ID Grand View, 870 pCi/g
		Subtotal			840	50,930	14.0		avg activ conc = 1,135 pCi/g
2/24/2014	U	GA - Lawrenceville, Ezzard Rd							Service only, see 9/3/14 for shipment
3/4/2014	Ra	MO - Farmington, W12, W4	3	WRT-01 to -08	336	19,430	5.0	14-0206-01	USE ID Grand View, 569 pCi/g
			3	WRT-09 to -16	336	19,640	5.8	14-0202-01	USE ID Grand View, 645 pCi/g
		Subtotal			672	39,070	10.8		avg activ conc = 607 pCi/g
4/8/2014	Ra	NC - Aqua NC, Brookwood W22	3	WRT-01 to -03	126	5,890	2.6	14-0138-01	USE ID Grand View, 937 pCi/g
4/8/2014	Ra	NC - Aqua NC, Brookwood 16	3	WRT-04 to -07	168	7,380	1.0	14-0146-01	USE ID Grand View, 285 pCi/g
4/8/2014	Ra	NC - Aqua NC, Cliffdale 14	3	WRT-08 to -14	294	14,410	3.0	14-0145-01	USE ID Grand View, 448 pCi/g
4/8/2014	Ra	NC - Aqua NC, Brookwd 51	3	WRT-15 to -16	84	4,510	2.1	14-0141-01	USE ID Grand View, 1,013 pCi/g
5/8/2014	Ra	IL - Bartlett, W4	3	WRT-11 to -22	504	34,270	5.9	14-0030-01A	USE ID Grand View, 381 pCi/g
			3	WRT-01 - 10;-23	462	29,090	2.9	14-0030-01B	USE ID Grand View, 220 pCi/g
		Subtotal			966	63,360	8.8		avg activ conc = 307 pCi/g
5/19/2014	Ra	WI - Brookfield, BSQ 1	3	WRT-01 to -14	588	35,080	5.3	14-0042-01A	USE ID Grand View, 326 pCi/g
			3	WRT-15 to -29	630	38,300	5.8	14-0042-01B	USE ID Grand View, 334 pCi/g
		Subtotal			1,218	73,380	11.1		avg activ conc = 330 pCi/g
6/9/2014	Ra	NJ - United Water, Whitesville	7	No. 3064	500	29,000	15.9	14-0198-01	USE ID Grand View, 1,210 pCi/g
6/26/2014	Ra	IL - Oswego, W7	3	WRT-01 to -14	588	37,140	13.6	14-0004-01A	USE ID Grand View, 809 pCi/g
7/10/2014	Ra	IL - Oswego, W4	3	WRT-01 to -13	546	31,720	14.2	14-0002-01	USE ID Grand View, 980 pCi/g
7/17/2014	Ra	IL - Sycamore, W9	3	WRT-01 to -12	504	31,860	3.0	14-0020-01	USE ID Grand View, 211 pCi/g
7/23/2014	U	NE - Grand Island, Central Basin, Train 2	9	WRT-01 & -02	775	37,500	20.7	14-0214-01	Cameco Smith Ranch-Highland WY, Sale of Used Resin, 1,340 pCi/g, 68 lb U
7/31/2014	Ra	IL - Elburn, W5	3	WRT-01 to -17	714	42,630	10.6	14-0014-01	USE ID Grand View, 695 pCi/g
8/6/2014	U	NE - Grand Island, Central Basin, Train 1	9	WRT-01 & -02	1,050	46,200	25.4	14-0214-02	Cameco Crow Butte, 1,215 pCi/g, 84 lb U. Stripped resin returned to WRT.

Water Remediation Technology LLC

Spent Media Exchanges and Shipments - Annual Tracking Form

Waste Shipment Date	Contaminant	CWS and Well Site	Container Code	Container ID	Est. Media Volume (cu ft)	Spent Media Weight (lb)	Activity - Parent Radionuclide (mCi)	Shipping Manifest Number	Disposal Site; Notes
9/3/2014	U	GA - Lawrenceville, Ezzard Rd	8	WRT-01 to -03	82	4,100	23.5	14-0177-01	Cameco Crow Butte, 12,600 pCi/g, 82 lb U
			10	WRT-04	30	360	--	14-0177-01	USE ID Grand View, PPE, debris, conc < 500 ppm U
9/21/2014	Ra	NJ - Vineland, W12	7	DW3003	730	31,000	2.0	14-0257-01	USE ID Grand View, 129 pCi/g
10/2/2014	Ra	WI - Pewaukee	3	WRT-01 to -10	420	24,230	6.1	14-0121-01	USE ID Grand View, 550 pCi/g
10/22/2014	Ra	IL - Illinois Prairie Estates	3	WRT-01 to -03	210	11,690	0.5	14-0029-01	USE ID Grand View, 110 pCi/g
10/23/2014	Ra	SD - New Underwood	3	WRT-01 to -06	252	11,390	3.2	14-0186-01	USE ID Grand View, 586 pCi/g
10/30/2014	Ra	IL - Cortland, W4	3	WRT-01 to -11	462	28,230	4.5	14-0016-01A	USE ID Grand View, 346 pCi/g
			3	WRT-12 to -22	462	27,590	3.5	14-0016-01B	USE ID Grand View, 278 pCi/g
		Subtotal			924	55,820	8.0		avg activ conc = 312 pCi/g
11/7/2014	Ra	IL - Oswego, W10	3	WRT-01 to -11	462	28,860	10.6	14-0007-01A	USE ID Grand View, 807 pCi/g
			3	WRT-12 to -22	462	28,290	15.1	14-0007-01B	USE ID Grand View, 1,163 pCi/g
		Subtotal			924	57,150	25.7		avg activ conc = 983 pCi/g
11/21/2014	Ra	NJ - Upper Deerfield, Love Lane	3	WRT-01 to -13	546	27,660	9.5	14-0182-01A	USE ID Grand View, 705 pCi/g
			3	WRT-14 to -26	546	32,720	8.1	14-0182-01B	USE ID Grand View, 542 pCi/g
		Subtotal			1,092	60,380	17.6		avg activ conc = 617 Pci/g
12/15/2014	Ra	NJ - United Water, Parkway	7	DW3005	426	25,600	15.0	14-0197-01A	USE ID Grand View, 1,290 Pci/g
			7	DW2055	291	17,500	7.7	14-0197-01B	USE ID Grand View, 970 pCi/g
			7	No.279056	500	30,000	12.7	14-0197-01C	USE ID Grand View, 932 pCi/g
		Subtotal			1,217	73,100	35		avg activ conc = 1,066 pCi/g

Subtotal - Radium Media Exchanges

12,989 756,040 209

Subtotal - Uranium Media Exchanges

1,993 92,420 74

approx 251 lb U

Total - Spent Media to LLRW Landfills or Other License Facilities

14,982 848,460 284

Non-Compact Waste Shipments to Local Subtitle D Landfills

4/24/2014	Ra	IL - Bartlett, W7	7	B201342	330	19,800	1.8	14-0032-01A	WMI Larawy Landfill, < 200 pCi/g
	Ra		7	W20-040	330	19,800	1.8	14-0032-01B	WMI Laraway Landfill, <200 pCi/g
		Subtotal			660	39,600	3.6		

Total - Local Landfill Disposals

660 39,600 3.6

Grand Total - All Media Exchanges

15,642 888,060 287

**Annual Audit of the WRT Radiation Protection Program
March 2015**

Attachment 3 Training/Refresher Training

The following WRT and CWS/HOA training was reviewed:

WRT

Radiation Safety Training for System Specialists

Radiation Safety	Refresher	D. Bollig/T. Adams	01/29/14
Radiation Safety	Refresher	Required Reading	09/02/14
Radiation Safety	Refresher	Required Reading	09/23/14
Radiation Safety	Initial	D. Bollig/K. Stovall	05/13-14/14
Radiation Safety	Instrumentation	D. Bollig/K. Stovall	05/13-14/14
Radiation Safety	Initial	D. Bollig	11/11-12/14
Radiation Safety	Refresher	Required Reading	12/07/14

CWS/HOA

Radiation Safety Awareness Training for CWS/HOA personnel

San Angelo, TX	Initial	T. Adams	
Eden, TX	Initial	T. Adams	
Elburn, IL	Refresher	Required Reading	09/24/14
Cortland, IL	Refresher	Required Reading	11/14/14
Bartlett, IL	Refresher	Required Reading	10/16/14
IPE, IL	Refresher	Required Reading	09/15/14
Antioch, IL	Refresher	Required Reading	09/19/14
Sycamore, IL	Refresher	Required Reading	10/14/14
Oswego, IL	Refresher	Required Reading	10/20/14
Farmington, MO	Refresher	Required Reading	10/27/14
Zavala, TX	Refresher	Required Reading	09/10/14

**Annual Audit of the WRT Radiation Protection Program
March 2015**

Falling Waters, TX	Refresher	Required Reading	09/08/14
Fox Run, VA	Refresher	Required Reading	11/11/14
Arbors, WI	Refresher	Required Reading	09/03/14
Brookfield, WI	Refresher	Required Reading	09/19/14
Ethan Allen, WI	Refresher	Required Reading	N.O.
Pewaukee, WI	Refresher	Required Reading	02/10/15
Bass Lake, CA	Refresher	Required Reading	09/03/14
Mission Springs, CA	Refresher	Required Reading	09/03/14
Royal Carrizo, CA	Refresher	Required Reading	10/21/14
Golden State Water, CA	Refresher	Required Reading	09/10/14
Lawrenceville, GA	Refresher	Required Reading	09/15/14
Aqua NC Brookwood/LaGrange,NC	Refresher	Required Reading	09/05/14

Note: N. O. = Not Operational

**Annual Audit of the WRT Radiation Protection Program
March 2015**

Attachment 4: WRT Personnel Interviewed

1. Duane Bollig
2. Kent Stovall
3. David Jones
4. Mike Dimitriou
5. Dan Debello
6. David Jones
7. Paul Tschida
8. Mark Thompson
9. Ron Dollar
10. Rory Roman
11. John Thome
12. Dave Melancon