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SRB TECHNOLOGIES (CANADA) INC.

2014

Annual Compliance and Performance Report

Licence Number NSPFOL-13.00/2015

Licence Condition Number 2.4

Submission Date:	March 31, 2015
Submitted to:	Jennifer Campbell Project Officer, Canadian Nuclear Safety Commission
Prepared by:	Jamie MacDonald Manager of Health Physics and Regulatory Affairs SRB Technologies (Canada) Inc. Signature
Reviewed by:	Ross Fitzpatrick Vice President SRB Technologies (Canada) Inc. Signature
Approved by:	Stephane Levesque President SRB Technologies (Canada) Inc. Signature

EXECUTIVE SUMMARY

SRBT is pleased to provide this compliance report to the Canadian Nuclear Safety Commission as part of our licensed activities.

Overall, 2014 was a successful year on virtually every account. As the business has grown, so has our commitment to ensuring that the qualified resources available to manage and execute our licensed activities. Organizational improvements have been made in areas of radiation protection and health physics as well as internal compliance with company programs and procedures.

We continue to process tritium safely, responsibly and efficiently. The ratio of the amount of tritium released to atmosphere versus the amount of tritium that we process has continued to decrease in 2014, where we achieved a new low value of 0.23%, meaning that for every 100 units of tritium that goes into our product, only 0.23 units is released as gaseous effluent. This ratio was as high as 1.70% in 2008.

In 2014, a total of 28,714,118 GBq of tritium was processed and we are expecting that tritium processed will increase by 15% in 2015.

We expect that in 2015, the ratio of tritium released to atmosphere to processed will continue to trend down, falling below our target of 0.22%. We also expect that tritium released to atmosphere per week will be less than 2014, and achieve our target of 1,272 GBq per week.

The modifications to our processing strategies and several emission-reduction initiatives continue to pay dividends with respect to worker dose, public dose, and the environmental impact of our facility. The collective dose to our staff reached an all-time low for a full processing year at less than 5 mSv, despite increases in production and the number of staff; in fact, only a single staff member exceeded 1 mSv for the year.

Senior Management has committed to targets that will maintain both the average and maximum occupational dose in 2014 at levels no greater than experienced in 2013, despite small projected increases in production.

The calculated public dose remains much less than 1% of the prescribed limit of 1 mSv, as derived from direct sampling and monitoring of the local environment. Groundwater concentrations continue to respond favorably as they recover from historical processing practices.

A significant amount of equipment relating to radiation and environmental protection has been modernized in 2014. SRBT purchased and commissioned new stack monitoring equipment, including new real-time tritium-in-air monitors, new bubbler units, and a new digital chart recorder for tracking emissions in real-time. New liquid scintillation counters were also procured, installed and commissioned, and several new portable tritium-in-air monitors were put into use.

Our facility continues to be subjected to several independent assessments during the year, and we have in place an expanded internal compliance program to complement these audits. In 2014 CNSC Staff performed one Type II Environmental Protection Inspection of the facility, where one recommendation and one action notice was identified and has since been addressed.

EXECUTIVE SUMMARY (Continued)

There was also one audit by our ISO 9001: 2008 registrar BSI Management Systems, one inspection by the Pembroke Fire Department and one inspection by a Fire Protection Consultant, where one minor issue was identified and has since being addressed.

We have continued to operate the facility in an open and transparent manner. One request for information was made by the public in 2014, which was fulfilled immediately. We made a presentation to our local municipal officials, and performed a significant amount of outreach. Various public information initiatives were taken including providing plant tours to local citizens and frequent web site updates with the latest environmental monitoring results.

The ways in which we manage our facility continue to evolve and change in response to new requirements. In 2014, SRBT provided CNSC Staff revisions of several key documents associated with our licensing basis, including the Radiation Safety Program, Maintenance Program, Quality Manual, Preliminary Decommissioning Plan, Cost Estimate and Financial Guarantee, Waste Management Program, and Public Information Program.

In addition, a new Training Program Manual was documented and accepted for use in line with new regulatory guidance. Our training program is now systematic in nature, and is focused on reducing the frequency and significance of human errors associated with safety-critical work.

In 2015, the Safety Analysis Report, Environmental Monitoring Program, Fire Protection Program, Contractor Management Program and Emergency Plan are all scheduled to undergo revision in response to changes in the regulatory requirements associated with our facility. As well, several new or revised processes are being documented in line with our action plan to comply with new requirements relating to our management system.

Site specific requirements for payments to the decommissioning escrow account have been met - a completely self-funded vehicle that does not rely on insurance, letters of credit or third part resources.

Overall, 2014 represents a successful year for SRBT; however, improvements in compliance and safety will never cease, and we will continue to strive to reduce doses to our workers, the public, and our impact on the environment.

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1.0 INTRODUCTION

1.1 GENERAL INTRODUCTION

For all of 2014, SRB Technologies (Canada) Inc. has been licensed under Canadian Nuclear Safety Commission Nuclear Substance Processing Facility Operating Licence, NSPFOL-13.00/2015[1]. Condition 2.4 of Licence NSPFOL-13.00/2015[1] reads:

The licensee shall prepare an annual compliance and performance report.

Section 3.2 of the Licence Conditions Handbook (LCH) LCH-SRBT-R000[2] for licence NSPFOL-13.00/2015[1] reads:

For licence condition 2.4, that the Annual Compliance Report should be submitted to the CNSC by March 31 of each year, covering the previous calendar year's operation including the following information:

i. Operational review including equipment and facility performance and changes, significant events/highlights that occurred during the year.

ii. Information on production including verification that limits specified in the licence was complied with.

iii. Modifications including changes in organization, administration and/or procedures that may affect licensed activities.

iv. Health physics information including operating staff radiation exposures including distributions, maxima and collective doses; review of action level or regulatory exceedence(s), if any, historical trending where appropriate.

v. Environmental and radiological compliance including results from environmental and radiological monitoring, assessment of compliance with licence limits, historical trending where appropriate, and quality assurance/quality control results for the monitoring.

vi. Facility effluents including gaseous and liquid effluent releases of nuclear substances from the facility, including unplanned releases of radioactive materials and any releases of hazardous substances.

vii. Waste management including types, volumes and activities of solid wastes produced, and the handling and storage or disposal of those wastes.

viii. Updates regarding activities pertaining to safety, fire protection, security, quality assurance, emergency preparedness, research and development, waste management, tritium mitigation and training (as applicable).

ix. Compliance with other federal and/or provincial Regulations.

x. A summary of non-radiological health and safety activities, including information on minor incidents and lost time incidents.

xi. Public information initiatives.

xii. Forecast for coming year(s).

1.1 GENERAL INTRODUCTION (Continued)

A CNSC Staff letter[3] dated March 10, 2011 provided a document[4] that outlined the reporting requirements for the 2011 and future Annual Compliance and Performance Reports for Class 1B Nuclear Facilities. SRBT produced the Annual Compliance Reports for 2011[5] and 2012[6] to these requirements. SRBT also produced the 2013 Annual Compliance Report[7] to these requirements and following review of this report CNSC Staff requested[8] that SRBT provide additional information which SRBT subsequently provided in an Addendum[9] on August 18, 2014. CNSC Staff accepted the 2013 Annual Compliance Report[7] and Addendum[9] in a letter[10] dated November 4, 2014.

The purpose of this report is therefore to provide the same information that was provided in the 2013 Annual Compliance Report[7] and Addendum[9] and to meet the requirements of conditions 2.4 of Licence NSPFOL-13.00/2015[1] providing the information in Section 3.2 of the Licence Condition Handbook LCH-SRBT-R000[2]. The information is reported in the basic format similar to that outlined in CNSC document[4] titled Annual Compliance Monitoring and Operational Performance Reporting Requirements for Class 1B Nuclear Facilities with the exception that some of the Tables and Figures are inserted in the relevant sections of the report rather than at the end of the report for ease of review.

1.2 FACILITY OPERATION

Throughout 2014 the facility was operated and maintained to all requirements of the Nuclear Safety Control Act (NSCA), Regulations, conditions of the Licence[1] and applicable safety programs and procedures. No regulatory limits were exceeded, and no building modifications were made. There were no action levels exceeded relating to bioassay and dosimetry, nor liquid effluent. However during the licence term, a single action level exceedance was reported[11] relating to tritium releases to atmosphere; an investigation was conducted resulting in a corrective action plan[12] which was accepted by CNSC Staff[13]. Both the initial and final detailed report on this event were posted to our public website, in accordance with our Public Information Program[14].

The Compliance Manager developed an audit schedule for 2014 which resulted in 18 internal audits being completed which resulted in 14 non-conformances (NCR) and 45 Opportunities for Improvement (OFI) being identified. In total 43 NCR's and 45 OFI's were raised in 2014 in several areas of the company operations.

In 2014 CNSC Staff performed one Type II Environmental Protection Inspection of the facility. The inspection[15] was conducted on April 10, 2014. One recommendation and one action notice was identified and has since been satisfactorily addressed.

In 2014 we also had an audit by our ISO 9001: 2008 registrar BSI Management Systems on November 12 and 13, 2014 which resulted in 3 opportunities for improvement being identified.

In 2014 we had inspections by the Pembroke Fire Department on May 7, 2014 and by a Fire Protection Consultant Nadine International Inc. on December 23, 2014. One minor issue was identified by the Pembroke Fire Department which will be addressed in early 2015.

In 2014 our staff increased from 36 to 43. All but one employee that was employed when the licence[1] was issued in July 2010 are working in the exact same positions. New staff with expertise and qualifications in areas of radiation, conventional and nuclear safety were added to our organization which had a direct impact in further increasing nuclear safety at the facility, and a positive impact on ensuring that our operations continue to remain safe and compliant, that worker exposures remain as low as reasonably achievable, and that SRBT continues to ensure the protection of workers, the public and the environment. By the end of 2014 our workforce had an average experience of just under 9 years with an average age of just over 40 years of age. The seven members of the Health Physics Team had a combined 107 years of work experience directly with the company. The company is now wholly-owned by the President Stephane Levesque and Vice President Ross Fitzpatrick who are Canadian residents, reside locally and have a full time, hands on role at the facility and together have more than 42 years of experience in the manufacture of tritium light sources and devices.

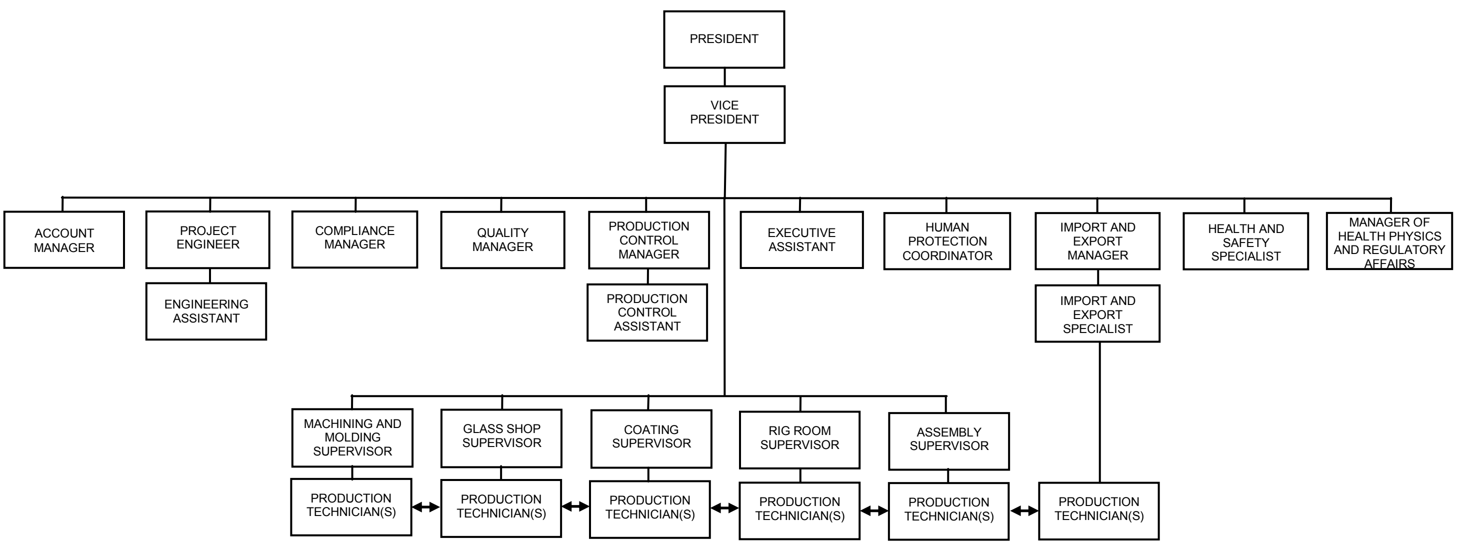
A number of committees meet on a regular basis to discuss various items that ensure compliance with the NSCA, Regulations and conditions of the Licence[1]. The information attained during these committee meetings has been extremely valuable in improving various safety programs and procedures and in ensuring the improvement in the provisions taken for the protection of the environment, the health and safety of persons and the maintenance of national security.

The Health Physics Committee which has formally met 25 times in 2014 is specifically responsible for review of all safety programs and safety related procedures to ensure that requirements of the NSCA, Regulations, conditions of the licence[1] are met. This Committee is comprised of seven employees including the President and Vice President who remain personally involved in the development and implementation of Safety Programs demonstrating a visible commitment to all staff. In a meeting[16] on April 9, 2014 the Manager of Health Physics and Regulatory Affairs was added to the Committee.

The Health Physics Committee continued to manage all processes relating to radiation safety and health physics. The Radiation Safety Program[17] was revised to reflect the addition of several new positions to the company, and procedures continue to be revised frequently as improvements are identified. This includes a new set of procedures specifically addressing activities associated with liquid scintillation counting.

The following organizational chart represents the current structure at the company that ensures SRBT meets the Nuclear Safety and Control Act, Regulations and conditions of the Licence[1]:

FIGURE 1: ORGANIZATIONAL CHART



A total of 43 employees work at the company including 15 administrative employees and 28 production employees.

The 15 administrative employees include:

Two members of Senior Management,

- President has the overall responsibility for the facility and ensures that all licensing requirements are met.
- Vice President assumes the full duties of the President in his absence or otherwise assists the President's in his duties.

Ten individuals at the Management level,

- Quality Manager is mainly responsible for the company Quality Assurance Program.
- Human Protection Coordinator is mainly responsible for identifying ways to reduce staff radiological exposure and for implementing of radiation safety procedures.
- Import and Export Manager is mainly responsible for the transport and receipt of radioactive materials.
- Executive Assistant is mainly responsible for environmental measurement and for providing administrative support to the President.
- Production Control Manager is mainly responsible for all company purchasing and production planning activities.
- Project Engineer is mainly responsible for all company research and development activities and the company maintenance program.
- Account Manager is mainly responsible for all company accounting activities.
- Health and Safety Specialist is mainly responsible for ensuring staff health and safety and ensuring compliance with the Occupational Health and Safety Regulations.
- Compliance Manager is mainly responsible for performing independent internal audits and further ensuring compliance.
- Manager of Health Physics and Regulatory Affairs is mainly responsible for oversight of all company Health Physics activities as well as communicating with CNSC Staff to ensure deadlines are met.

Three employees that assist individuals at the Management level,

- Import and Export Specialist assists the Import and Export Manager in their duties.
- Production Control Assistant assists the Production Control Manager in their duties.
- Engineering Assistant assists the Project Engineer in their duties.

The 28 production employees include:

Five Production Supervisors,

- Glass Shop Supervisor is responsible for all the activities within the Glass Shop Department.
- Coating Supervisor is responsible for all the activities within the Coating Department.
- Rig Room Supervisor is responsible for all the activities within the Rig Room Department.
- Assembly Supervisor is responsible for all the activities within the Assembly Department.
- Machining and Molding Supervisor is responsible for all the activities within the Machining and Molding Department.

23 Production Technicians,

- Production Technicians who are responsible for performing production activities to company procedures.

1.3 PRODUCTION OR UTILIZATION

1.3.1 POSSESSION LIMIT

Section IV (c) of Licence NSPFPL-13.00/2015[1] reads:

possess a maximum of 6,000 TBq of tritium in any form.

Throughout 2014 the possession limit was not exceeded. The maximum tritium activity possessed at any time during 2014 remained below 6,000 TBq. Tritium activity on site during 2014 can be found in **Appendix A** of this report.

At all times, unsealed source material was stored on uranium getter beds or in the handling volumes of the gas filling rigs.

1.3.2 RELEASE LIMITS TO ATMOSPHERE

Throughout the year SRB Technologies (Canada) Inc. operated under release limits to atmosphere prescribed under its Nuclear Substance Processing Facility Operating Licence number NSPFOL-13.00/2015[1] and its associated release limits to atmosphere which are outlined in Appendix A of the licence.

Stack release values in 2014 based on weekly sampling and analysis for tritium oxide (HTO) and elemental tritium (HT) were well below the release limits.

On average, the emissions of "HTO" were maintained at 15.94% of the licence limit and the emissions of "HTO + HT" were maintained at 14.77% of the licence limit. See Facility Emissions Data in **Appendix B** of this report:

TABLE 1: 2014 AIR RELEASES AGAINST RELEASE LIMIT

NUCLEAR SUBSTANCE AND FORM	LIMIT (GBq/YEAR)	RELEASED (GBq/YEAR)	RELEASED (GBq/WEEK)	% OF LIMIT
TRITIUM AS TRITIUM OXIDE (HTO)	67,200	10,712	206	15.94%
TOTAL TRITIUM AS TRITIUM OXIDE (HTO) AND TRITIUM GAS (HT)	448,000	66,161	1,272	14.77%

Total air emissions in 2014 have decreased by 16% of what they were in 2013 though production only decreased by 6%. In 2013, emissions of "HTO" were 26.52% (15.94% in 2014) of the licence limit and the emissions of "HTO + HT" were 17.61% (14.77% in 2014) of the licence limit.

1.3.3 TRITIUM PROCESSED

In 2014, a total of 28,714,119 GBq's of tritium was processed compared to a total of 30,544,759 GBq's in 2013.

Therefore 6% less tritium was processed in 2014 than in 2013.

1.3.4 TRITIUM RELEASED TO ATMOSPHERE vs TRITIUM PROCESSED

When analyzing the operation's performance at reducing emissions it is important to analyze the releases to atmosphere against the tritium processed. This provides an indication at how effective emission reduction initiatives have been successful in reducing emissions.

The following table defines the ratio of tritium released to atmosphere against tritium processed from 2008:

TABLE 2: TRITIUM RELEASED TO ATMOSPHERE vs TRITIUM PROCESSED

YEAR	TRITIUM RELEASED TO ATMOSPHERE (GBq/YEAR)	TRITIUM PROCESSED (GBq/YEAR)	% RELEASED TO PROCESSED	% INCREASE (+) REDUCTION (-)
2008	40,100	2,356,979	1.70	N/A
2009	40,547	5,045,720	0.80	- 53%
2010	36,426	6,643,732	0.55	- 31%
2011	55,584	7,342,449	0.76	+ 38%
2012	29,905	10,224,590	0.29	- 62%
2013	78,875	30,544,759	0.26	- 10%
2014	66,161	28,714,119	0.23	-12%

In 2014 the amount of tritium released to atmosphere to the amount of tritium processed was 0.23%. This is a 12% reduction from what it was in 2013.

1.3.5 ACTION LEVELS FOR RELEASES TO ATMOSPHERE

Action Levels to atmosphere are outlined in section 3.10 of the Licence Conditions Handbook number LCH-SRBT-R000[2]:

TABLE 3: ACTION LEVELS FOR RELEASES TO ATMOSPHERE

NUCLEAR SUBSTANCE AND FORM	WEEKLY ACTION LEVEL (GBq)
TRITIUM AS TRITIUM OXIDE (HTO)	840
TOTAL TRITIUM AS TRITIUM OXIDE (HTO) AND TRITIUM GAS (HT)	7,753

TABLE 4: CHART RECORDER ACTION LEVEL FOR RELEASES TO ATMOSPHERE:

MEASURE ON THE CHART RECORDER
10,000 µCi/m FOR A DURATION OF ONE HOUR

In 2014, a single action level exceedance was reported[11] relating to tritium releases to atmosphere as described in Table 3. This exceedance occurred during the period of October 28 to November 4, 2014 where 16,570 GBq of total tritium was released compared to an Action Level of 7,753 GBq representing 214% of the action level for the week. This release constitute 3.7% of the annual release limit for total tritium.

SRBT conducted an investigation and identified contributing causes, root causes and corrective actions. SRBT's investigation concluded that the higher tritium emissions were related to two contributing events; leakage of gaseous tritium light sources and mechanical failure of a valve on a filling rig. SRBT submitted a corrective action plan[12] which was accepted by CNSC Staff[13]. Both the initial and final detailed report on this event were posted to our public website, in accordance with our Public Information Program[14].

1.3.6 RELEASE LIMIT TO SEWER

Throughout the year SRB Technologies (Canada) Inc. operated well below the release limits to sewer prescribed under its Nuclear Substance Processing Facility Operating Licence number NSPFOL-13.00/2015[1] and its associated release limits to sewer which are outlined in Appendix A of the licence.

TABLE 5: SEWER RELEASES AGAINST RELEASE LIMIT:

NUCLEAR SUBSTANCE AND FORM	LIMIT (GBq/YEAR)	RELEASED (GBq/YEAR)	% OF LIMIT
TRITIUM – WATER SOLUBLE	200	13	6.5%

Sewer release values based on sampling and analysis indicate that the emissions to sewer in 2014 were 6.5% of the licence limit. See Annual Liquid Effluent Data in **Appendix C** of this report.

Sewer releases have increased slightly compared to the releases for 2013 (9.1 GBq, or 4.55% of the licence limit). The observed increase is due to more frequent cleaning and associated water use.

Since March 5, 2012[18] SRBT has worked to a maximum daily release target to the sewer of 0.15 GBq. On August 15, 2014, SRBT incorporated this target as a formal action level, thus requiring a report to be made to CNSC staff should liquid effluent releases exceed 0.15 GBq in a given day of operation.

1.4 FACILITY MODIFICATION

A number of improvements have been made throughout 2014 that contribute to further protecting the environment and the health of the public and staff. These include a number of program and procedure improvements.

1.4.1 BUILDING MODIFICATIONS

No modifications were made to the building during 2014 therefore the Commission's authorization was not required.

An addition is planned to the non-nuclear footprint of the facility, to be completed in 2015. This area will be used to store parts relating to manufacturing, and will add approximately 180 square meters to the Zone 1 footprint of the facility as outlined in **Appendix D** of this report.

1.4.2 DOCUMENT MODIFICATION

None of the program and procedure improvements made during 2014 required the Commission's authorization.

1.4.2.1 MANAGEMENT SYSTEM DOCUMENTS

In 2012, the Canadian Standards Association expanded the scope of standard N286, which had been last published in 2005 under the title *Management system requirements for nuclear power plants*. The broadened scope of the 2012 version of this standard is reflected in the change in title - *Management system requirements for nuclear facilities*.

In a letter[19] dated June 13, 2014, CNSC Staff informed SRBT that the new 2012 version of N286 was to be the new set of requirements for our management system. As a result, SRBT conducted a comprehensive gap analysis[20] between the Quality Manual[21] in place at the time and the N286-12 standard, and subsequently developed an expansive Implementation Plan[22] to address the gaps in a systematic and risk-informed manner, while ensuring our operations remain safely managed and controlled at all times.

The gap analysis[20] and Implementation Plan[22] was submitted to CNSC staff on September 8, 2014, with CNSC staff noting their satisfaction with these submissions on November 6, 2014[23]. Several additional recommendations were made by CNSC staff during a promotional site visit on November 25, 2014, and these shall also be taken into consideration as our new management system evolves.

The Implementation Plan[22] has been well underway since it was submitted. By the end of 2016, SRBT's goal is to have a management system which meets or exceeds the requirements of N286-12. Throughout the execution of the plan, SRBT has also committed to keep CNSC staff formally updated on our progress in this area.

1.4.2.2 QUALITY MANUAL

A new Quality Manual[24] was submitted to CNSC Staff on September 12, 2014 to reflect organizational improvements, and to provide greater clarity on how our management system addresses the requirements and expectations of CNSC Staff.

CNSC Staff accepted this revision in a letter[25] dated December 12, 2014.

1.4.2.3 WASTE MANAGEMENT PROGRAM

A new revision of the SRBT Waste Management Program[26] was finalized and submitted to CNSC staff on December 23, 2014.

The Waste Management Program[26] was revised to align with the latest versions of the CSA N292-series of standards, including N292.0-14, *General principles for the management of radioactive waste and irradiated fuel*; N292.3-14, *Management of low and intermediate-level radioactive waste*; and N292.5-11, *Guideline for the exemption or clearance from regulatory control of materials that contain, or potentially contain, nuclear substances*.

The revised program[26] now includes a set of new procedures focused on the key processes discussed in the standards which constitute an effective waste management program.

1.4.2.4 MAINTENANCE PROGRAM

Much of the guidance relating to maintenance of nuclear structures, systems and components is focused on the maintenance of nuclear power plants. SRBT is a relatively unique facility, and much of this guidance clearly does not apply to our operations. Proactively, the Maintenance Program[27] was reviewed and revised to incorporate several useful aspects of maintenance programs aimed at nuclear power plants.

This review used the guidance of CNSC Regulatory Document RD/GD- 210, *Maintenance Programs for Nuclear Power Plants*, and as a result, such concepts as critical spare parts and master equipment lists have now been incorporated to the extent possible in our management of maintenance.

1.4.2.5 PUBLIC INFORMATION PROGRAM

The Public Information Program[14] was revised on August 1, 2014 (Revision 8) to address the comments received from CNSC Staff[28] and to reflect the requirements of Regulatory Document RD/GD-99.3, *Public Information and Disclosure,* issued by the Canadian Nuclear Safety Commission in March 2012.

On October 31, 2014 CNSC staff approved[29] SRBT's Public Information Program[14] (Revision 8) stating it met all the criteria outlined in the Regulatory Document RD/GD-99.3, *Public Information and Disclosure* and was deemed fully satisfactory.

SRBT's latest Public Information Program[14] demonstrates SRBT's commitment to openness and transparency by being vastly improved by more broadly reaching stakeholders using more methods of providing information.

1.4.2.6 PRELIMINARY DECOMMISSIONING PLAN

In 2014, SRBT hired consultants Doug McNab of D&J Consulting and Terry Donahue of RadSafe Canada Ltd., to revise SRBT's Preliminary Decommissioning Plan (PDP)[30] to address both CNSC Staff comments and make changes and improvements to the PDP based on their knowledge of decommissioning other CNSC licensed facilities.

Mr. Donahue and Mr. McNab were recently directly involved in the full decommissioning of Shield Source Inc. which was a CNSC licensed facility with operations very similar to that of SRBT.

SRBT provided CNSC staff a revised Preliminary Decommissioning Plan[31], Cost Estimate and Financial Guarantee; the revised Cost Estimate reflected inflationary increases since the plan was approved by the Commission in 2008.

These documents were also revised using guidelines found in G-219 - *Decommissioning Planning for Licensed Activities*, G-206 - *Financial Guarantees for the Decommissioning of Licensed Activities* and CSA Standard N294-09, *Decommissioning of facilities containing nuclear substances*.

As part of revising the Preliminary Decommissioning Plan SRBT further investigated methods for establishing a Financial Guarantee as outlined in Regulatory Guide G-206. This review concluded that the method currently used to fund the Financial Guarantee which was approved by the Commission for this facility in June 26, 2008 continues to be the only available method of funding for SRBT. This method is appropriate to our individual situation as allowed in Regulatory Guide G-206.

As part of the PDP[31], SRBT proposed to fund the increase of $102,012.00 by making six equal installments of $17,002.00, in October and April of each year, over a three year period, to the Escrow Account. With the Commission's approval we proposed that the first payment towards the revised Financial Guarantee begin in October 2015 with the renewal of the licence effective July 1, 2015.

SRBT proposed to continue to use a revised Escrow Agreement[32] and a revised Financial Security and Access Agreement[33] to be approved by CNSC Staff to provide access to these funds.

Historical annual inflationary indexes are typically below the annual accrued interest rate of the Escrow Account. SRBT proposes that all accrued interest in the existing Escrow Account remain in that account and be used to address inflationary indexing.

1.4.2.7 RADIATION SAFETY PROGRAM

On September 12, 2014, revision XI of the SRBT Radiation Safety Program[17] was submitted to CNSC staff. This revision was primarily aimed at incorporating the responsibilities assigned to new positions in the organization.

1.4.2.8 LICENCE LIMITS, ACTION LEVELS AND ADMINISTRATIVE LIMITS

On May 13, 2014, SRBT issued Revision D of descriptive document "Licence Limits, Action Levels and Administrative Limits"[34]. CNSC staff undertook a review of the document and provided comments that SRBT addressed in revision E[35], issued on August 15, 2014, which CNSC staff accepted on November 7, 2014[36].

1.4.2.9 EMS OBJECTIVES AND TARGETS

On June 18, 2014, SRBT issued Revision C of the Environmental Management System document "Objectives and Targets"[37]. CNSC staff undertook a review of the document and provided comments that SRBT addressed in revision D, issued on August 15, 2014[38], which CNSC staff accepted on November 12, 2014[39].

1.4.2.10 TRAINING PROGRAM MANUAL

A new Training Program Manual started being developed in late 2014 and will be completed and implemented in 2015 to address CNSC Regulatory Document 2.2.2, *Personnel Training* published in August 2014.

Under this Training Program Manual SRBT will manage critical staff training activities in a systematic approach, including each of the five key processes in a cyclic manner – analysis, design, development, implementation and evaluation. CNSC staff has been instrumental in providing guidance on the development of this new, systematic approach to training at our facility, which provides greater assurance that human performance errors, and their safety impact, are effectively minimized.

2.0 SAFETY AND CONTROL AREAS

2.1 MANAGEMENT

2.1.1 MANAGEMENT SYSTEM

The quality management system implemented continues to ensure that results of various assessments are raised in a corrective or preventive action and subjected to a root cause analysis controlled by the Quality Department.

In 2014, a total of 43 non-conformances and 45 opportunities for improvement were raised in different areas of the company operations. By the end of 2014, 25 of these non-conformances had been addressed in full and another 7 are expected to be addressed in early 2015. The remaining 11 are expected to be addressed before the end of 2015.

All staff is continuously reminded to maintain a healthy safety culture in identified areas that may need improvement or corrective action for all company safety. On December 9, 2014 this was specifically discussed with all staff during the SRBT's annual training session. The Quality Manager formally presented the corrective action process to all staff and the importance of this process.

On December 22, 2014 a Management Meeting[40] took place for which all managers and senior management were present. The quality management system was reviewed to ensure it remains suitable and effective at meeting the requirements of the NSCA, Regulations, conditions of the licence[1] and ISO 9001: 2008.

A Senior Management Meeting[41] took place on December 23, 2014 to report and discuss the results of the Benchmarking and Self-assessment activities performed in 2013 and to define areas where improvements can be made in the various company safety programs.

Organizational Management reviews are scheduled between January 7 and 23, 2015 for the Quality Manager to review the Benchmarking and Self-assessment activities that were performed by all the Organizational Managers for 2014.

Although SRBT is transitioning their management system to be in line with the CSA standard N286-12, as required by the CNSC, the review and effectiveness of the QA program was found to be effective overall at meeting the current requirements of the NSCA, Regulations and conditions of the licence[1] as well as ISO9001: 2008 and customer requirements.

SRBT continues regularly performs various assessments to measure the performance and effectiveness of the Quality Management System to ensure it remains effective and review if any improvements are needed and corrective actions addressed as required. These reviews are performed through several methods for example; review of internal audits, benchmarking, routine and non-routine self-assessments and management reviews, regulatory audits and other third party audit results such as ISO 9001: 2008 and customers.

2.1.1.1 CNSC INSPECTIONS

CNSC Staff conducted a Type II Compliance Inspection[15] at the facility on April 10, 2014. The purpose of the inspection was to verify compliance with the NSCA, CNSC Regulations and the CNSC operating licence NSPFOL-13.00/2015[1] and Licence Conditions Handbook[2].

The inspection resulted in one recommendation and one action notice which has since been addressed. The scope of the inspection and ensuing report[15] included the following elements:

- Environmental Protection
- Conventional Health and Safety
- Radiation Protection
- Management System

2.1.1.2 ISO 9001: 2008 REGISTRAR AUDITS

SRB Technologies (Canada) Inc. continues to maintain a quality management system that is registered to ISO 9001: 2008 by BSI Management Systems.

On November 12 and 13, 2014 the yearly surveillance assessment was performed by BSI Management Systems which resulted in 3 opportunities for improvement (OFI) being identified. Our next re-certification audit with BSI Management Systems will take place over 3 days and is tentatively scheduled to start on November 9, 2015.

2.1.1.3 INTERNAL AND EXTERNAL AUDITS

The Compliance Manager developed an audit schedule for 2014 which resulted in 18 internal audits being conducted. The audits performed focused on activities associated with developing, managing and implementing various company safety programs.

These 18 audits alone resulted in identifying 14 non-conformances (NCR) and 45 Opportunities for Improvement (OFI).

In 2014 there were no external audits performed.

2.1.1.4 PEMBROKE FIRE DEPARTMENT INSPECTION

Pembroke Fire Department conducted a fire inspection on May 7, 2014, one minor violation of the Ontario Fire Code was identified. The one minor violation that was found has since been addressed and verified by the Pembroke Fire Department.

2.1.1.5 FIRE PROTECTION CONSULTANT INSPECTION

As required by licence NSPFOL-13.00/2015[1] and section 3.11 of the Licence Conditions Handbook LCH-SRBT-R000[2], on December 23, 2014 a Fire Protection Consultant, Nadine International Inc. performed an annual third party review of compliance with the requirements of the National Fire Code, 2005, and National Fire Protection Association, NFPA-801, 2008 edition: Standard for Fire Protection for Facilities Handling Radioactive Materials.

The review resulted in no findings except for identifying work that needs to be completed in order to ensure that the Fire Alarm System is in full compliance with the requirements of CAN/ULC-S536. The Fire Alarm System will continue to be monitored as this work is being performed to ensure that there is no threat of a fire occurring without being detected. The work which will be performed and reviewed by third parties with expertise in this area is expected to be completed in early 2015.

2.1.1.6 UNDERWRITERS LABORATORIES

Underwriters Laboratories (UL) provides safety-related certification, validation, testing, inspection, auditing, advising and training services to a wide range of clients, including manufacturers.

UL performs quarterly visits of our facility. These visits are un-announced and are to ensure compliance that the products we produce which are listed with UL are manufactured using the materials, procedures and testing parameters required under the specific UL listing.

In 2014, UL performed inspections on March 5, 2014, June 23, 2014 and September 19, 2014 and on November 12, 2014 with no issues identified.

2.1.1.7 AUDITS FROM CUSTOMERS

SRBT supplies products for military, commercial, aerospace and scientific applications.

In 2014 three customers audited our facility.

Veolia Environmental Services performed an audit on April 30, 2014, Conestoga-Rovers & Associates (CRA) performed an audit on behalf of General Motors of Canada Ltd on May 7, 2014 and Bell Helicopter Textron Inc. performed an audit on June 11 and 12, 2014.

All three audits resulted in no issues identified.

2.1.1.8 BENCHMARKING

In 2014 individuals responsible for specific programs and procedures at SRBT regularly looked at process problems, corrective actions as well as trending and used this information to benchmark elsewhere in or out of the organization in order to improve the effectiveness of these programs and procedures and to help define where improvements could be made.

Benchmarking against other CNSC Licensees was encouraged. The documents of other CNSC Licensees were continuously reviewed:

- Commission Member Documents
- Proceedings, Including Reasons for Decision
- Documents from other licensees

Meetings with the Quality Manager and Senior Management will take place in 2015 to discuss the results of the 2014 benchmarking activities performed and to define areas of improvement.

2.1.1.9 SELF-ASSESSMENTS

Throughout 2014 routine self-assessments by Organizational Managers were undertaken to identify, correct and prevent problems that hinder the achievement of the company's vision, mission, goals, values and policy and to assess the adequacy and effectiveness of the Quality Management System.

Self-assessments were performed by review of:

- Analysis and trending of performance data against historical data
- Input from stakeholders (public, contractors, regulators, etc.)
- Workspace inspections or observations
- Routine communications with staff to determine whether expectations are understood
- Training and coaching results
- Corrective and preventive actions raised throughout the organization
- Internal audit results

Meetings with the Quality Manager and Senior Management will take place in early 2015 to discuss the results of the 2014 self-assessments and to define areas of improvement.

2.1.1.10 CHANGES IN QUALITY ASSURANCE DOCUMENTS

A new Quality Manual[24] was submitted to CNSC Staff on September 12, 2014 to reflect organizational improvements, and to provide greater clarity on how our management system addresses the requirements and expectations of CNSC Staff. CNSC Staff accepted this revision in a letter[25] dated December 12, 2014.

On September 8, 2014 we submitted to CNSC Staff a Gap Analysis[20] between our Management System and the requirements of CSA standard N286-12 Management System Requirements for Nuclear Facilities.

To address the gaps identified SRBT also developed and submitted to CNSC Staff an Implementation Plan[22] to meet the requirements of N286-12. CNSC Staff approved the Implementation Plan[22] in a letter dated November 6, 2014[23]. This implementation plan will ensure that the management system improvements are implemented in a safe and controlled fashion.

The gap analysis[20] and Implementation Plan[22] was submitted to CNSC staff on September 8, 2014, with CNSC staff noting their satisfaction with these submissions on November 6, 2014[23]. Several additional recommendations were made by CNSC staff during a promotional site visit on November 25, 2014, and these shall also be taken into consideration as our new management system evolves.

A revised Quality Manual in line with the CSA standard N286-12 will be developed by the end of 2016.

A few associated second tier quality procedures are also expected to be updated in 2015 to address the gaps identified in the Gap Analysis completed, and other opportunities for improvements and the corrective actions identified through recent audits and inspections.

2.1.1.11 RESULTS OF LSC-QA PROGRAM

2.1.1.11.1 ROUTINE PERFORMANCE TESTING

Routine Performance Testing are performed on both Liquid Scintillation Counters (LSC) as required in section 4.2.3 of CNSC Regulatory Standard S-106 titled "Technical and Quality Assurance Requirements for Dosimetry Services", revision 1.

Routine Performance Testing is performed to specifically demonstrate that the dosimetry service is operated in a predictable and consistent way.

Routine Performance Testing was carried out every 3 months as required throughout 2014 on each of the two 'Wallac 1409' LSC units, for a total of eight Routine Performance Tests without failures.

SRBT purchased and installed two new LSC counters in the fourth quarter of 2014, to replace the Wallac 1409 units which had reached the end of serviceable life.

Performance testing was conducted on the two new 'TriCarb 2910' units once in 2014, with no failure reported.

All records are kept on file.

2.1.1.11.2 WEEKLY EFFICIENCY CHECK

The LSC-QA[42] program includes weekly instrument efficiency checks using National Institute of Standards and Technology (NIST) traceable standards of a blank, H-3 and C-14 standards. The absolute activity of the capsules is calibrated by comparison with the reference standards traceable through NIST.

All tests have been performed at least on a weekly basis for both the Wallac 1409 and TriCarb 2910 LSC units, and passed the acceptability criteria. All records are kept on file.

2.1.1.12.3 BATCH VALIDITY TEST

In addition, NIST traceable standards, certified to have an estimated accuracy of ± 1.2%, are prepared in-house, analyzed and checked against acceptability criteria with every batch of samples being analyzed.

All tests were performed with every batch in order to ensure quality control of laboratory processes. All records are kept on file.

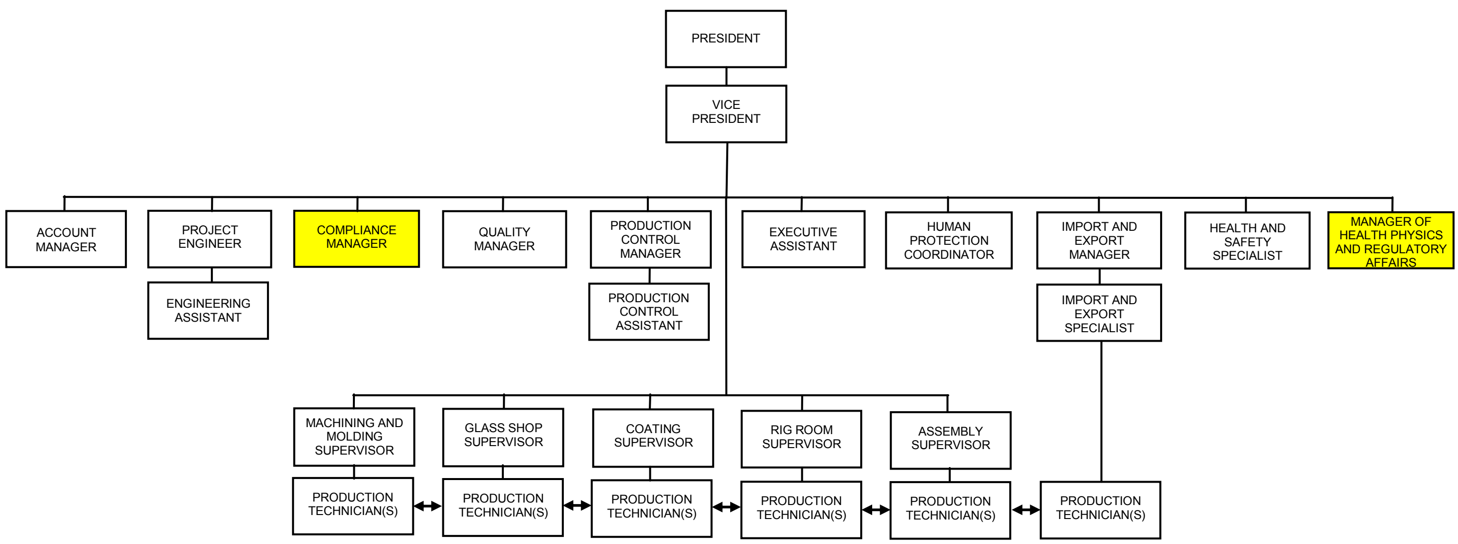
2.1.2 HUMAN PERFORMANCE MANAGEMENT

2.1.2.1 ORGANIZATIONAL IMPROVEMENTS

Over the term of the current licence[1] a number of organizational improvements have been made to further ensure the protection of the public, the workers and the environment.

The following organizational chart represents the current structure at the company that ensures SRBT meets the Nuclear Safety and Control Act, Regulations and conditions of the Licence[1]. Positions highlighted in yellow have been created in 2014:

FIGURE 2: ORGANIZATIONAL CHART WITH POSITIONS CREATED IN 2014 HIGHLIGHTED IN YELLOW



On April 1, 2014 a new position of Manager of Health Physics and Regulatory Affairs was added to the organization. This individual holds a bachelor of science degree from an accredited Canadian University, and brings over 13 years of experience working in the field of radiation protection and health physics, as well as over 5 years of experience in the field of nuclear safety regulation and inspection. The Manager of Health Physics and Regulatory Affairs is mainly responsible for oversight of all company Health Physics activities to ensure that the requirements of the Nuclear Safety and Control Act (NSCA), Regulations, conditions of the licence[1] and ISO 9001 are met, and is also responsible for communicating with CNSC Staff and ensuring that deadlines for submission of responses and documents are met.

On April 1, 2014 a new position of Compliance Manager was added to the organization whose main focus is to perform independent internal audits and further ensuring compliance of all work areas with company programs and procedures. This is an entirely new management position reporting directly to the President. This individual has formal training in auditing and has been employed at the facility for over 17 years in various capacities. This individual is being trained by a consultant with over thirty years of experience performing inspections and audits with the CNSC.

On April 1, 2014 a full time third-party consultant was hired with over thirty years of experience with the Canadian Nuclear Safety Commission, in order to provide training and mentorship to key staff, as well as technical support on special projects and activities as required by Senior Management.

Each one of the noted improvements in our organization had a direct impact in further increasing nuclear safety at the facility, and a positive impact on ensuring that our operations continue to remain safe and compliant, that worker exposures remain as low as reasonably achievable, and that SRBT continues to ensure the protection of workers, the public and the environment.

SRBT has successfully grown the business in a sustainable and controlled fashion throughout the year. Staffing levels have risen in step with production gains, while continuing emission reduction initiatives have been effective in ensuring that our effect on the environment and the public remains minimized, well below regulatory requirements, and as low as reasonably achievable.

2.1.2.2 EXPERIENCED WORKFORCE

In 2014 our staff increased from 36 to 43.

By the end of 2014 our workforce had an average experience of just under 9 years with an average age of just over 40 years of age.

The seven members of the Health Physics Team had a combined 107 years of work experience directly with the company.

The company is now wholly-owned by the President Stephane Levesque and Vice President Ross Fitzpatrick who are Canadian residents, reside locally and have a full time, hands on role at the facility and together have more than 42 years of experience in the manufacture of tritium light sources and devices.

Careful consideration was taken when appointing new staff to ensure continued Nuclear Safety. The activities of five work areas (marked in yellow in Table 6) **do not** involve tasks that affect Nuclear Safety. Generally employees hired as Production Technicians are first appointed to one of these five work areas. These positions do not in any way impact the company's ability to ensure that the requirements of the Nuclear Safety and Control Act, Regulations and conditions of the licence[1] are met.

TABLE 6: NUCLEAR SAFETY TASKS PERFORMED PER WORK AREA

WORK AREA	AVERAGE YEARS EXPERIENCE	RESPONSIBLE FOR PROGRAMS AND PROCEDURES THAT AFFECT NUCLEAR	PROCESS TRITIUM	HANDLE SEALED TRITIUM SOURCES
ADMINISTRATION	12.94	X		
RIG ROOM	9.20		X	X
GLASS BLOWING	7.76			
ASSEMBLY	6.75			X
MACHINING & MOLDING	5.77			
COATING	4.91			
SHIPPING	0.82			
CLEANING	0.21			

The Rig Room is the department where tritium processing takes place, and has the highest average work experience with the company of any production department. The average work experience of the staff within this department is just over 9 years. The Supervisor and another employee in this department have over 23 years of experience and perform or oversee all activities that involve tritium processing or handling of tritium sources.

The Assembly Department is where tritium sources are handled by staff for assembly into products or for packaging. The tritium is contained in the source at this stage and the possibility of tritium exposure is low. The Supervisor in this department has almost 16 years of experience and performs or oversees all activities of five other staff members with the support of the Human Protection Coordinator who is a member of the Health Physics Team and has over 23 years of experience working at the company.

It is also important to note that staff in management and supervisory positions already has experience being in charge of this number of employees. Overall staffing levels and staffing levels in each department are within those between 2000 and 2006 where current Management and Production Supervisors were in the same positions. With the increased staff Senior Management make a point to visit each work area on a daily basis and to speak to most staff about their work and to see if any issue needed resolving.

2.1.2.3 COMMITTEES

In 2014, committees have been instrumental in the development and refinement of company programs and procedures, identifying new safety initiatives and improving communication within the growing staff.

Committees use meeting results as an opportunity for improvement and make recommendations accordingly. In 2014 a total of 91 minuted meetings have taken place at the company compared to 59 in 2013, a 54% increase. In 2014 Committee Meetings increased in order to foster communication within the growing staff and to support new safety initiatives. We expect Committee Meetings to continue to be the main force to improve Nuclear Safety in the future and new Committees will continue to be instituted as deemed appropriate.

The Executive Committee formally established a new “Training Committee” who is tasked with ensuring that the requirements of the new regulatory document REGDOC 2.2.2 Personnel Training is being implemented and adhered to.

The Health Physics Committee met 14 times more in 2014 than in 2013 mainly due to significant improvements made to equipment, procedures, staff training and also the introduction of the new Manager of Health Physics and Regulatory Affairs who is mainly responsible for oversight of all company Health Physics activities.

TABLE 7: BREAKDOWN OF MEETINGS HELD

COMMITTEE	**NUMBER OF MEETINGS**
HEALTH PHYSICS COMMITTEE	25
OTHER STAFF	23
WORKPLACE HEALTH AND SAFETY COMMITTEE	17
PUBLIC INFORMATION COMMITTEE	6
FIRE PROTECTION COMMITTEE	5
TRAINING	5
MITIGATION COMMITTEE	4
EXECUTIVE COMMITTEE	4
PRODUCTION COMMITTEE	1
WASTE MANAGEMENT COMMITTEE	1
TOTAL	**91**

Notable improvements made by the Committees in 2014 include the establishment of a new “Training Committee”, new health physics equipment, fire panel improvements, many revised programs and procedures and the ongoing implementation of CSA N286-12 Management System Requirements for Nuclear Facilities.

Actual improvements included the creation of new positions at the company of Compliance Manager and Manager of Health Physics and Regulatory Affairs.

We expect Committee Meetings to continue to be the main force to improve Nuclear Safety in the future and new Committees will continue to be instituted as deemed appropriate.

2.1.2.4 RADIATION PROTECTION TRAINING

All staff received Radiation Protection Training as part of the ongoing employee training program, with the vast majority receiving this training on December 9, 2014. Two staff members who missed the first session were provided the training in a supplementary session. The training included information with respect to natural radiation exposure, anticipated health effects from radiation exposure, tritium, proper handling of tritium throughout the facility, emissions monitoring, environmental monitoring, fire safety, security, the non-conformance process, licensing, overview of other licensees and facilities, public relations, emergency preparedness and safety features within the facility. Open dialogue was encouraged with a question and answer session. A written test was provided to all 41 participants. The pass criterion for the test is 75%. Results averaged 97% with no marks below 75%. Any wrong answer on the test was also discussed in detail with all employees individually to ensure full understanding.

New staff members received introductory training in radiation safety, even if they were not expected to handle nuclear substances as part of their responsibilities.

2.1.2.5 FIRE EXTINGUISHER TRAINING

Yearly fire extinguisher training was performed for all staff on June 3, 2014 by the Pembroke Fire Department.

2.1.2.6 FIRE RESPONDER TRAINING

There was no training of Fire Responders in 2014. SRBT and the Pembroke Fire Chief determine if this training is required. Their decision is based on if changes have occurred at SRBT’s facility, if the training has not been performed for a number of years or if there are a number of new firefighters and/or volunteers that have not yet taken the training. The training of fire responders was last performed in 2011 and included a tour of the facility and information with respect to the hazardous materials found on the site. Responders were also instructed on the various properties and precautions with respect to tritium.

2.1.2.7 TDG TRAINING

In March 2014, both the Import and Export Manager and the Import and Export Specialist received Dangerous Goods Training by an external qualified third party.

2.1.2.8 HEALTH PHYSICS TRAINING

Members of the Health Physics Team continue to maintain qualification for tasks that they are assigned routinely.

In 2014, SRBT began the process of implementing a systematic approach to training (SAT) in line with newly published regulatory document REGDOC 2.2.2, *Personnel Training.* Four activities were identified that are related to Health Physics Team activities that will require a SAT-based training program to be developed and implemented: Weekly Stack Monitoring, Advanced Health Physics Instrumentation, Liquid Effluent Management and Control, and Bioassay and Dosimetry.

Work on design and implementation of these initiatives progressed through the second half of 2014.

2.1.2.9 FIRE PROTECTION COMMITTEE MEMBER TRAINING

The Fire Protection Committee has not added any new members in 2014 to the committee, but continues to have a volunteer firefighter for the Municipality of l'Isle-aux-Allumettes who is enrolled in a Fire Fighter 1 course and thereby receives ongoing fire protection training.

Also the committee will look at possibly adding a new member in 2015 that will bring additional fire protection expertise to the committee.

2.1.2.10 HEALTH AND SAFETY TRAINING

The Health and Safety Specialist had attended a Health & Safety Conference in Ottawa on October 2014 and took part in training seminars that included:

- Workplace Inspections
- Legislative Changes to CLC Part II
- Medical Emergencies in the Workplace
- Investigating Workplace Harassment

2.1.3 OPERATING PERFORMANCE

SRBT has continued to safely operate throughout 2014. Our programs and processes have continued to evolve to meet or exceed regulatory requirements and expectations, with safety as an overriding priority in all aspects of our licensed activities.

In 2014 our team continued to strive to minimize the amount of tritium released to the environment for every unit of tritium processed – we refer to this as the 'released to processed' ratio. This ratio (marked in yellow in Table 8) which was at its lowest in 2014 is an excellent indicator of the overall effectiveness of our emission-reducing initiatives. The following table illustrates how this ratio has trended since 2010.

TABLE 8: RATIO TRITIUM RELEASED TO TRITIUM PROCESSED 2010-2014

DESCRIPTION	2010	2011	2012	2013	2014
Total Tritium Released To Atmosphere (GBq/Year)	36,426	55,584	29,905	78,875	66,161
Tritium Processed (GBq/Year)	6,643,732	7,342,449	10,224,590	30,544,759	28,714,119
Released To Processed (%)	0.55	0.76	0.29	0.26	0.23
Increase (+) Reduction (-) (%)	-31	+38	-62	-10	-12

Throughout the licence period, SRBT has continuously possessed, transferred, used, processed, managed and stored all nuclear substances related to the operation of our facility in compliance with the requirements of our licence[1].

In 2014, a single action level exceedance was reported[11] relating to tritium releases to atmosphere. This exceedance occurred during the period of October 28 to November 4, 2014 due to two distinct events that occurred during the sampling period. SRBT conducted an investigation and identified contributing causes, root causes and corrective actions. SRBT submitted a corrective action plan[12] to minimize the probability of recurrence.

The Compliance Manager performed 18 internal audits in 2014. The audits focused on all activities associated with developing, managing and implementing all company safety programs. These audits alone resulted in identifying 14 non-conformances (NCR) and 45 Opportunities for Improvement (OFI) being identified.

In 2014, a total of 43 non-conformances and 45 opportunities for improvement were raised in different areas of the company operations. By the end of 2014, 25 of these non-conformances had been addressed in full and another 7 are expected to be addressed in early 2015. The remaining 11 are expected to be addressed before the end of 2015.

2.2 FACILITY AND EQUIPMENT

2.2.1 SAFETY ANALYSIS AND HYPOTHETICAL INCIDENT SCENARIOS

Our operating practices and processes in 2014 have continued to be conducted in full alignment with the latest version of SRBT's Safety Analysis Report (SAR)[43], and the document titled Review of Hypothetical Incident Scenarios[44], dated February 22, 2008. This document[44] analyzes incident scenarios for the facility and determines if these were applicable considering the improvements made to the safety programs and procedures and the upgrades that have been implemented over the years.

These documents[43][44] are continuously reviewed for accuracy and validity. The overall safety case remained valid and effective throughout 2014. No modification or change performed in 2014 has affected the validity of the safety case.

With the incorporation of the new CSA standard N286-12, *Management system requirements for nuclear facilities,* as part of the regulatory expectations relating to our facility, SRBT conducted a gap analysis[20] to determine areas that require action to bring our management system into compliance with the standard. Specific requirements relating to safety analysis for isotope processing facilities are included in the latest revision of N286-12, which notes that "the safety analysis process shall be established and controlled".

Although we have always maintained an accepted SAR[43], one of the gaps identified was that a formal process for conducting safety analysis was not sufficiently established as a process in our systems. As a result, as part of our Implementation Plan[22] to align our management system with N286-12, we are developing this process in a risk-informed fashion.

This new Safety Analysis process is one of the first deliverables in our Implementation Plan[22]; once this process is defined and documented, our current SAR[43] will be reviewed and revised in line with the new process. We expect the SAR[43] to be revised and submitted to CNSC staff by the end of 2015.

As always, SRBT will continue to respond to events in the nuclear industry and beyond that could influence or otherwise affect our safety analysis[43]. It is not expected that our licensed activities and processes will change over the coming years. However, should emissions-reducing initiatives identify any technical and engineered systems that could increase the level of safety if incorporated, these emissions-reducing initiatives will be thoroughly analyzed with respect to safety, in consultation with CNSC staff and the Commission if required, prior to implementation.

2.2.2 PHYSICAL DESIGN

As a manufacturing company, SRBT owns and operates several pieces of equipment, several of which constitute structures, systems and components (SSCs) which have a bearing on safety and our licensed activities. Such equipment includes the active ventilation systems and associated emissions monitoring equipment, the tritium processing rigs, tritium-in-air monitors, and liquid scintillation counters.

All of our equipment is kept in a condition that is fit for service, including the SSCs associated with tritium monitoring and processing. In 2014 there were no significant equipment failures that presented a safety concern.

Senior Management has committed extensive resources to the modernization and renewal of safety-critical SSCs in service at SRBT. Several examples are discussed below. These initiatives provide further confidence that our critical SSCs will continue to function reliably and effectively throughout the next licensing term.

No change in physical design of the facility occurred over 2014. As most potential hazard associated with the facility would result from fire, the ability of systems, structures and components to meet and maintain their design basis is maintained through the company Maintenance Program[27] which includes periodic inspection for the facility. As required by condition 7.1 and 7.2 of CNSC operating licence NSPFOL-13.00/2015[1] and section 3.7 of the Licence Conditions Handbook LCH-SRBT-R000[2] SRBT shall operate, maintain, test, and inspect the facility in accordance with the National Fire Code, 2005, and National Fire Protection Association, NFPA-801, 2008 edition.

2.2.3 FITNESS FOR SERVICE

The Maintenance Program[27] has continued to remain effective in 2014. The facility and equipment associated with the facility were maintained and operated within all manufacturers requirements.

Proactively, the Maintenance Program[27] was reviewed and revised to incorporate several useful aspects of maintenance programs aimed at nuclear power plants.

This review used the guidance of CNSC Regulatory Document RD/GD- 210, *Maintenance Programs for Nuclear Power Plants*, and as a result, such concepts as critical spare parts and master equipment lists have now been incorporated to the extent possible in our management of maintenance.

2.2.3.1 VENTILATION

The ventilation of the facility is such that the air from the facility flows to the area with greatest negative pressure in Zone 3 which has the highest potential for tritium contamination where all tritium processing takes place. This area and part of Zone 2 are kept at high negative pressure with the use of two air handling units which combined provide airflow of approximately 10,000 cubic feet per minute.

The air handling units are connected to a series of galvanized and stainless steel ducts. In addition to providing ventilation for the facility these air handling units also provide local ventilation to a number of fume hoods which are used to perform activities that have a potential for tritium contamination and exposure.

These air handling units are maintained through contract maintenance and service program with local contract providers in conjunction whereby preventive maintenance is performed by qualified staff. All records of the maintenance are kept on file. Ventilation equipment maintained in 2014 can be found in **Appendix E** of this report.

All ventilation systems were maintained in fully operational condition with no major system failures during 2014 to the requirements of our Maintenance Program[27] and operational procedures[45][46]. Equipment is maintained on a quarterly or semi-annually basis, see equipment maintenance information in **Appendix F** of this report. Equipment maintenance was performed under contract with a fully licensed maintenance and TSSA certified local HVAC contract provider. All records of the maintenance are kept on file.

2.2.3.2 STACK FLOW PERFORMANCE

Stack maintenance is performed by a third party, in order to ensure effective performance of the ventilation system and minimize airflow reductions from the beginning to the end of the maintenance cycle to ensure accuracy of results.

Pitot tubes that were installed in the stacks are maintained by a third party to ensure stack airflow are at design requirements. This essentially allows for daily stack flow verification in addition to more detailed annual stack flow verification performed by a third party.

Stack Performance Verification was performed on October 8, 2014 by a third party. The inspection confirmed that the stacks were performing to design requirements and that the airflow on both air handling units have remained approximately the same in 2014 from what they were in 2013. The stack height and the airflow in the fume hoods continue to be checked on a regular basis.

We will continue to monitor and trend the results of the yearly Stack Performance Verification, no further action is required at this time other than continuing to perform the daily readings of the stack height and the monthly airflow checks of fume hoods. All records are kept on file.

2.2.3.3 LIQUID SCINTILLATION COUNTERS

For several years, two identical liquid scintillation counters (Model Wallac 1409) were maintained and calibrated on a yearly basis to ensure their functionality by a qualified service representative from the manufacturer of the equipment. Service on the Wallac 1409 units was completed in March 2014. All records of the maintenance are kept on file.

In early 2014, the manufacturer of the Wallac 1409 informed SRBT that these LSC counters were nearing ‘end-of-life’, and maintenance activities in the future could not be guaranteed.

As a result, in November 2014 SRBT purchased two brand-new ‘TriCarb’ model 2910 liquid scintillation counters using our ‘New Equipment, Process or Activity’ process, as required by our Quality Manual[24]. These units have been installed, tested, commissioned and approved for use in a controlled manner, and intercomparison testing by an independent third party confirmed that they accurately measure tritium levels in our samples.

The Wallac 1409 counters were taken out of service once these new units were accepted for full use.

The two new systems will continue to be maintained and calibrated on an annual basis by a qualified service representative from the manufacturer of the equipment, to ensure their functionality, accuracy and reliability.

2.2.3.4 PORTABLE TRITIUM-IN-AIR MONITORS

Portable tritium-in-air monitors are maintained in Zones 2 and 3. The portable units are used to determine the source of tritium that might cause an alarm threshold to be breached.

In 2014, additional portable tritium-in-air monitors were procured. There are now six portable tritium-in-air monitors available for airborne tritium monitoring at the facility. Four are located in Zone 3, one in Zone 2, and one in Zone 1 in the shipping and receiving area. There is also one unit stored off-site at the Pembroke Fire Hall as part of an emergency preparedness kit.

As required by our Radiation Safety Program[17] all tritium-in-air monitors were calibrated at least once during 2014. All records of the maintenance are kept on file.

2.2.3.5 ROOM TRITIUM-IN-AIR MONITORS

The ambient air in selected key areas of the facility is continuously monitored using stationary tritium-in-air monitors.

There are now five stationary tritium-in-air monitors available for airborne tritium monitoring at the facility. Three monitors are strategically located in Zone 3; one in the Rig Room where gaseous tritium light sources are filled and sealed, one in the Laser Room where a laser is used to cut and seal small gaseous tritium light sources and inspected, and one in the Tritium Laboratory where tritium is transferred from bulk supply containers to filling containers. One stationary tritium-in-air monitor is located in Zone 2 in the Assembly Area, where gaseous tritium light sources are pre-packed in preparation for shipping or installed into device housings. A stationary tritium-in-air monitor was purchased and set up in the shipping area in 2014 as an additional ALARA initiative. This new station provides an early warning signal of a problem should a light or device be damaged during packaging activities. This type of event rarely occurs; however, the installation of a new monitor demonstrates our commitment to ensuring doses remain as low as reasonably achievable.

As required by our Radiation Safety Program[17] all tritium-in-air monitors were calibrated at least once during 2014. All records of the maintenance are kept on file.

2.2.3.6 STACK MONITORING EQUIPMENT

Stack monitoring equipment is incorporated for each of two main air-handling units. For each air-handling unit, the monitoring equipment includes:

- A tritium-in-air monitor connected to a real-time recording device.
- A bubbler system for discriminately collecting HTO and HT.
- A flow measurement device with elapsed time, flow rate and volume.

As required by our procedures[47], each tritium-in-air monitor connected to the real-time recording device (chart recorder) was calibrated at least once in 2014. The chart recorder itself was verified as calibrated on a quarterly basis. All records of the maintenance are kept on file.

As a result of the analysis of lessons learned from the events in 2012 relating to SSI, SRBT committed significant resources to upgrading and modernizing the key equipment associated with our stack monitoring systems.

In the fourth quarter of 2014, SRBT purchased and received two new bubbler systems. These new bubbler units are like-for-like replacements intended to be exchanged with units that have performed sampling reliably and accurately since 2006. The new units were tested, readied for use and commissioned in late 2014. An independent third-party performed verification activities in early 2015, confirming that the new bubblers function as required, and provide an accurate and reliable measure of our weekly emissions.

The tritium-in-air monitors (TAMs) that sample our atmospheric emissions in real time were also replaced with modern units in 2014. The new TAMs can provide SRBT with twice the maximum concentration reading when compared with the older units, and use digital circuitry that allows for extremely sensitive measurements that were not possible before. This has allowed our staff to identify and effectively address even small changes in our emissions.

The real-time stack monitoring system has been further augmented with the installation of a second chart recorder to supplement the original analog unit. The new 'Datachart' recorder is digital and fully programmable, with information logged and retained for further analysis. Health Physics Team members can now break down emissions in a detailed fashion, pinpointing the exact moment in time that an event began and terminated, and even providing a way to mathematically estimate the amount of tritium emitted over any selected time period.

In all cases, changes to the stack monitoring equipment followed our engineering change processes, to ensure that the changes were done in a controlled fashion, that the system design remained valid, and that the changes did not compromise the safety functions or accuracy of the systems.

Filters for the bubbler system and for both tritium-in-air monitors connected to the chart recorder are changed regularly and records are kept on file.

As the calibration of a flow measurement device is only valid for one year, each device is replaced with a calibrated unit on an annual basis.

A verification activity for the bubbler systems is scheduled for the first months of 2015. Going forth, as a result of the lessons learned from the events in 2012 relating to Shield Source International (SSI), SRBT has decided to increase the frequency of system verifications, and plan on ensuring this process is conducted each year rather than every two years.

2.2.3.7 WEATHER STATION

Maintenance of the weather station is performed as per the manufacturer's recommendation, every two years.

Maintenance of the weather station was performed on October 31, 2014 and will be performed again in 2016. All records of the maintenance are kept on file.

2.3 CORE CONTROL PROCESSES

2.3.1 RADIATION PROTECTION

2.3.1.1 DOSIMETRY SERVICES

During 2014, SRBT maintained a Dosimetry Service License[48], 11341-3-18.0, for the purpose of providing in-house dosimetry services for the staff of SRBT and contract workers performing services for SRBT where there existed potential exposure for uptake of tritium.

Dosimetry results were submitted on a quarterly basis to Health Canada in a timely fashion for input to the National Dose Registry for 48 individual staff members. Two employees were only employed at SRBT for a part of the year as summer students.

SRBT participated in the annual Tritium Urinalysis Performance Test sponsored by the National Calibration Reference Centre for Bioassay, Radiation Surveillance and Health Assessment Division, Radiation Protection Bureau of Health Canada. The participation is a regulatory requirement for Dosimetry Service Providers.

SRBT received the Certificate of Achievement for successful participation in the Tritium Urinalysis Performance Test from the National Calibration Reference Centre for Bioassay and In Vivo Monitoring for the year 2014.

SRBT also submits, to the CNSC, an Annual Compliance Report for the Dosimetry Service License[48], 11341-3-18.0.

2.3.1.2 STAFF RADIATION EXPOSURE

SRBT, through the Dosimetry Service License[48], 11341-3-18.0, assesses the radiation dose to its employees and to contract workers who may have exposure to tritium.

For SRBT staff members, all are classified as Nuclear Energy Workers. All staff members participate in the dosimetry program. Persons who work in Zones 1 and 2 provide bioassay samples for tritium concentration assessment on a bi-weekly frequency due to the very low probability of uptake of tritium. Persons assigned to work in Zone 3 provide bioassay samples on a weekly frequency due to the significant probability of uptake of tritium.

The assessment of dose to personnel, due to tritium uptake, is performed in accordance with the Health Canada Guidelines for Tritium Bioassay and CNSC Regulatory Standard S-106 titled “Technical and Quality Assurance Requirements for Dosimetry Services”, revision 1.

There were no “personnel contamination event”.

The maximum annual dose received by any person employed by SRBT is well within the regulatory limit for a nuclear energy worker of 50.0 mSv per calendar year. The maximum annual staff dose was 1.29 mSv with an average for all staff of only 0.10 mSv. Collective dose was also low at 4.98 mSv.

The table found in **Appendix G** of this report provides the radiological occupational annual dose data for 2014. The table provides a comparison of dosimetry results for the years 1997 to 2014. Any comparison of the dose in 2007 and 2008 to previous years is not informative or appropriate as the facility only processed tritium until January 31, 2007, and only resumed processing tritium in July of 2008.

2.3.1.3 ACTION LEVELS FOR DOSE AND BIOASSAY LEVEL

Section 3.8 of the Licence Conditions Handbook LCH-SRBT-R000[2] for licence NSPFOL-13.00/2015[1] currently provides SRBT's action levels for dose and for bioassay level.

During 2013, SRBT undertook a complete review of operating conditions and of the Action Levels for dose and bioassay level to ensure that the Action Levels were adequate to detect the emergence of a potential loss of control of the Radiation Protection Program. As a result, in a letter[49] to CNSC Staff dated February 25, 2013, SRBT has proposed new Action Levels subsequently approved[50] by CNSC Staff that were lower than those previously observed:

TABLE 9: ACTION LEVELS FOR EFFECTIVE DOSE TO WORKER

PERSON	PERIOD	ACTION LEVELS (mSv)
NUCLEAR ENERGY WORKER	QUARTER OF A YEAR	1.0
	1 YEAR	3.0
	5 YEAR	15.0
PREGNANT NUCLEAR ENERGY WORKER	BALANCE OF THE PREGNANCY	2.0

In 2014 none of the staff members exceeded the action levels for effective dose to worker.

TABLE 10: ACTION LEVELS FOR BIOASSAY RESULT TO WORKER

PARAMETER	ACTION LEVEL
BIOASSAY RESULT	1,000 Bq/ml FOR ANY PERIOD

There were no instances at any time in 2014 whereby a staff member's tritium body burden exceeded the action level of 1,000 Bq/ml.

2.3.1.4 ADMINISTRATIVE LIMITS FOR DOSE AND BIOASSAY LEVEL

SRBT has in place administrative limits for effective dose to worker and bioassay result.

During 2013, SRBT undertook a complete review of operating conditions and of the Administrative Limits for dose and bioassay level to ensure that the Administrative Limits were adequate to detect the emergence of a potential loss of control of the Radiation Protection Program. As a result, in a letter[49] to CNSC Staff dated February 25, 2013, SRBT has proposed new Administrative Limits subsequently approved[50] by CNSC Staff that were lower than those previously observed:

TABLE 11: ADMINISTRATIVE LIMITS FOR EFFECTIVE DOSE TO WORKER

PARAMETER	ADMINISTRATIVE LEVEL
EFFECTIVE DOSE TO WORKER	2.25 mSv/YEAR 0.75 mSv/QUARTER

In 2014 none of the staff members exceeded any of the Administrative Levels for effective dose to worker.

TABLE 12: ADMINISTRATIVE LIMITS FOR BIOASSAY RESULT TO WORKER

PARAMETER	ADMINISTRATIVE LEVEL
BIOASSAY RESULT	500 Bq/ml FOR ANY PERIOD IN ZONE 3 100 Bq/ml FOR ANY PERIOD IN ZONE 1 OR 2

During 2014, there was one instance where a Zone 3 staff member’s bioassay result exceeded the administrative limit of 500 Bq/ml and one instance that resulted in a Zone 2 staff member’s bioassay sample result exceeded the administrative limit 100 Bq/ml.

2.3.1.5 CONTAMINATION CONTROL

Tritium contamination control is maintained by assessment of non-fixed tritium contamination levels throughout the facility by means of swipe method and liquid scintillation counting of the swipe material. SRBT has in place the following administrative surface contamination limits:

TABLE 13: ADMINISTRATIVE SURFACE CONTAMINATION LIMITS

ZONE	SURFACES	ADMINISTRATIVE SURFACE CONTAMINATION LIMITS
1	ALL SURFACES	4.0 Bq/cm^2
2	ALL SURFACES	4.0 Bq/cm^2
3	ALL SURFACES	40.0 Bq/cm^2

An overview of swipe monitoring results for 2014 has been tabulated and is included in **Appendix H** of this report. A total of 7,940 swipes were performed in various work areas in 2014.

The data collected shows that 367 swipes were taken in Zone 1 resulting in a pass rate of 97.82% below the administrative level of 4 Bq/cm^2.

The data collected shows that 1,765 swipes were taken in Zone 2 resulting in a pass rate of 93.48% below the administrative level of 4 Bq/cm^2.

The data collected shows that 5,808 swipes were taken in Zone 3 resulting in a pass rate of 93.66% below the administrative level of 40 Bq/cm^2.

All swipe results are reported to the area supervisors. The area supervisor and the Health Physics Team reviews the results to determine where extra cleaning effort is necessary.

A comparison of the data for 2013 and 2014 was made:

TABLE 14: 2013 AND 2014 PASS/FAIL RATIO COMPARISON

ZONE	2013 PASS/FAIL RATIO	2014 PASS/FAIL RATIO
1	95.71%	97.82%
2	94.86%	93.48%
3	93.45%	93.66%

During 2014, quarterly Health Physics Committee meetings[51][52][53][54] were held to review swipe results. The purpose of the review was to determine if the sampling locations chosen are effective in identifying areas where contamination may be present. The sampling locations were methodically compared against each other and approximately 20% of locations with the highest pass-rate for the quarter, which were the areas least likely to exceed the administrative limits, were replaced by new locations selected at the discretion of the Health Physics Committee.

The pass rates observed in 2014 are consistent with those observed in 2013 which demonstrates that the contamination control practices implemented by our program are effective.

2.3.1.6 DISCUSSION OF THE SIGNIFICANCE OF THE RESULTS FOR ALL DOSE CONTROL DATA

In 2014, decreases in maximum, average and collective doses were seen when compared to 2013 data. Several factors have contributed to the reduction of these values, as discussed below.

2.3.1.6.1 MAXIMUM DOSE

As expected in 2014 and as previous years, the highest dose received by any employee was to an individual working primarily in Zone 3 where tritium is processed. The maximum dose to an employee in 2014 was 1.29 mSv, a value that is 0.64 mSv lower than the maximum dose to an employee in 2013, a reduction by about one third.

The reduction in maximum dose can be attributed in part to ensuring that work that may result in higher exposures is not performed solely by one individual. In addition, augmented oversight by the Health Physics Team in areas with higher probabilities of exposure to tritium has also contributed to lowering the maximum dose. Finally, SRBT has taken steps to reduce the manufacturing of light types that have historically resulted in higher worker dose; specifically, several types of laser-cut light sources are being phased out of our routinely offered product line.

The maximum dose to an employee for 2014 is 0.49 mSv higher than the maximum dose to an employee in 2012, but still below the average maximum of 2.66 mSv between 1997 and 2014. The maximum dose to an employee will be more closely managed in 2015 in order to ensure continuous reduction.

In 2014, the maximum dose to an employee working primarily in Zone 2 was 0.09 mSv and is 0.07 mSv lower than the maximum dose to an employee working primarily in Zone 2 in 2013.

In 2014, the maximum dose to an employee working primarily in Zone 1 was 0.01 mSv and is 0.02 mSv less than the maximum dose to an employee working primarily in Zone 1 in 2013.

In 2014, the maximum dose to an employee working primarily in administration was 0.04 mSv and is 0.13 mSv lower than the maximum dose to an employee working primarily in administration in 2013. The employee which received 0.04 mSv spends approximately half of their time inspecting product and performing internal audits in Zones 2 and 3.

2.3.1.6.2 AVERAGE DOSE

The average dose for all staff in 2014 was 0.10 mSv and is 0.11 mSv lower than the average dose to all staff in 2013. Dose reduction initiatives have been effective in driving the average dose down compared to 2013, especially in Zone 3. The increase in staff that are assigned to primarily work in areas of the facility other than Zone 3 is also a factor in the lowering of the average dose in 2014.

The average quarterly collective dose to employees working primarily in Zone 3 in 2014 was 1.14 mSv, a value which is 0.68 mSv lower than in 2013.

The average quarterly collective dose to employees working primarily in Zone 2 in 2014 was 0.07 mSv, a value that is 0.01 mSv lower than in 2013.

The average quarterly collective dose to employees working primarily in Zone 1 in 2014 was 0.01 mSv, the same as it was in 2013.

The average quarterly collective dose to employees working primarily in administration in 2014 was 0.03 mSv, a value that is 0.05 mSv lower than in 2013.

2.3.1.6.3 COLLECTIVE DOSE

The collective dose for the staff in 2014 was 4.98 mSv for a total of 48 (46 full time and 2 summer students) staff members. Although the number of employees increased in 2014, the collective dose for the year is 2.96 mSv lower than the collective dose to staff in 2013.

The lowering of the collective dose at the facility despite the increase in staff is a testament to the effectiveness of the dose-reduction initiatives implemented over the past several years.

2.3.1.7 DISCUSSION ON RADIATION PROTECTION PROGRAM EFFECTIVENESS

The Radiation Safety Program[17] remains effective in protecting the prevention of unreasonable risk to the health and safety of persons.

2.3.1.7.1 STAFF DOSE

The Radiation Safety Program[17] prescribed measures to ensure that staff doses are kept to levels as low as reasonably acceptable.

The Radiation Safety Program[17] requires that stationary Tritium-In-Air monitors are used to assess ambient air in several areas of the facility. These monitors are set with audible alarm thresholds that ensure that staff are evacuated from work areas when abnormal concentrations of tritium are detected.

By responding to any alarms as trained, staff dose is minimized. Action is taken accordingly to reduce or eliminate source of tritium exposure and in ensuring staff dose are kept as low as reasonably achievable.

In 2014, a stationary monitor was added to the general shipping area in Zone 1 as an ALARA-driven initiative. Although tritium hazards are exceedingly rare in this area, by monitoring the area directly and continuously, action can be taken in quick fashion to eliminate the hazard should it arise during packing activities.

The Radiation Safety Program[17] also requires that portable Tritium-In-Air monitors are made available to staff to identify localized sources of tritium exposure in the facility. Action can then be taken accordingly to reduce or eliminate localized sources of tritium.

Five additional portable tritium-in-air monitors were procured and commissioned in 2014, and staff in all departments have been provided training in the use of this equipment.

The Radiation Safety Program[17] requires that surface contamination is assessed throughout the facility at frequent intervals, based upon the probability of contamination being present. Actions are taken to ensure levels are kept as low as reasonably achievable, and all areas of the facility are thoroughly cleaned on a daily basis. The actions include an informal review of work practices by the Human Protection Coordinator and Department Supervisor where adjustments are made as deemed necessary. Doses remain as low as reasonably achievable in part due to the diligent execution of a program of contamination control.

Worker dose is assessed by bioassay testing of staff urine using liquid scintillation counting. Samples are provided at intervals that are based upon the probability and expected magnitude of uptake. Staff are also trained to identify to the Health Physics Team any unexpected events that may have resulted in abnormal tritium uptakes. Actions are taken to ensure tritium uptake levels are minimized and kept as low as reasonably achievable. The actions include the continuous oversight and review of work practices by the Human Protection Coordinator and Department Supervisor where adjustments are made as deemed necessary.

The Radiation Safety Program[17] requires that equipment used is maintained and calibrated regularly to ensure the adequacy of results. During 2014, the performance of all calibrated equipment used for radiation protection purposes was assessed and calibrated as required by our program.

2.3.1.7.2 PUBLIC DOSE

The Radiation Safety Program[17] prescribed measures to ensure that public dose are kept to levels as low as reasonably acceptable.

The Radiation Safety Program[17] requires that an Environmental Monitoring Program[55] is in place to assess the amount of tritium released to the environment and to formally calculate the dose to the public. Results are reviewed on a quarterly basis by at least three members of the Health Physics Team. This review includes a comparison of current data with historical data to identify any trends. Any unexpected results or negative trends may result in changes in work practices as deemed necessary in order to ensure public dose are kept as low as reasonably achievable.

As required by the Radiation Safety Program[17], bubbler systems are in place to formally measure tritium emissions from the facility. The results are entered by a trained employee who is a member of the Health Physics Team and verified on a weekly basis by six other key employees, including four members of the Health Physics Team and the Production Supervisors for each Zone 2 and Zone 3 where tritium may be released. Unexpected results or negative trends are investigated and reviewed, and the actions from this review may result in changes in work practices as deemed necessary to ensure the environmental impact of our operations are kept as low as reasonably achievable, including any public dose.

In addition to the bubbler systems, the Radiation Safety Program[17] requires that a real-time emissions monitoring system is also used. This system is in place to monitor tritium emissions from the facility as they take place, in real time. The results are verified regularly by production staff and production supervisors as part of tritium processing procedures. In addition, the Health Physics Team reviews emissions data on a frequent basis to identify abnormal trends.

All real-time stack monitoring data is recorded on a chart recorder. The concentration trends over time for each active ventilation system are key during any review or investigation that may be required when tritium emissions are higher than expected. The actions from this review may result in changes in work practices as deemed necessary and contribute in ensuring our environmental impact is minimized.

In 2014, a new digital data recorder was added to the real-time stack monitoring system as a second recording mechanism. The digital recorder is fully programmable, and displays concentration values in numerical form, as well as providing a trendline. This has allowed production staff and the Health Physics Team to detect even minor variations in our emissions, variations that were harder to detect to the naked eye using the paper-based recorder.

As well, the data recorded by the digital recorder permits a more reliable mathematical estimation of the tritium emissions over any time period. Any emission event can be analyzed in fine detail to determine when it occurred, how the emission changed with time, when it terminates, and to estimate how much tritium was emitted.

The real-time stack monitoring system plays a significant role in ensuring that our environmental impact remains as low as reasonably achievable.

2.3.1.8 SUMMARY OF RADIATION PROTECTION PROGRAM PERFORMANCE

Objectives and targets have been set for the upcoming year based on historical performance in 2014 and previous years.

2.3.1.8.1 AIR EMISSION TARGET

Targets for 2014 relating to the total emission of tritium via the gaseous effluent stream were set at 1,289.30 GBq per week. In addition, the 'released to processed' ratio target was set at 0.22%, meaning for every 100 units of tritium processed through the year, less than 0.22 units of tritium are released.

The following table provides the ratio of tritium released to atmosphere against tritium processed and the tritium released per week in 2014:

TABLE 15: 2014 RELEASED PER WEEK AND TRITIUM RELEASED TO PROCESSED

YEAR	RELEASED (GBq/WEEK)	% RELEASED TO PROCESSED
2014	1,272	0.23

SRBT was successful in meeting our total release target, as 1,272 GBq of total tritium was released per week, on average. For the year, the released to processed ratio came in just over the target, at 0.23%.

Average weekly releases to atmosphere of 1,272 GBq per week in 2014 represent less than 20% of our weekly Action Levels of 7,753 GBq (HT + HTO).

In 2013 the amount of tritium released to atmosphere to the amount of tritium processed was 0.26%. Although the target was not achieved, it remains that the ratio for 2014 represents a reduction year over year.

Although tritium production is expected to increase by 15% in 2015, SRBT intends on maintaining the processed to released ratio target at 0.22%, in order to demonstrate our continuing commitment to minimizing our environmental impact.

2.3.1.8.2 OCCUPATIONAL DOSE TARGET

For 2014, the occupational dose target was set as an average dose to workers of 0.19 mSv, while the maximum dose to a worker was targeted as 1.74 mSv.

Production was projected to remain relatively stable in 2014 when these target were selected; In actuality 6% less tritium was processed in 2014 than in 2013.

Despite the increase in production, SRBT managed to reach all dose-related targets for 2014. The occupational average dose target of 0.19 mSv was met, as an average dose to workers of 0.10 mSv was achieved, a value that represents 3.3% of our yearly Action Level of 3.0 mSv.

The maximum dose to a worker in 2014 was 1.29 mSv, which again met the target set for the year of 1.74 mSv. The maximum dose of 1.29 mSv represents 43% of an action level, and 2.58% of the annual regulatory limit of 50 mSv for a nuclear energy worker.

In 2015, production rates are projected to increase; a 15% rise is projected as of the writing of this report. Given this outlook, management has decided to implement the same occupational dose targets for 2015 as we actually achieved in 2014 (0.10 mSv average, 1.29 mSv maximum).

2.3.1.9 SUMMARY OF CONTINUOUS IMPROVEMENTS UNDER ALARA PERFORMANCE

Keeping radiation doses 'as low as reasonably achievable', or ALARA, is a concept that forms a key component of how we train and mentor our staff, and also drives a significant portion of the decisions made by our safety committees and by our management.

Committee meetings in particular offer a vital platform for shaping ALARA initiatives and improvements. Members of each committee brainstorm ways to improve all of our processes, but above all, safety remains the overriding priority. In 2014 a total of 91 committee meetings took place, representing a 54% increase in the number of meetings compared to the previous year.

The Health Physics Committee, which includes senior management, met 14 times more in 2014 than in 2013 mainly due to significant improvements made to equipment, procedures, staff training and also the introduction of the new Manager of Health Physics and Regulatory Affairs who is mainly responsible for oversight of all company Health Physics activities.

As well, in order to support our commitment to safety, senior management has taken a proactive approach and invested a significant amount of financial and human resources into ALARA-driven improvements during 2014.

As a result of these collaborative efforts, several improvements were made in order to continue to drive doses to workers and members of the public even lower. Some examples are cited below.

Health physics related equipment improvements were one of the primary vehicles in ensuring worker and public doses remained ALARA; improvements in the quantity of instruments available to staff, as well as the modernization of several systems and components were successfully implemented in 2014.

The selective reduction in the manufacture of specific, difficult types of light sources results in a lowering of the number of activities being performed that could have higher than usual dose consequences.

In some cases, job activities that could potentially result in tritium uptakes were distributed amongst several staff members in order to ensure that no one individual accrued an unnecessarily high body burden.

A renewed and refreshed training session was conducted in December, focused on Radiation Safety. All requirements for this session defined in our processes were met, but the activity was significantly augmented to ensure that audience engagement was continuous, and the information was relevant. Specific, ALARA-driven strategies for day-to-day tasks were described so that all staff could take action to reduce their dose.

In response to administrative level exceedances, action is taken once an investigation is conducted, to ensure doses to staff remain ALARA. For example, work on a specific light type was moved temporarily to an area with greater ventilation in case additional light failures were to occur during handling. Although no additional instances of breakage were observed of the type that caused the administrative level to be exceeded, this action is another example of an ALARA-driven decision.

In 2015, continuing emphasis will be placed on the ALARA concept for all key relevant decisions and initiatives, in order to ensure that we hit our targets for worker dose, and that our environmental impact and public dose levels remains extremely low.

2.3.1.10 SUMMARY OF RADIATION DEVICE AND INSTRUMENTATION PERFORMANCE

All instruments in 2014 continued to be maintained in a state of safe operation.

As discussed in detail in section "2.2.3 Fitness for service" of this report the Maintenance Program[27] has continued to remain effective in 2014. The facility and equipment associated with the facility were maintained and operated within all manufacturers' requirements and as prescribed by the Radiation Safety Program[17] to ensure that all regulatory requirements were met.

2.3.1.11 SUMMARY OF INVENTORY CONTROL MEASURES

2.3.1.11.1 TRITIUM

A number of Inventory Control Measures are in place to ensure that tritium on site does not exceed the possession limit prescribed by licence NSPFOL-13.00/2015[1].

Procedure RSO-009[56] (Revision I) titled "Tritium Inventory Management" is specifically used to assess tritium inventory on site.

Tritium on site is found in:

- Bulk containers, U-beds and tritium traps
- New light sources
- The exit signs for our facility
- New product that contain light sources
- Work in progress
- Waste
- Expired light sources taken out of product
- Products that contain expired light sources
- Non-conforming product

2.3.1.11.2 OTHER NUCLEAR SUBSTANCES

Procedure RSO-029[57] (Revision A) titled “Nuclear Substances Inventory Management” is specifically used to assess all nuclear substances on site other than tritium.

2.3.1.11.3 CHECK SOURCES

A CS-137 disc check source, with an estimated activity of 0.76 microcuries is stored in the LSC lab for Health Physics related testing.

2.3.1.11.4 DEPLETED URANIUM

Depleted uranium in metallic form for use in tritium traps are utilized during the course of production, 7.27 Kg were on site at the end of 2014:

TABLE 16: DEPLETED URANIUM INVENTORY BREAKDOWN AT THE END OF 2014

QTY	DESCRIPTION	DEPLETED URANIUM IN EACH (GRAMS)	TOTAL DEPLETED URANIUM (GRAMS)
1	LOOSE FORM	NA	3,155
9	ACTIVE P.U.T.T.	30 +/- 1 GRAM	272
45	NON-ACTIVE P.U.T.T.	30 +/- 1 GRAM	1,343
1	U-BED	240	240
4	AMERSHAM CONTAINERS THAT WE OWN (0666AY)	405	1,620
2	AMERSHAM CONTAINERS THAT WE OWN (3605D)	320	640
		TOTAL	**7,270**

2.3.1.11.5 LSC EXTERNAL SOURCES

The operations require the use of liquid scintillation counters (LSC’s). LSC’s on site have external standard sources incorporated as part of the instruments, including:

- Two Ba-133 695.6 KBq/ea sources contained in LSC’s put into production this year.
- Two Eu-152 740 kBq sources, each source is in one of two Wallac 1409 LSC currently at the facility.
- One Ra-226 370 kBq source that was in a Wallac 1215 LSC which was used at the facility but is no longer operational.
- One Ba-133 0.4 microcuries source that was removed from a discontinued liquid scintillation counter.

2.3.1.12 SUMMARY OF RADIATION PROTECTION PROGRAM IMPROVEMENTS

In 2014, SRBT invested significant resources into equipment that supports the mission of the Health Physics Team. This included acquisition of new portable and stationary tritium-in-air monitors, new components for the stack monitoring system, a new digital data recorder for tracking emissions of tritium in real-time, and new liquid scintillation counters and upgrades for the LSC laboratory.

Also in 2014, SRBT created a new organizational manager tasked with oversight of all company radiation safety and health physics-related activities. The Manager of Health Physics and Regulatory Affairs is responsible for research and implementation of new initiatives that may help reduce emissions and staff exposures or that will improve company health physics activities.

SRBT revised the “Licence Limit, Action Levels and Administrative Limit” document[36] to ensure that action levels are adequate to detect the emergence of a potential loss of control of the Radiation Protection Program. The latest revision of this document was accepted by CNSC staff in November of 2014.

During 2014, quarterly Health Physics Committee meetings[51][52][53][54] were held to review swipe results. The purpose of the review was to determine if the sampling locations chosen are effective in identifying areas where contamination may be present. The sampling locations were methodically compared against each other and approximately 20% of locations with the highest pass-rate for the quarter, which were the areas least likely to exceed the administrative limits, were replaced by new locations selected at the discretion of the Health Physics Committee.

The pass rate for facility contamination control during 2014 has remained comparable with previous years, which continues to demonstrate that our program is effective at identifying areas with contamination.

2.3.2 CONVENTIONAL HEALTH AND SAFETY

2.3.2.1 JURISDICTION

SRBT is subject to Federal Jurisdiction thus, the Canada Labour Code Part II (CLC Part II) and the Canada Occupational Health and Safety regulations.

2.3.2.2 INDUSTRIAL HEALTH AND SAFETY PROGRAM

Being under federal jurisdiction in 2014, the industrial Health and Safety Program for the SRBT facility was compliant with the requirements of the CLC Part II & Canada Occupational Health and Safety regulations.

2.3.2.3 WORKPLACE HEALTH AND SAFETY COMMITTEE

In accordance with Section 135(1) of the CLC Part II, SRB Technologies (Canada) Inc. maintains a Workplace Health and Safety Committee.

The Committee is now comprised of four representatives. Additional management and worker representatives were added in 2014 to provide the committee with more experience and diversity. Under section 135(10) of the CLC Part II the Committee is required to meet no less than 9 times per year. The Committee met 17 times in 2014 and all minutes are kept on file.

2.3.2.4 MINOR INCIDENTS AND LOST TIME INCIDENTS

There were no major incidents to report in 2014. There was however four minor injuries of which only two where the employee required medical care at the local hospital. One visit was for a cut that required a few stitches, the other worker was sent as a preventative measure due to a hand injury. All the required documents were sent to Workplace Safety and Insurance Board (WSIB) and reports are kept on file. These incidents did not result in any lost time as the workers returned the same day.

2.3.2.5 VISITS FROM HUMAN RESOURCES AND SKILLS DEVELOPMENT CANADA (HRSDC)

There has been no facility visits by HRSDC in 2014.

2.3.2.6 REPORTING

In accordance with Section 15.10 (1) of Part XV of the Canada Occupational Health and Safety Regulations the Employer's Annual Hazardous Occurrence Report was submitted to HRSDC as required.

In accordance with Section 10 of the Safety and Health Committees and Representatives Regulations, the Work Place Committee Report was submitted to the Regional Safety Officer at Canada Labour prior to March 31, 2014 as required.

2.3.3 ENVIRONMENTAL PROTECTION

This section of the report will provide environmental and radiological compliance including results from environmental and radiological monitoring, assessment of compliance with licence limits, historical trending where appropriate, and quality assurance/quality control results for the monitoring.

SRB Technologies (Canada) Inc. developed an Environmental Monitoring Program[55] that provides data for site-specific determination of tritium concentrations along the various pathways for exposure probabilities to the public due to the activities of the operations. Most samples are analyzed and collected by a third party contracted by SRBT.

On September 4, 2014 CNSC Staff also collected a number of environmental samples with our third party for comparison.

2.3.3.1 PASSIVE AIR SAMPLERS

A total of 40 passive air samplers (PAS) are located throughout a two kilometer radius from the SRBT facility, in eight sectors, ranging in distance at 250, 500, 1,000, and 2,000 meters.

The samples were collected on a monthly basis by a third party laboratory for tritium concentration assessment by the third party laboratory.

Several duplicate samplers are included for quality assurance purposes. Several samplers are also located specifically to provide data for assessment of the defined critical group members. PAS results for 2014 can be found in the table in **Appendix I** of this report.

The table shows the HTO concentrations for the samplers located in each of the eight compass sectors. The correlation for the results of the samplers as they increase in distance from the facility is quite evident. The patterns of the lines are very similar in most cases. Tritium oxide in air concentrations for each month of 2014 are graphically represented for each of eight compass sectors and for each of the distances from the facility and are found in **Appendix J** of this report.

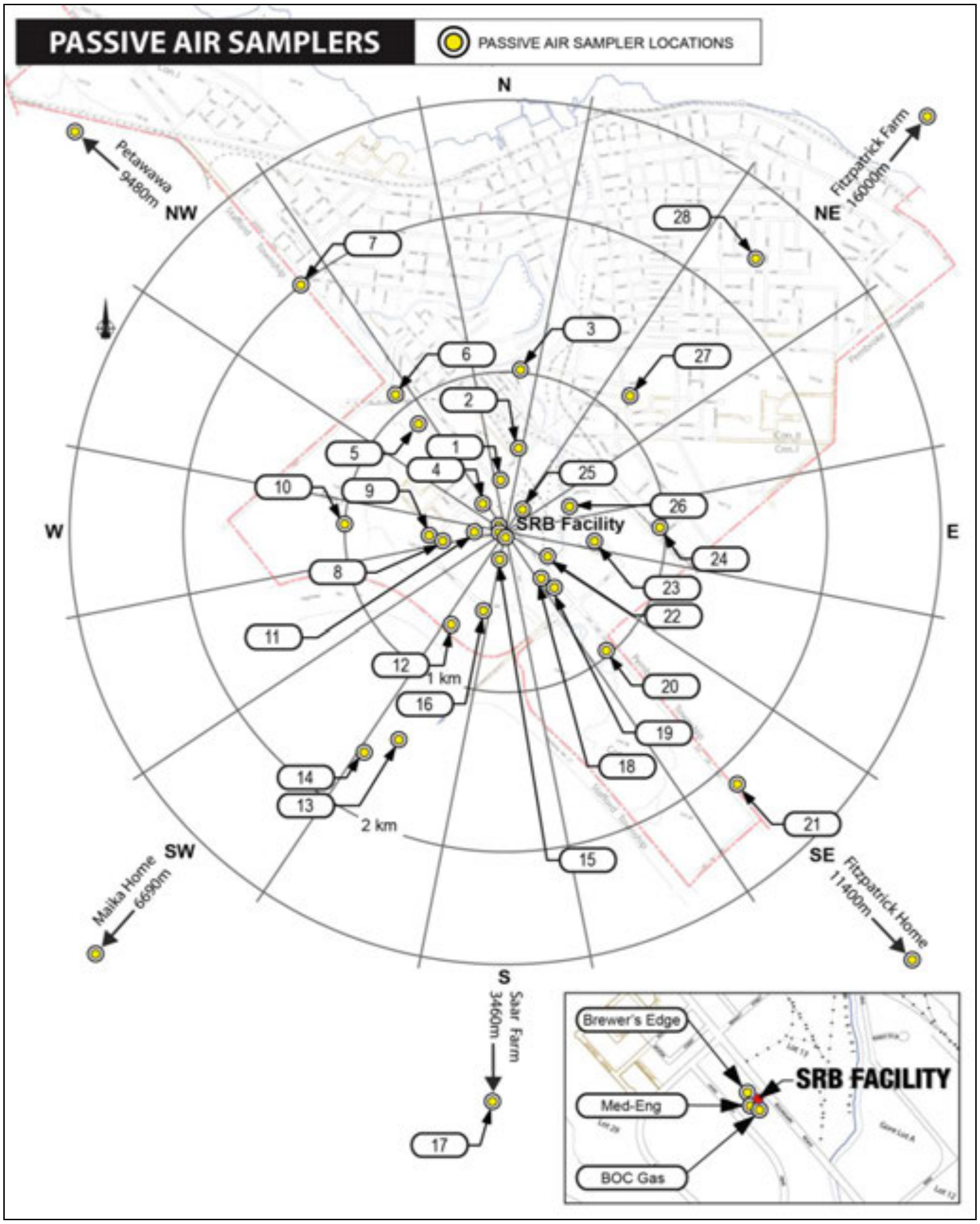
The PAS`s represent tritium exposure pathways for inhalation and skin absorption and used in the calculations for critical group annual estimated dose for 2014.

The sum of the average concentration for all 40 PAS`s in 2014 was 49.74 Bq/m$^3$ and is 1.92 times lower than the sum of the average concentration for all 40 PAS`s in 2013, which was 95.53 Bq/m^3.

Total tritium emissions in 2014 (66,161 GBq) decreased to 83.9% of those experienced in 2013 (78,875 GBq). This is primarily due to emissions-reduction initiatives such as the decrease in piping diameter on the processing rigs, and the availability of higher resolution real-time emission data using the digital data recorder (allowing staff to take actions to reduce emissions at even lower levels).

In addition, facility emissions of tritium oxide (HTO) were significantly lower in 2014 (10,712 GBq) for the year, HTO releases were 60% of those for 2013 (17,824 GBq). When compared to the PAS results (52.1% of 2013 values), it is clear that the environmental monitoring program collects data that consistently reflects the emissions from the facility.

FIGURE 3: PASSIVE AIR SAMPLER LOCATIONS

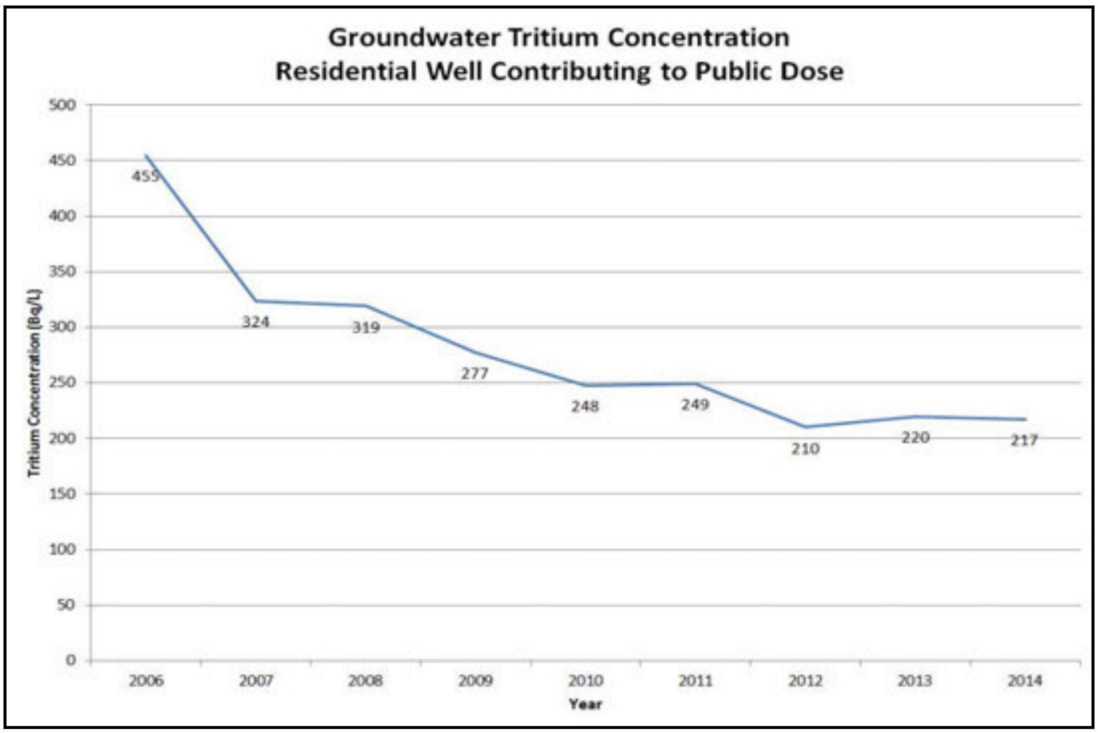


2.3.3.2 GROUNDWATER MONITORING

Based on our groundwater studies and ensuing reports[58][59][60][61] SRBT maintains a comprehensive groundwater monitoring program as part of our overall Environmental Monitoring Program[55]. Dedicated, engineered sampling wells are used to establish tritium concentrations in the groundwater each month at various depths and in differing geologic strata. Variations are trended over time to measure the response of historical contamination of the local aquifer. Since the program was established, groundwater measurements have been in very good agreement with established hydrogeological modelling predictions.

In addition, several local residences permit SRBT to acquire samples three times annually, to provide additional data for our program. In 2014, the highest average residential well tritium concentration value was measured at 217 Bq/L, a value that continues trend downward, and remains far below the Ontario Drinking Water Quality Standard of 7,000 Bq/L.

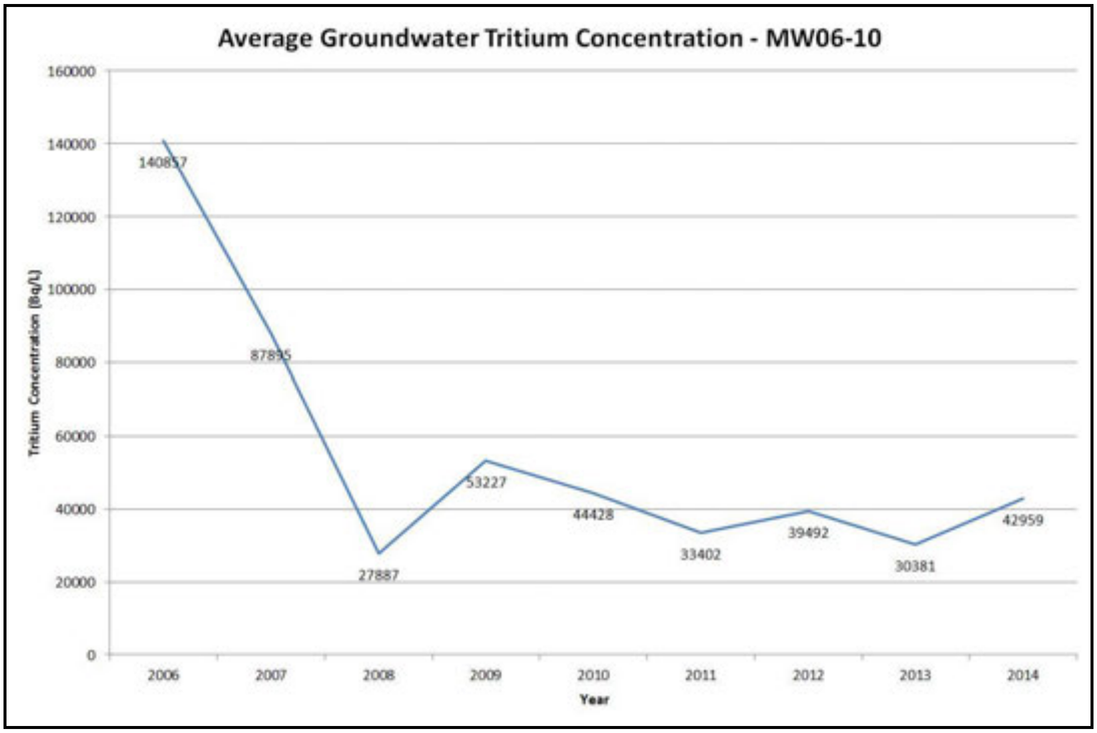
FIGURE 4: RESIDENTIAL WELL WITH HIGHEST CONCENTRATION



More importantly, public dose values attributed to groundwater consumption have decreased significantly over the past several years as a direct result of our efforts to minimize our environmental impact. In 2014 SRBT has continued to provide a compilation of the entire set of groundwater monitoring data to CNSC staff on a monthly basis. Well monitoring results can be found in **Appendix K** of this report.

Of the now 34 monitoring wells, by the end of 2014 the concentrations of only two wells now exceed the Ontario Drinking Water Guideline of 7,000 Bq/L. These two wells (MW06-10 and MW07-13) are located on the SRBT site within 50 meters of the stack and showed either decreasing or steady concentrations in 2014. The highest average tritium concentration in any well remains in monitoring well MW06-10 which is located in the stack area. The average concentrations in the majority of the monitoring wells continue to decrease since being drilled. For example in 2007 the concentration of 8 wells exceeded 7,000 Bq/L.

FIGURE 5: MONITORING WELL WITH HIGHEST CONCENTRATION



While most of the released tritium in the air is dispersed, some of it will reach the soil through dry and wet deposition. Infiltrated precipitation water brings tritium into the groundwater below it. The deposition of tritium on and around the facility from air emissions and resulting soil moisture and standing water are the sole direct contributor to tritium found in groundwater.

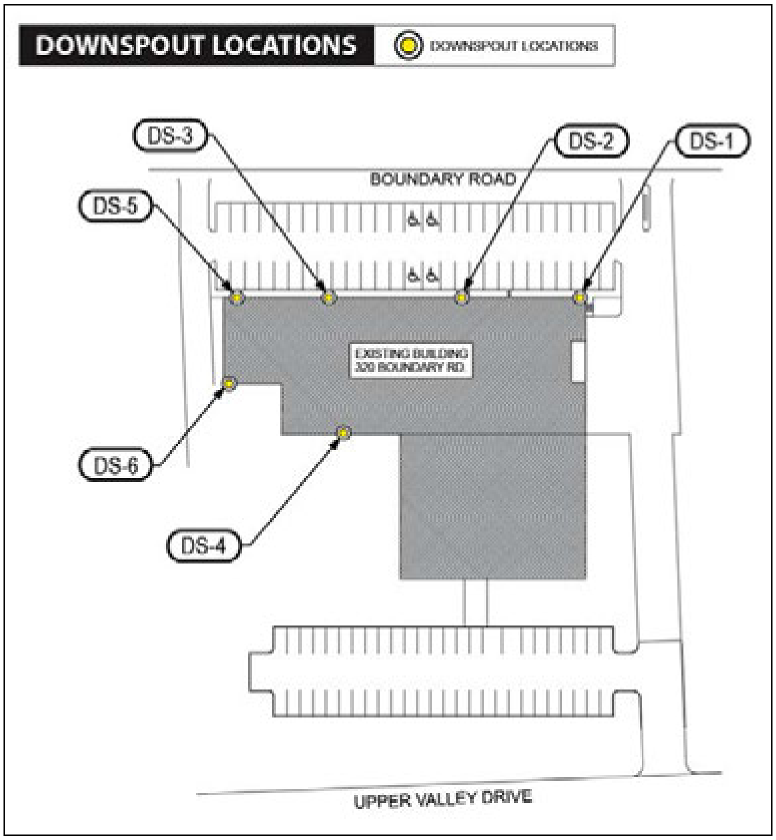
Groundwater is affected by the percolation of soil moisture and standing water from the surface. Current concentrations in the wells are expected to eventually gradually decrease once all historical emissions have flushed through the system and/or decayed with some influence of higher concentrations in nearby wells from lateral underground water flow.

This will be confirmed by continuous monitoring of the existing network of wells. The rate at which this decrease will occur is dependent on the level and speed of recharge of the groundwater on and around the SRBT facility.

2.3.3.3 RUN OFF FROM DOWNSPOUTS

Tritium concentrations are measured in all facility downspouts. The samples were collected periodically by SRBT for tritium concentration assessment.

FIGURE 6: BUILDING DOWNSPOUTS



Runoff from downspouts was collected during six precipitation events throughout 2014. Average results per downspout in 2014 ranged between 100 Bq/L (DS-1) and 634 Bq/L (DS-6).

The average tritium concentration for all six downspouts in 2014 was 267 Bq/L, and is 2.99 times less than the average tritium concentration for all six downspouts in 2013 which was 798 Bq/L.

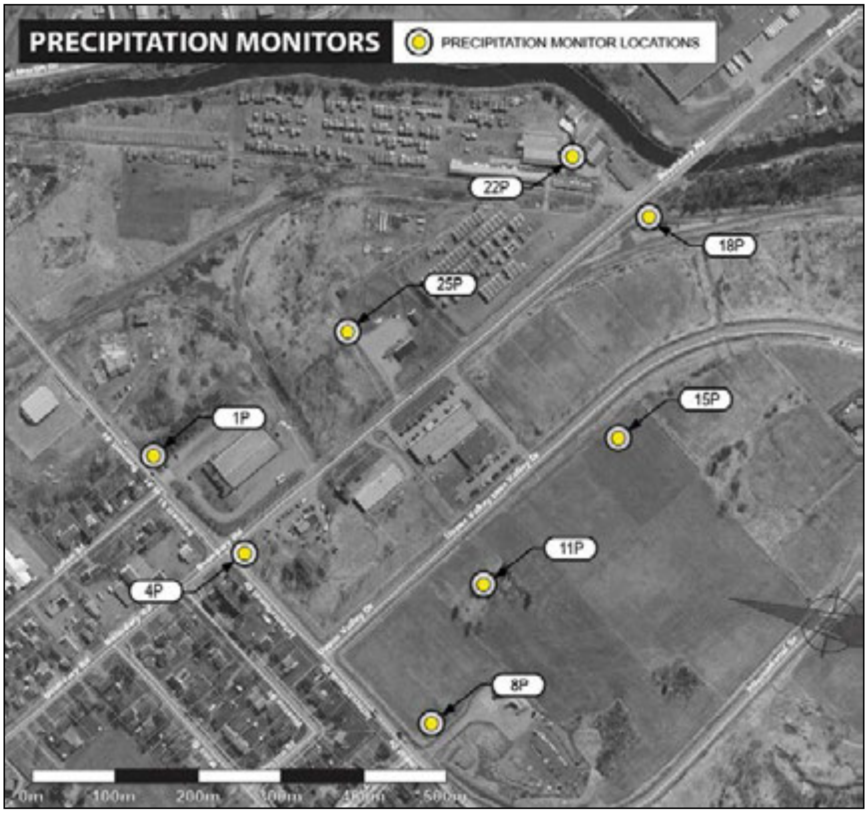
Total tritium emissions in 2014 decreased to 83.8% of those experienced in 2013; as such it is therefore reasonable to have observed a decrease in tritium concentration in downspouts.

Runoff monitoring results can be found in **Appendix L** of this report.

2.3.3.4 PRECIPITATION SAMPLER RESULTS

Eight precipitation monitors are installed near existing air monitoring stations that are located approximately 250 m from the facility.

FIGURE 7: MAP OF AIR AND PRECIPITATION MONITORING STATIONS



The samples were collected on a monthly basis by SRBT and a third party laboratory for tritium concentration assessment by the third party laboratory. Average results in 2014 ranged between 12 Bq/L (sampler 15P) and 67 Bq/L (sampler 4P).

The average tritium concentration for all eight precipitation monitors in 2014 was 42 Bq/L, which is 2.45 times less that the average for 2013, which was 103 Bq/L.

Total tritium emissions in 2014 decreased to 83.8% of those experienced in 2013; as such it is therefore reasonable to have observed a decrease in tritium concentration in precipitation.

Precipitation monitoring results and comparisons can be found in **Appendix M** of this report.

The tritium concentration in precipitation monitors are generally lower than the concentrations that are expected by the model. This means that the model used to define the estimated values continues to be adequate in overestimating the impact from the emissions on soil moisture and in turn protective of groundwater. The overestimation can also be partly attributed to the fact that SRBT does not process tritium during the occurrence of any type of precipitation.

Having lower values in the precipitation monitors than the concentrations that were expected by the model can provide further evidence that concentration in soil moisture are lower when no processing takes place during the occurrence of precipitation.

2.3.3.5 WATER LEVEL MEASUREMENTS

The water levels are measured in monitoring wells on a monthly basis prior to purge and sampling. Analysis of this data shows consistent trends from year to year when comparing season to season.

Compilation of water level measurements for 2014 can be found in **Appendix N** of this report.

2.3.3.6 PRODUCE MONITORING RESULTS

Produce from a local market and from local gardens were sampled once in 2014. The samples were collected by a third party laboratory for tritium concentration assessment by the third party laboratory. The results were reported to the members of the public and posted on the web site. This data is also used in the calculations for critical group annual estimated dose for 2014.

Produce monitoring results and locations for 2014 can be found in **Appendix O** of this report with graphs comparing 2006 to 2014 results.

The average tritium concentration in produce for 2014 was 135 Bq/L, a value that is 1.48 times greater than the average tritium concentration in produce for 2013 which was 91 Bq/L.

2.3.3.7 MILK MONITORING RESULTS

Milk from a local producer and from a local distributor is sampled every four months. The samples were collected by SRBT and a third party laboratory for tritium concentration assessment by the third party laboratory. This data is also used in the calculations for critical group annual estimated dose for 2014.

Milk monitoring results and locations for 2014 can be found in **Appendix P** of this report. Tritium concentrations in milk for 2014 remained very low, averaging 5 Bq/L, and several times falling below the lower limit of detection of 4 Bq/L.

2.3.3.8 WINE MONITORING RESULTS

Wine from a local producer is sampled once a year. The sample was collected by a third party laboratory for tritium concentration assessment by the third party laboratory. The results were promptly reported to the members of the public.

Wine monitoring results for 2014 are low at 10 Bq/L and can be found in **Appendix Q** of this report with a graph comparing results from 2006 to 2014.

2.3.3.9 RECEIVING WATERS MONITORING RESULTS

Samples of receiving waters downstream from SRBT in the Muskrat River were collected regularly. Samples were collected by SRBT and a third party laboratory for tritium concentration assessment by the third party laboratory.

Receiving waters monitoring results for can be found in **Appendix R** of this report. All obtained samples of receiving waters in 2014 fell below the minimum detection limit for tritium concentration, (typically less than 3 to 5 Bq/L).

2.3.3.10 WEATHER DATA

A weather station near the facility collects data on a continuous basis. See weather data for 2014 in **Appendix S**.

2.3.3.11 SOIL SAMPLING

Soil sampling is not a formal part of SRBT's Environmental Monitoring Program[55]. Some soil samples were obtained during 2014 as a proactive confirmatory measure. This included soil obtained from nearby areas that were under development which required digging such as the building expansion, or cable laying activities. Samples were obtained on May 14, June 3, October 24 and November 3, 2014.

In all cases, soil samples were measured for free water tritium concentrations. Sample results consistently measured less than the Ontario Drinking Water Guideline value of 7,000 Bq/L; only soil obtained from within the 'compound' area where the stacks are located exceeded this value (10,977 Bq/L).

2.3.3.12 PUBLIC DOSE FOR 2014

The calculation method used to determine the dose to the 'Critical Group' as defined in the SRBT Environment Monitoring Program (EMP)[55] is described in the EMP[55] document using the effective dose coefficients found in CSA Guideline N288.1-08.

TABLE 17: CSA GUIDELINE N288.1-08 EFFECTIVE DOSE COEFFICIENTS FOR H-3 (HTO)

AGE GROUP	EFFECTIVE DOSE COEFFICIENT (µSv/Bq)
INFANT	5.3E-5
CHILD	2.5E-5
ADULT	2.0E-5

The dose assessed for the Critical Group is a summation of:

- Tritium uptake from inhalation and absorption through skin at the place of residence and/or the place of work, ($P_{(i)19}$ and $P_{(e)19}$), and
- Tritium uptake due to consumption of well water (P_{29}), and
- Tritium uptake due to consumption of produce (P_{49}), and
- Tritium uptake due to consumption of dairy products (P_{59}).

Dose due to inhalation

The closest residence to Passive Air Sampler NW250 is located at the intersection of Boundary Road and International Drive at approximately 240 meters from the point of release. The 2014 average concentration of tritium oxide in air at Passive Air Sampler NW250 has been determined to be 2.65 Bq/m^3.

Three passive air samplers are located close to the SRBT facility and represent the tritium oxide in air ($P_{(i)19}$ and $P_{(e)19}$) concentrations for the critical group member (adult worker) at samplers 1, 2, and 13. The sampler indicating the highest tritium oxide in air concentration is used to calculate the P19 dose values while at work. The highest average result for 2014 for PAS # 1, PAS # 2, and PAS # 13 is 4.33 Bq/m^3 at PAS # 13.

Using the following inhalation rates coefficients found in CSA Guideline N288.1-08 and assuming 2,080 hours (23.744%) of work per year with 6,680 hours (76.256%) at home for a total of 8,760 hours per week:

TABLE 18: CSA GUIDELINE N288.1-08 INHALATION RATES

AGE GROUP	INHALATION RATE (m^3/a)
INFANT	2,740
CHILD	7,850
ADULT	8,400

$P_{(i)19}$: Adult worker dose due to HTO inhaled at residence

The average value for tritium oxide in air for the sampler representing the place of residence for the defined critical group equals 2.65 Bq/m^3.

$P_{(i)19r}$ = $[H\text{-}3_{air}]$ (Bq/m^3) Breathing Rate (m^3/a) x DCF_{H3} (μSv/Bq)
= 2.65 Bq/m^3 x 8,400 m^3/a (76.256%) x 2.0E-05 μSv/Bq
= 0.339 μSv/a

$P_{(i)19}$: Adult worker dose due to HTO inhaled at work

Taking the highest concentration between Passive Air Samplers #1, #2, and #13 is Passive Air Samplers #13 at 4.33 Bq/m^3.

$P_{(i)19w}$ = $[H\text{-}3_{air}]$ (Bq/m^3) Breathing Rate (m^3/a) x DCF_{H3} (μSv/Bq)
= 4.33 Bq/m^3 x 8,400 m^3/a (23.744%) x 2.0E-05 μSv/Bq
= 0.173 μSv/a.

$P_{(i)19}$: Adult resident dose due to HTO inhaled at residence

The average value for tritium oxide in air for the sampler representing the place of residence for the defined critical group equals 2.65 Bq/m^3:

$P_{(i)19}$ = $[H\text{-}3_{air}]$ (Bq/m^3) Breathing Rate (m^3/a) x DCF_{H3} (μSv/Bq)
= 2.65 Bq/m^3 x 8,400 m^3/a x 2.0E-05 μSv/Bq
= 0.445 μSv/a

$P_{(i)19}$: Infant resident dose due to HTO inhaled at residence

The average value for tritium oxide in air for the sampler representing the place of residence for the defined critical group equals 2.65 Bq/m^3:

$P_{(i)19}$ = $[H\text{-}3_{air}]$ (Bq/m^3) Breathing Rate (m^3/a) x DCF_{H3} (μSv/Bq)
= 2.65 Bq/m^3 x 2,740 m^3/a x 5.3E-05 μSv/Bq
= 0.385 μSv/a

$P_{(i)19}$: Child resident dose due to HTO inhaled at residence

The average value for tritium oxide in air for the sampler representing the place of residence for the defined critical group equals 2.65 Bq/m^3:

$P_{(i)19}$ = $[H\text{-}3_{air}]$ (Bq/m^3) Breathing Rate (m^3/a) x DCF_{H3} (μSv/Bq)
= 2.65 Bq/m^3 x 7,850 m^3/a x 2.5E-05 μSv/Bq
= 0.520 μSv/a

Dose due to skin absorption

$P_{(e)19}$: Adult worker dose due to skin absorption of HTO at residence

The dose due to skin absorption is equal to the dose due to inhalation.

$P_{(e)19r}$ = 0.339 μSv/a

$P_{(e)19}$: Adult worker dose due to skin absorption of HTO at work

The dose due to skin absorption is equal to the dose due to inhalation.

$P_{(e)19w}$ = 0.173 μSv/a

$P_{(e)19}$: Adult resident dose due to skin absorption of HTO at residence

The dose due to skin absorption is equal to the dose due to inhalation.

$P_{(e)19}$ = 0.445 μSv/a

$P_{(e)19}$: Infant resident dose due to skin absorption of HTO at residence

The dose due to skin absorption is equal to the dose due to inhalation.

$P_{(e)19}$ = 0.385 μSv/a

$P_{(e)19}$: Child resident dose due to skin absorption of HTO at residence

The dose due to skin absorption is equal to the dose due to inhalation.

$P_{(e)19}$ = 0.520 μSv/a

Dose due to consumption of well water

The tritium uptake due to consumption of well water is calculated by taking the average tritium concentration of the water sampled.

Using the following annual consumption rates found in CSA Guideline N288.1-08:

TABLE 19: CSA GUIDELINE N288.1-08 WATER CONSUMPTION RATES

AGE GROUP	WELL WATER CONSUMPTION RATE (L/a)
INFANT	357.7
CHILD	511.0
ADULT	839.5

The highest concentration in a residential well used as the sole source of the drinking water is found in RW-8 at 217 Bq/L and will therefore be used in the calculation of the public dose.

P_{29}: Adult dose due to consumption of well water

P_{29} = $[H\text{-}3]_{well}$ x M x 2.0E-05 μSv/Bq;
= [217 Bq/L] x 839.5 L/a x 2.0E-05 μSv/Bq
= 3.643 μSv/a

P_{29}: Infant dose due to consumption of well water

P_{29} = $[H\text{-}3]_{well}$ x M x 5.3E-05 μSv/Bq;
= [217 Bq/L] x 357.7 L/a x 5.3E-05 μSv/Bq
= 4.114 μSv/a

P_{29}: Child dose due to consumption of well water

P_{29} = $[H\text{-}3]_{well}$ x M x 5.3E-05 μSv/Bq;
= [217 Bq/L] x 511 L/a x 2.5E-05 μSv/Bq
= 2.772 μSv/a

Dose due to consumption of produce

The tritium uptake due to consumption of produce, both locally purchased and home grown is calculated by taking the average tritium concentration of produce purchased from the local market and consuming 70% of the annual total and by taking the average tritium concentration from local gardens and consuming 30% of the annual total.

Using the following annual consumption rates for produce found in CSA Guideline N288.1-08:

TABLE 20: CSA GUIDELINE N288.1-08 PRODUCE CONSUMPTION RATES

AGE GROUP	FRUIT CONSUMPTION RATE (Kg/a)	ABOVE GROUND VEGETABLES CONSUMPTION RATE (Kg/a)	ROOT VEGETABLES CONSUMPTION RATE (Kg/a)	TOTAL CONSUMPTION RATE (Kg/a)
INFANT	66.1	43.8	23.4	133.3
CHILD	93.1	113.5	63.1	269.7
ADULT	174.5	234.3	104	512.8

If we assume the average concentration in produce purchased from a market to be 177 Bq/L and if we assume the average concentration in produce from the local gardens with the highest average concentration of 183 Bq/L at 413 Sweezey Court. Historically the average concentration of all produce in all gardens was used but it was determined that using the garden with the highest average concentrations would be more conservative.

P_{49}: Adult dose due to consumption of produce (HTO)

P_{49HTO} = [[$\mathbf{H}_{prod,market}$] + [$\mathbf{H}_{prod,res}$]] x 2.0E-05 μSv/Bq
= [[H-3_{veg}] (Bq/kg) x (kg) x 0.7] + [H-3_{veg}] (Bq/kg) x (kg) x 0.3]] x 2.0E-5 μSv/Bq
= [[177 Bq/kg x 512.8 kg/a x 0.7] + [183 Bq/kg x 512.8 kg/a x 0.3]] x 2.0E-05 μSv/Bq
= [[63,536 Bq/a] + [28,153 Bq/a]] x 2.0E-05 μSv/Bq
= 1.834 μSv/a

P_{49}: Infant dose due to consumption of produce (HTO)

P_{49HTO} = [[$\mathbf{H}_{prod,market}$] + [$\mathbf{H}_{prod,res}$]] x 5.3E-05 μSv/Bq
= [[H-3_{veg}] (Bq/kg) x (kg) x 0.7] + [H-3_{veg}] (Bq/kg) x (kg) x 0.3]] x 5.3E-5 μSv/Bq
= [[177 Bq/kg x 133.3 kg/a x 0.7] + [183 Bq/kg x 133.3 kg/a x 0.3]] x 5.3E-05 μSv/Bq
= [[16,516 Bq/a] + [7,318 Bq/a]] x 5.3E-05 μSv/Bq
= 1.263 μSv/a

P_{49}: Child dose due to consumption of produce (HTO)

P_{49HTO} = [[$\mathbf{H}_{prod,market}$] + [$\mathbf{H}_{prod,res}$]] x 2.5E-05 μSv/Bq
= [[H-3_{veg}] (Bq/kg) x (kg) x 0.7] + [H-3_{veg}] (Bq/kg) x (kg) x 0.3]] x 2.5E-5 μSv/Bq
= [[177 Bq/kg x 269.7 kg/a x 0.7] + [183 Bq/kg x 269.7 kg/a x 0.3]] x 2.5E-05 μSv/Bq
= [[33,416 Bq/a] + [14,807 Bq/a]] x 2.5E-05 μSv/Bq
= 1.206 μSv/a

For OBT, the same equations are applied, using the same ingestion rates and fractions. Since measures of OBT are not available, the measured HTO amount can be used to estimate the OBT. The transfer parameter from HTO in air to HTO in the plant (on a fresh weight basis) is given by:

$\mathbf{P_{14HTO} = RF_p \cdot [1 - DW_p] / H_a}$

The transfer parameter from HTO in air to OBT in a plant (fresh weight basis) is:

$\mathbf{P_{14HTO\text{-}OBT} = RF_p \cdot DW_p \cdot ID_p \cdot WE_p / H_a}$

Where: RF_p = Reduction factor – default is 0.68

DW_p = Dry weight of plant – default value of 0.1 for generic fruit and vegetables

ID_p = Isotopic discrimination factor for plant metabolism (unitless) - default is 0.8

WE_p = Water equivalent of the plant dry matter (L water • kg^{-1} dry plant) – default value for all plants is 0.56

H_a = Atmospheric absolute humidity - a generic default value of 0.011 L/m^3 can be used.

In using the default values and combining the equations, the amount of OBT in a plant (fresh weight basis) can be determined by multiplying the HTO measure for plants for the same location by 0.05.

If we assume the average concentration in produce purchased from a market to be 177 Bq/L and if we assume the average concentration in produce from the local gardens with the highest average concentration of 183 Bq/L at 413 Sweezey Court.

Then the values for OBT will be 8.85 Bq/L produce purchased from a market and 9.15 Bq/L in produce from local gardens:

TABLE 21: CSA GUIDELINE N288.1-08 EFFECTIVE DOSE COEFFICIENTS FOR H-3 (OBT)

AGE GROUP	EFFECTIVE DOSE COEFFICIENT (µSv/Bq)
INFANT	1.3E-4
CHILD	6.3E-5
ADULT	4.6E-5

P_{49}: Adult dose due to consumption of produce (OBT)

$\mathbf{P_{49OBT}}$ = [[$\mathbf{H_{prod,market}}$] + [$\mathbf{H_{prod,res}}$]] x 4.6E-05 µSv/Bq
= [[H-3_{veg}] (Bq/kg) x (kg) x 0.7] + [H-3_{veg}] (Bq/kg) x (kg) x 0.3]] x 4.6E-5 µSv/Bq
= [[8.85 Bq/kg x 512.8 kg/a x 0.7] + [9.15 Bq/kg x 512.8 kg/a x 0.3]] x 4.6E-05 µSv/Bq
= [[3,177 Bq/a] + [1,408 Bq/a]] x 4.6E-05 µSv/Bq
= 0.211 µSv/a

P_{49}: Infant dose due to consumption of produce (OBT)

$\mathbf{P_{49OBT}}$ = [[$\mathbf{H_{prod,market}}$] + [$\mathbf{H_{prod,res}}$]] x 1.3E-4 µSv/Bq
= [[H-3_{veg}] (Bq/kg) x (kg) x 0.7] + [H-3_{veg}] (Bq/kg) x (kg) x 0.3]] x 1.3E-4 µSv/Bq
= [[8.85 Bq/kg x 133.3 kg/a x 0.7] + [9.15 Bq/kg x 133.3 kg/a x 0.3]] x 1.3E-4 µSv/Bq
= [[825.79 Bq/a] + [365.91 Bq/a]] x 1.3E-4 µSv/Bq
= 0.155 µSv/a

P_{49}: Child dose due to consumption of produce (OBT)

P_{49OBT} = [[$H_{prod,market}$] + [$H_{prod,res}$]] x 6.3E-5 µSv/Bq
= [[H-3_{veg}] (Bq/kg) x (kg) x 0.7] + [H-3_{veg}] (Bq/kg) x (kg) x 0.3]] x 6.3E-5 µSv/Bq
= [[8.85 Bq/kg x 269.7 kg/a x 0.7] + [9.15 Bq/kg x 269.7 kg/a x 0.3]] x 6.3E-5 µSv/Bq
= [[1,670.79 Bq/a] + [740.33 Bq/a]] x 6.3E-5 µSv/Bq
= 0.152 µSv/a

P_{49}: Adult dose due to consumption of produce (HTO + OBT)

P_{49} = P_{49HTO} + P_{49OBT}
= 1.834 µSv/a + 0.211 µSv/a
= 2.045 µSv/a

P_{49}: Infant dose due to consumption of produce (HTO + OBT)

P_{49} = P_{49HTO} + P_{49OBT}
= 1.263 µSv/a + 0.155 µSv/a
= 1.418 µSv/a

P_{49}: Child dose due to consumption of produce (HTO + OBT)

P_{49} = P_{49HTO} + P_{49OBT}
= 1.206 µSv/a + 0.152 µSv/a
= 1.358 µSv/a

Dose due to consumption of local milk

The tritium uptake due to consumption of milk, from a local producer and distributor is calculated by taking the average tritium concentration of the milk sampled.

Using the following annual milk consumption rates found in CSA Guideline N288.1-08:

TABLE 22: CSA GUIDELINE N288.1-08 MILK CONSUMPTION RATES

AGE GROUP	WELL WATER CONSUMPTION RATE (L/a)
INFANT	370.84
CHILD	305.14
ADULT	265.355

The average concentration in milk being 5 Bq/L but adjusting for the density of milk 5 Bq/L x 0.97 L/kg = 4.85 Bq/kg.

P_{59}: Adult dose due to consumption of milk

P_{59} = [H-3]$_{dairy}$ x M x 2.0E-05 µSv/Bq;
= [4.85 Bq/kg] x 265.355 kg/a x 2.0E-05 µSv/Bq
= 0.026 µSv/a

P_{59}: Infant dose due to consumption of milk

P_{59} = $[H\text{-}3]_{dairy}$ x M x 5.3E-05 μSv/Bq;
= [4.85 Bq/kg] x 370.84 kg/a x 5.3E-05 μSv/Bq
= 0.095 μSv/a

P_{59}: Child dose due to consumption of milk

P_{59} = $[H\text{-}3]_{dairy}$ x M x 5.3E-05 μSv/Bq;
= [4.85 Bq/kg] x 305.14 kg/a x 2.5E-05 μSv/Bq
= 0.037 μSv/a

Critical group annual dose due to tritium uptake based on EMP

Based on the EMP[55] results the annual dose (P_{total}) due to tritium uptake from inhalation and skin absorption, consumption of local produce, local milk and well water equates to a maximum of 6.738 μSv/A for an adult worker of the critical group in 2014 compared to 6.795 μSv/A in 2013.

TABLE 23: 2014 CRITICAL GROUP ANNUAL DOSE DUE TO TRITIUM UPTAKE BASED ON EMP

DOSE CONTRIBUTOR		ADULT WORKER ANNUAL DOSE (μSv/A)	ADULT RESIDENT ANNUAL DOSE (μSv/A)	INFANT RESIDENT ANNUAL DOSE (μSv/A)	CHILD RESIDENT ANNUAL DOSE (μSv/A)
DOSE DUE TO INHALATION AT WORK	$P_{(I)19}$	0.173	N/A	N/A	N/A
DOSE DUE TO SKIN ABSORPTION AT WORK	$P_{(E)19}$	0.173	N/A	N/A	N/A
DOSE DUE TO INHALATION AT RESIDENCE	$P_{(I)19}$	0.339	0.445	0.385	0.520
DOSE DUE TO SKIN ABSORPTION AT RESIDENCE	$P_{(E)19}$	0.339	0.445	0.385	0.520
DOSE DUE TO CONSUMPTION OF WELL WATER	P_{29}	3.643	3.643	4.114	2.772
DOSE DUE TO CONSUMPTION OF PRODUCE	P_{49}	2.045	2.045	1.418	1.358
DOSE DUE TO CONSUMPTION OF MILK	P_{59}	0.026	0.026	0.095	0.037
TOTAL DOSE DUE TO TRITIUM UPTAKE	P_{TOTAL}	6.738	6.604	6.397	5.207

2.3.3.13 DISCUSSION ON ENVIRONMENTAL PROTECTION PROGRAM EFFECTIVENESS

The Environment Protection Program[55] has been effective in measuring tritium in the environment and at ensuring the prevention of unreasonable risk to the environment.

A total of 40 passive air samplers (PAS) are located throughout a two kilometer radius from the SRBT facility, in eight sectors, ranging in distance at 250, 500, 1,000, and 2,000 meters. Our passive air sampler system is effective and provides the full extent of tritium concentrations in air resulting from the emissions from the facility and in turn effective at providing real data to accurately estimate the dose to a member of the critical group resulting from the emissions from the facility.

In 2014 a summation of average PAS results for the year correlated well with facility emissions of tritium oxide. The 2014 sum of the average of the PAS array fell to 52% of the value for 2013, while tritium oxide emissions for 2014 fell to 60% of the value for 2013.

Total tritium emissions in 2014 (66,161 GBq) decreased to 83.9% of those experienced in 2013 (78,875 GBq). This is primarily due to emissions-reduction initiatives such as the decrease in piping diameter on the processing rigs, and the availability of higher resolution real-time emission data using the digital data recorder (allowing staff to take actions to reduce emissions at even lower levels).

In addition, facility emissions of tritium oxide (HTO) were significantly lower in 2014 (10,712 GBq) for the year, HTO releases were 60% of those for 2013 (17,824 GBq). When compared to the PAS results (52% of 2013 values), it is clear that the environmental monitoring program collects data that consistently reflects the emissions from the facility.

Our well monitoring system is effective at providing the full extent of tritium concentrations in groundwater resulting from the emissions from the facility and in turn effective at providing real data to accurately estimate the dose to a member of the critical group resulting from the emissions from the facility.

Our precipitation monitoring system is effective at monitoring soil moisture concentrations resulting from the emissions from the facility and in turn effective at providing real data to accurately estimate the future groundwater conditions resulting from the emissions from the facility.

Tritium concentrations in both milk and produce that are consumed by residents living near the facility are measured. This data is effective at providing the full extent of tritium concentrations in human food resulting from the emissions from the facility and in turn effective at providing real data to accurately estimate the dose to a member of the critical group resulting from the emissions from the facility.

2.3.3.14 SUMMARY OF ENVIRONMENTAL PROTECTION PROGRAM IMPROVEMENTS

Environmental monitoring data is now analyzed by an additional member of the organization. The Manager of Health Physics and Regulatory Affairs is responsible for ensuring the design, implementation and accuracy of the Environmental Monitoring Program[55], as well as developing written observation on analysis of results for inclusion in the EMP Quarterly Reports.

Additional staff were trained on aspects of supporting the EMP[55], including the purging and level measurement of groundwater monitoring wells, and the collection of downspout samples.

2.3.3.15 SUMMARY OF ENVIRONMENTAL PROTECTION PROGRAM PERFORMANCE

The Environmental Protection Program[55] performed well at proving data to validate that the release limit is protective of the environment and that emissions are being monitored accurately.

Tritium concentrations in precipitation are measured in eight precipitation monitors that are installed near existing air monitoring stations that are located approximately 250 m from the facility. The tritium concentration in precipitation monitors and downspouts are generally lower than the concentrations that are expected by the model. This means that the model used to define the estimated values was adequate in overestimating the impact from the emissions on soil moisture and in turn protective of groundwater.

Another indicator that the Environmental Protection Program[55] is performing properly is in the ability of the sets of data to correlate.

Total air emissions in 2014 have decreased by 1.19 times from what they were in 2013, and HTO emissions have decreased by 1.67 times. It is therefore reasonable to assume that if the Environmental Protection Program is performing as designed that a similar decrease in environmental data be observed as we have witnessed in 2014:

- The sum of the average concentrations for all 40 PAS`s in 2014 was 1.92 times less than the sum of the average concentrations for all 40 PAS`s in 2013.
- The average tritium concentration for all six downspouts in 2014 was 2.99 times less than the average tritium concentration for all six downspouts in 2013.
- The average tritium concentration precipitation monitors in 2014 was 2.45 times less than the average tritium concentration for precipitation monitors in 2013.

2.3.4 EMERGENCY MANAGEMENT AND RESPONSE

As most potential hazards associated with the facility would result from fire, Emergency Management and Response for the facility are addressed by an extensive Fire Protection Program[62] supported by an Emergency Plan[63].

2.3.4.1 FIRE PROTECTION

Various measures were taken at the facility in 2014 to improve fire safety.

2.3.4.1.1 FIRE PROTECTION COMMITTEE

In 2014, five minuted meetings have been held which have resulted in the implementation of various measures, which have improved fire safety at the facility.

2.3.4.1.2 FIRE PROTECTION PROGRAM AND PROCEDURES

CNSC staff notified SRBT in June 2014 that CSA N393-13 was to form the new regulatory requirements applied to our facility relating to fire protection. As a result, SRBT undertook a gap analysis[64] between our current Fire Protection Program[62] and the new standard. This gap analysis[64] and a proposed implementation plan[64] was accepted by CNSC staff in December 2014[65], and SRBT expects a new revision of our Fire Protection Program to be issued by July 31, 2015.

2.3.4.1.3 MAINTENANCE OF THE SPRINKLER SYSTEM

In 2014 quarterly maintenance was performed on the fire sprinkler system by a third party, in addition a weekly check of various valves and line pressures were performed by trained SRBT staff. All records are kept on file.

2.3.4.1.4 FIRE PROTECTION EQUIPMENT INSPECTIONS

In 2014 inspections of the emergency lighting and fire extinguishers have been performed monthly by in-house by trained staff.

An inspection of the emergency lighting and fire extinguishers was also performed by a qualified third party on March 31, 2014. All records are kept on file.

2.3.4.1.5 FIRE EXTINGUISHER TRAINING

Yearly fire extinguisher training was performed for all staff on June 3, 2014 by the Pembroke Fire Department.

2.3.4.1.6 FIRE PROTECTION COMMITTEE MEMBER TRAINING

The Fire Protection Committee continues to have a volunteer firefighter who is enrolled in a Fire Fighter 1 course and thereby receives ongoing fire protection training.

2.3.4.1.7 FIRE RESPONDER TRAINING

There was no training of Fire Responders in 2014. SRBT and the Pembroke Fire Chief determine if this training is required. Their decision is based on if changes have occurred at SRBT's facility, if the training has not been performed for a number of years or if there are a number of new firefighters and/or volunteers that have not yet taken the training. The training of fire responders was last performed in 2011 and included a tour of the facility and information with respect to the hazardous materials found on the site. Responders were also instructed on the various properties and precautions with respect to tritium.

2.3.4.1.8 FIRE ALARM DRILLS

Five in-house Fire Alarm Drills were performed in 2014. All drills were reviewed by the Fire Protection Committee. All drills were conducted with no major findings to address.

2.3.4.1.9 FIRE PROTECTION CONSULTANT INSPECTION

As required by licence NSPFOL-13.00/2015[1] and section 3.11 of the Licence Conditions Handbook LCH-SRBT-R000[2], on December 23, 2014 a Fire Protection Consultant, Nadine International Inc. performed an annual third party review of compliance with the requirements of the National Fire Code, 2005, and National Fire Protection Association, NFPA-801, 2008 edition: Standard for Fire Protection for Facilities Handling Radioactive Materials.

The review resulted in no findings except for identifying work that needs to be completed in order to ensure that the Fire Alarm System is in full compliance with the requirements of CAN/ULC-S536. The Fire Alarm System will continue to be monitored as this work is being performed to ensure that there is no threat of a fire occurring without being detected. The work which will be performed and reviewed by third parties with expertise in this area is expected to be completed in early 2015.

2.3.4.1.10 PEMBROKE FIRE DEPARTMENT INSPECTION

Pembroke Fire Department conducted a fire inspection on May 7, 2014, one minor violation of the Ontario Fire Code was identified. The one minor violation that was found has since been addressed and verified by the Pembroke Fire Department.

2.3.4.2 EMERGENCY PREPAREDNESS

Various measures were taken at the facility in 2014 to further improve emergency preparedness and emergency response measures.

2.3.4.2.1 EMERGENCY PLAN

An Emergency Plan[63] was revised to address CNSC Staff comments and was submitted to CNSC Staff on February 14, 2013 and subsequently approved by CNSC in an e-mail dated March 21, 2013[66].

With the publication of CNSC regulatory document REGDOC 2.10.1, *Nuclear Emergency Preparedness and Response*, SRBT has once again committed to ensure our Emergency Plan[63] is upgraded to the latest set of requirements. Our program[63] has been analyzed for gaps[67] against the new regulatory document, and arrangements made for a major revision of the Emergency Plan based on this analysis. We expect the plan to be revised and submitted to CNSC staff in September of 2015.

2.3.4.2.2 EMERGENCY EXERCISE

We plan on conducting an Emergency Exercise on February 9, 2015.

SRBT plans on conducting a full-scale emergency training exercise in concert with the Pembroke Fire Department and the City of Pembroke. We plan on simulating an emergency situation initiated in our Zone 2 area, where tritium light sources are installed into various safety signs and devices.

Within the exercise design, both fire and radiological hazards will be simulated in order to challenge the response of the fire department and our staff and management. Observers will be present to assess all aspects of the response against our current Emergency Plan[63], as well as against the new requirements of REGDOC 2.10.1.

This exercise will be an extremely useful activity to help our facility in the development of the next revision of the Emergency Plan going into the next licence term.

2.3.5 WASTE AND BY-PRODUCT MANAGEMENT

2.3.5.1 WASTE MANAGEMENT PROGRAM

The Nuclear Substances and Radiation Devices Regulations were amended April 2008 with one of the significant changes being the introduction of regulatory measures that allow for the removal of nuclear substances from regulatory control by establishing clearance limits below which abandonment or disposal is safe.

These threshold limits are based on international standards and practices for bulk quantities of materials, published in the 2004 edition of the International Atomic Energy Agency (IAEA) Safety Standards Series, Safety Guide No. RS-G-1.7 - Application of the Concepts of Exclusion, Exemption and Clearance. The adoption of these new international standards is consistent with the CNSC risk-informed regulatory control and ensures that Canadian regulations are consistent with international practices.

Therefore, as a result of these changes, SRBT is able to dispose of some of its waste through conventional methods.

In 2014, the SRBT Waste Management Program[26] was revised to reflect these changes, and to align the program with the requirements and guidance of the following CSA standards:

- CSA N292.0-14, *General principles for the management of radioactive waste and irradiated fuel,* published in May 2014.
- CSA N292.3-14, *Management of low- and intermediate-level radioactive waste,* published in May 2014.
- CSA N292.5-11, *Guideline for the exemption or clearance from regulatory control of materials that contain, or potentially contain, nuclear substances,* published July 2011.

2.3.5.2 RADIOACTIVE CONSIGNMENTS

Eight shipments of “Low Level Waste” (LLW) were made in 2014.

Five shipments solely contained expired gaseous tritium light sources with the other three shipments made on July 2, 2014, September 9, 2014 and November 25, 2014 being comprised predominantly of Zone 3 used protective clothing, used equipment components, crushed glass, filters, broken lights and cleaning material.

TABLE 24: RADIOACTIVE CONSIGNMENTS

DATE	CONSIGNOR	WASTE DESCRIPTION	QTY AND PACKAGE DESCRIPTION	TOTAL WEIGHT (Kg)	TOTAL ACTIVITY (TBq)
Mar. 4, 2014	AECL	LLW	66 x Type A Pkgs	290	1,433.88
Jun. 10, 2014	AECL	LLW	44 x Type A Pkgs	196	944.61
Jul. 2, 2014	AECL	LLW	3 x 200 L Drums	215	0.13
Jul. 22, 2014	AECL	LLW	57 x Type A Pkgs	228	958.75
Sep. 9, 2014	AECL	LLW	2 x 200 L Drums	140	0.88
Oct. 1, 2014	AECL	LLW	52 x Type A Pkgs	208	1,145.09
Nov. 25, 2014	AECL	LLW	2 x 200 L Drums	140	0.82
Dec. 9, 2014	AECL	LLW	46 x Type A Pkgs	204	954.52

2.3.5.3 STORAGE OF RADIOACTIVE WASTE

Radioactive waste was stored on-site and inventory records of the waste were maintained. All packaged wastes were inspected monthly for potential off-gassing and container integrity.

2.3.5.3.1 "VERY LOW-LEVEL WASTE" INTERIM STORAGE

Waste that is only minimally contaminated and meets the clearance limits in accordance with the Nuclear Substances and Radiation Devices Regulations is deemed to be "Very Low-Level Waste" (VLLW). The activity of the VLLW that SRBT possesses, falls under Schedule 1 Exemption Quantities and is therefore limited to transferring or disposing of no more than 1 tonne of material per year per pathway or disposal route. Therefore, any additional waste that is produced throughout the year above the 1 tonne limit is stored on-site until it is transferred or disposed.

Examples of such "general waste" are typically paper towel, gloves, disposable lab coats, shoe covers, etc. The VLLW that is stored on-site was collected in various receptacles throughout the facility, assessed, and ultimately placed into storage awaiting transfer or disposal.

Intended for landfill:

TABLE 25: INTERIM STORAGE OF VLLW (GENERAL WASTE) PATHWAY: LANDFILL

AMOUNT IN STORAGE AT YEAR END 2013	AMOUNT GENERATED THROUGHOUT 2014	TRANSFERRED OFF SITE 2014	AMOUNT IN STORAGE AT YEAR END 2014
0 Kg	+ 925.90 Kg	- 925.90 Kg	0 Kg
0 GBq	+ 28.06 GBq	- 28.06 GBq	0 GBq

Intended for recycling:

TABLE 26: INTERIM STORAGE OF VLLW (PLASTIC) PATHWAY: RECYCLING

AMOUNT IN STORAGE AT YEAR END 2013	AMOUNT GENERATED THROUGHOUT 2014	TRANSFERRED OFF SITE 2014	AMOUNT IN STORAGE AT YEAR END 2014
1,654.00 Kg	+1,335.00 Kg	- 2,937.20 Kg	51.80 Kg
56.01 GBq	+ 64.13 GBq	- 114.66 GBq	5.48 GBq

A number of drums are also stored on site that contain excavated soil from the well drilling activities that have taken place between 2006 and 2007:

TABLE 27: INTERIM STORAGE OF "VERY LOW LEVEL WASTE" (EXCAVATED SOIL)

AMOUNT IN STORAGE AT YEAR END 2013	AMOUNT GENERATED THROUGHOUT 2014	TRANSFERRED OFF SITE 2014	AMOUNT IN STORAGE AT YEAR END 2014
12 x 200 L drums	0	0	12 x 200 L drums
0.09 GBq	0	0	0.09 GBq

2.3.5.3.2 "LOW-LEVEL WASTE" INTERIM STORAGE

"Low-level waste" (LLW) is any waste with activity levels that exceed the clearance limits or exemption quantities established in the Nuclear Substances and Radiation Devices Regulations.

Typical examples of such wastes are tritium-contaminated equipment or components, crushed glass, filters, broken lights, clean-up material, pumps, pump oil, etc. LLW was collected in various sealed receptacles (cans or re-sealable bags) assessed, and ultimately placed into a steel drum, which is located in the Waste Storage Room within Zone 3. Once a drum was full it was prepared for interim storage and placed in the Waste Storage Room awaiting transfer to a CNSC licensed waste handling facility.

TABLE 28: INTERIM STORAGE OF "LOW LEVEL WASTE"

AMOUNT IN STORAGE AT YEAR END 2013	AMOUNT GENERATED THROUGHOUT 2014	TRANSFERRED OFF SITE 2014	AMOUNT IN STORAGE AT YEAR END 2014
5 x 200 L drums	+ 11 x 200 L drums	- 7 x 200 L drums	9 x 200 L drums
0.19 TBq	+ 0.40 TBq	- 0.30 TBq	0.29 TBq

2.3.5.4 HAZARDOUS MATERIAL COLLECTION AND STORAGE

There were no hazardous wastes collected or stored in 2014.

2.3.5.5 WASTE MINIMIZATION

During 2014, SRBT staff continued to divert uncontaminated materials from becoming unnecessarily contaminated by reducing the material transferred to the active areas.

2.3.6 NUCLEAR SECURITY

SRBT had no security related events in 2014 and over the entire licensing period. SRB Technologies (Canada) Inc. has a Security Program[68] for the facility in accordance with CNSC regulatory requirements and CNSC Staff expectations.

New staff members are required to qualify for a Facility Access Security Clearance (FASC), even if they are not expected to handle nuclear substances as part of their responsibilities. Individuals and contractors that visit the facility are required to also have an FASC or be escorted at all times by an individual with a valid FASC.

Over the course of 2014 several physical upgrades and security enhancements were made to improve nuclear security at the facility. Maintenance of the entire security system is performed by an independent third party at least every 6 months.

2.3.7 SAFEGUARDS AND NON-PROLIFERATION

SRBT possesses, uses, stores and manages an extremely small quantity of depleted uranium, which is a controlled nuclear substance. Our inventory of depleted uranium inventory did not increase in 2014.

This material is used as storage media for tritium gas on our processing equipment, a well-understood and widely-used strategy for manipulating and storing tritium in its gaseous, elemental state. By using depleted uranium in this fashion, we can ensure that the quantity of gaseous tritium being used during any given processing operation is restricted. This helps to ensure that the consequences of any unplanned event are minimized with respect to radiation and environmental protection, by ensuring that any release of tritium is limited.

During 2014, the IAEA has not conducted any verification activities of our inventory of this material, nor requested any information on this matter. As a licensee, and pursuant to the General Nuclear Safety and Control Regulations, SRBT is fully committed to ensure that we meet all applicable regulatory requirements relating to Canada's obligations relating to nuclear non-proliferation and safeguards.

Should a safeguards verification activity be requested or conducted, or a request for information made by the IAEA, SRBT will provide all accommodation to the agency and CNSC Staff in order to satisfy our responsibilities in this safety and control area.

2.3.8 PACKAGING AND TRANSPORT OF NUCLEAR SUBSTANCES

2.3.8.1 IMPORT AND EXPORT ACTIVITIES

As per the requirements of the Nuclear Non-proliferation Import and Export Control Regulations, SRBT is required to obtain import and export licences for all international tritium shipments. During 2014 all import and export licenses were acquired as necessary and no licence limits were exceeded. Throughout 2014 export licences were amended by the CNSC staff, eliminating the prior and post notification process on most export licences, adding annual reports and/or end of licence reports in replace of the notification process. Annual reports of all import and export shipments were compiled and submitted to the CNSC as required for each licence issued to SRBT.

2.3.8.2 SHIPPING ACTIVITIES

No transport incidents occurred nor were reported during 2014.

SRBT prepared, packaged and shipped, in accordance with CNSC regulatory document, SOR/2000-208, Packaging and Transport of Nuclear Substances Regulations, 1,122 consignments to various customers located in 19 countries around the world including Canada. The number of monthly shipments containing radioactive material for 2014 can be found in **Appendix T** of this report.

For the purpose of packaging and offering for transport, shipments of product designated as dangerous goods, SRBT must comply with the requirements of:

- CNSC
- IAEA
- International Air Transport Association (IATA)
- Transport Canada

Regulations for the safe transport of radioactive goods are found in guides published by the above groups. The procedures used at SRBT are based on regulations and practices found in the following publications;

- Packaging and Transport of Nuclear Substances Regulations
- IAEA Safety Standards Series - No. TS-R-1
- Dangerous Goods Regulations (IATA)
- The TDG Compliance Manual: Clear Language Edition (Carswell)

Staff members involved with the packaging, offering for transport and receipt of dangerous goods are given Transportation of Dangerous Goods (TDG) training in accordance with the applicable regulations and are issued certificates by the employer.

3.0 OTHER MATTERS OF REGULATORY INTEREST

3.1.1 PUBLIC INFORMATION PROGRAM

This section of the report will provide public information initiatives taken in 2014.

3.1.1.1 DIRECT INTERACTION WITH THE PUBLIC

Only one inquiry was received in 2014 from a member of the public who requested our licence application by e-mail. An e-mail was sent the same day with the licence application attached also explaining that the application could be found on our website.

In 2014, as part of the current licence[1] we have sampled water from a number of wells belonging to the public every four months for tritium concentration. On a yearly basis we also sample produce from gardens belonging to members of the public for tritium concentration. We promptly provide each member of the public with a report of the sample results along with the anticipated radioactive exposure due to tritium from consuming either the water or produce. We provide members of the public a comparison of this exposure against the CNSC limit and against radioactive exposure from other known sources, such as cosmic radiation, x-rays, etc.

Plant tours have proven to be a useful tool for SRBT to reach the public. In 2014 we have provided plant tours to 28 members of the general public (was 17 in 2013) who had expressed interest in our facility.

In 2014 we have also provided plant tours to local representatives for: the Renfrew County Community Futures Development Corporation, the Business Development Bank of Canada, The City of Pembroke and to the Federal Member of Parliament and staff.

In 2014 as part of conducting our business in Pembroke we have also provided plant tours to local employees representatives of our existing and prospective suppliers of goods and/or services: RadSafe, Purelink, MW Ltd., McKinnon Well Drilling, Dean and Sinclair, Sheppard and Gervais, JW HVac Services Ltd., The Security Company, the Commissionaires and CNL.

In 2014 we also provided plant tours to existing and prospective customers: Bell Helicopter, Isolite, Shield Source Inc., CRA, Veolia, MB Microtec and Beijing Initiatives.

TABLE 29: PLANT TOURS 2014

	2014
GENERAL PUBLIC	28
LOCAL INSTITUTIONS	4
LOCAL SUPPLIERS	10
CUSTOMERS	6
TOTAL	**48**

On September 9, 2014, SRBT posted on our website our licence renewal application along with the press release informing the public of our application.

In anticipation of licence renewal, on November 18, 2014, SRBT made a presentation to Pembroke City Council and provided information on operations, emissions, monitoring results and other current activities. The presentation was also televised on Cogeco Cable.

SRBT also provided the press release informing the following stakeholders of our licence application along with an information pamphlet and survey with postage paid return envelope:

- Individuals living within 500 meters of the facility (185 residences)
- Residents with wells or gardens that are being monitored by SRB
- Local and adjacent businesses (28 businesses)
- Local media, television, print and radio
- Local special interest groups
- Local Aboriginal groups
- Local elected officials at the Municipal, Provincial and Federal level

Of the 250 surveys that were sent a total of 24 were returned back representing a 9.6% response rate. Responses were mostly positive with few concerns expressed. The survey and information pamphlet are also posted on our website.

3.1.1.2 PUBLIC INFORMATION PROGRAM

The Public Information Program[14] was revised on August 1, 2014 (Revision 8) to address the comments received from CNSC Staff[28] and to reflect the requirements of Regulatory Document RD/GD-99.3, *Public Information and Disclosure,* issued by the Canadian Nuclear Safety Commission in March 2012.

On October 31, 2014 CNSC staff approved[29] SRBT's Public Information Program[14] (Revision 8) stating it met all the criteria outlined in the Regulatory Document RD/GD-99.3, *Public Information and Disclosure* and was deemed fully satisfactory.

3.1.1.3 PUBLIC INFORMATION COMMITTEE

The Public Information Committee had six minuted meetings in 2014 mostly consisting of discussing new revisions of the Public Information Program, planned completion dates listed in our action plan, interactions with public and website updates. Also discussed new revisions of our groundwater brochure[69], general information brochure[70] and pamphlet[71] which were all updated on August 20, 2014 to reflect the data in the 2013 Annual Compliance Report and subsequently posted on our website.

3.1.1.4 WEBSITE

The website is frequently updated to provide up to date information on the facility including environmental monitoring results from passive air samplers, air emissions, produce and groundwater. The main page provides a number of possible information sources for the public on tritium and radiation exposure. The website now includes our “Public Disclosure Protocol”.

A new updated website is set to launch at the end of February 2015. The web site will continue to provide current environmental monitoring data and content on tritium but will include current content on emergency preparedness, the safe transport of tritium to the facility and products from the facility, and how to safely dispose of products. It will be designed so that content is more accessible, easier to find, and in plain language. All company web site and domain names will also all be directed to this site.

3.1.1.5 COLLABORATION

In 2014 SRBT continue to collaborate with the CNSC, the University of Ottawa and L'Institut de Radioprotection et de Sûreté Nucléaire (IRSN) on the research field campaign on “Tritium Measurements in the Terrestrial and Air Environments“.

The project involved extensive monitoring of tritium in the environment in the vicinity of SRBT. As part of the project SRBT provided plant tours to all IRSN members involved as well as providing storage space for some equipment, electricity to power some of this equipment and made available all weather station monitoring data as well as all facility air emission and passive air sampler data.

3.1.1.6 COMMUNITY SUPPORT

SRBT has supported the local community by providing support to various organizations and causes. SRBT is a member of the Algonquin College Radiation Safety Program Advisory Committee and during the summer of 2015, SRBT will be employing a summer student who is currently studying the Radiation Safety Program at Algonquin College. SRBT has supported the Main Street Community Services who provides research based programs for children with special needs. SRBT has supported causes such as Canadian Breast Cancer Foundation, Community Living Upper Ottawa Valley and Bernadette McCann House for Women. SRBT also supports a local sports team and benefit dance.

3.1.2 SITE SPECIFIC

3.1.2.1 DECOMMISSIONING ESCROW ACCOUNT DEPOSITS

CNSC Regulatory Guide G-206 titled "*Financial Guarantees for the Decommissioning of Licensed Activities*" provides guidance regarding the establishment and maintenance of measures to fund the decommissioning of activities licensed by the CNSC.

To be acceptable to the CNSC, a funding measure must provide assurance that adequate resources will be available to fund decommissioning activities based on information provided to the CNSC. The financial guarantee must be at arm's length from the licensee and the CNSC must be assured that it or its agents can, upon demand, access or direct adequate funds if a licensee is not available to fulfil its obligations for decommissioning.

3.1.2.1.1 CURRENT FUNDING

A Financial Guarantee was approved[72] by the Commission for this facility on June 26, 2008 based on the previous revision of the Preliminary Decommissioning Plan[30]. This financial guarantee of $550,476.00 was funded by installments made to an Escrow account in October and April of each year with the last installment made in April 2014.

3.1.2.1.2 PROPOSED FUNDING

In 2014, SRBT hired consultants Doug McNab of D&J Consulting and Terry Donahue of RadSafe Canada Ltd., to revise SRBT's Preliminary Decommissioning Plan (PDP)[30] to address both CNSC Staff comments and make changes and improvements to the PDP based on their knowledge of decommissioning other CNSC licensed facilities.

Mr. Donahue and Mr. McNab were recently directly involved in the full decommissioning of Shield Source Inc. which was a CNSC licensed facility with operations very similar to that of SRBT.

SRBT provided CNSC staff a revised Preliminary Decommissioning Plan[31], Cost Estimate and Financial Guarantee; the revised Cost Estimate reflected inflationary increases since the plan was approved by the Commission in 2008.

These documents were also revised using guidelines found in
G-219 - *Decommissioning Planning for Licensed Activities*,
G-206 - *Financial Guarantees for the Decommissioning of Licensed Activities* and CSA Standard N294-09, *Decommissioning of facilities containing nuclear substances*.

As part of revising the Preliminary Decommissioning Plan SRBT further investigated methods for establishing a Financial Guarantee as outlined in Regulatory Guide G-206. This review concluded that the method currently used to fund the Financial Guarantee which was approved by the Commission for this facility in June 26, 2008 continues to be the only available method of funding for SRBT. This method is appropriate to our individual situation as allowed in Regulatory Guide G-206.

As part of the PDP[31], SRBT proposed to fund the increase of $102,012.00 by making six equal installments of $17,002.00, in October and April of each year, over a three year period, to the Escrow Account. With the Commission's approval we proposed that the first payment towards the revised Financial Guarantee begin in October 2015 with the renewal of the licence effective July 1, 2015.

SRBT proposed to continue to use a revised Escrow Agreement[32] and a revised Financial Security and Access Agreement[33] to be approved by CNSC Staff to provide access to these funds.

Historical annual inflationary indexes are typically below the annual accrued interest rate of the Escrow Account. SRBT proposes that all accrued interest in the existing Escrow Account remain in that account and be used to address inflationary indexing.

3.1.2.2 ONTARIO MINISTRY OF THE ENVIRONMENT

In 2014 SRBT continued to make releases of hazardous substances to the air under a Certificate[73] of Approval (Air), Number 5310-4NJQE2 issued by the Ontario Ministry of the Environment in accordance with Section 9 of the Ontario Environment Protection Act.

3.1.3 IMPROVEMENT PLANS AND FUTURE OUTLOOK

3.1.3.1 SAFETY ANALYSIS AND HYPOTHETICAL INCIDENT SCENARIOS

During 2014 as part of licence renewal, SRBT reviewed the Safety Analysis[43] (SAR) and associated Hypothetical Incident Scenarios[44], and determined that the analysis and scenarios remain valid, and would be used in support of our licence renewal in 2015. CNSC Staff concurred with this determination.

As part of the commitments associated with the N286-12 action plan, SRBT shall develop a documented safety analysis process in 2015. Once this process is documented, the SAR[43] will be reviewed and revised in line with this new process, an activity that was also included in the N286-12 action plan.

3.1.3.2 QUALITY MANUAL

A new revision of the Quality Manual[24] was completed September 12, 2014, which was submitted to the CNSC and approved[25]. This new revision included the recent updates of organizational improvements, and a preamble section which provides greater clarity on how the management system meets the CNSC requirements.

On September 8, 2014 a Gap Analysis[20] was completed on the Quality Manual vs the CSA standard N286-12 *Management System Requirements for Nuclear Facilities* and submitted to CNSC. To address the gaps identified, SRBT also developed and submitted to CNSC an Implementation Plan[22] to align the SRBT Management System with N286-12; the Gap Analysis[20] and Implementation Plan[22] were both accepted by CNSC staff. The implementation plan will ensure that the management system improvements are implemented in a safe and controlled fashion over the next two years.

A revised SRBT Quality Manual in line with the CSA standard N286-12 is expected for the end of 2016.

A few associated second tier quality procedures are also expected to be updated in 2015 to address the gaps identified in the Gap Analysis completed, and other opportunities for improvements and the corrective actions identified through recent audits and inspections.

3.1.3.3 CONTRACTOR MANAGEMENT PROGRAM

In 2014 we have continued to work on a draft of the Contractor Management Program[74] to address the comments[75] from CNSC Staff to provide greater control of contractors and define work to be performed in a more specific manner. The revised program will also include improved Vendor/Contractor appraisal guidelines and increased detail to the ongoing Contractor evaluation process. A final revision is expected to be issued by June 30, 2015.

3.1.3.4 DERIVED RELEASE LIMITS

SRBT operates to a release limit that is protective of groundwater and that represents only a small fraction of any Derived Release Limits (DRL) that would be developed for the facility.

The dose to the public resulting from our emissions is calculated using actual environmental sampling data using the effective dose coefficients found in CSA Guideline N288.1-08. So a DRL document would only provide a secondary means of calculating the dose to a member of the public.

A preliminary draft of a revision to the SRBT Derived Release Limits document was provided by a qualified third party in 2014. The revision has not yet been accepted by SRBT, as we are considering including additional recently developed information on the behavior of tritium in the local environment as part of the final DRL.

In particular, studies generated by the CNSC in partnership with the University of Ottawa are due to be released in 2015 that may potentially include information that can inform the final revision of the DRL document. As such, a new DRL is expected to be established in late 2015 or early 2016.

3.1.3.5 ENVIRONMENTAL MONITORING PROGRAM

Canadian Standards Association (CSA) published the following three environmental protection standards that apply to nuclear facilities, including uranium processing and fuel fabrication facilities:

- In May 2010, the second edition of CSA N288.4, *Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*
- In April 2011, CSA N288.5, *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*
- In June 2012, CSA N288.6, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills*

A gap analysis will be completed against CSA Standard N288.4-10, N288.5-11 and N288.6-12 by December 31, 2015. The Environmental Monitoring Program[55] will then undergo revision based upon the results of the gap analysis. This task is expected to be completed by June 30, 2016.

3.1.3.6 WEB SITE

A new updated website is set to launch at the end of February 2015. The web site will continue to provide current environmental monitoring data and content on tritium but will include current content on emergency preparedness, the safe transport of tritium to the facility and products from the facility, and how to safely dispose of products. It will be designed so that content is more accessible, easier to find, and in plain language. All company web site and domain names will also all be directed to this site.

3.1.3.7 EMERGENCY EXERCISE

In 2014, a significant amount of planning was performed in order to prepare the facility to conduct a full-scale emergency preparedness exercise. The exercise scenario accepted requires the participation of the Pembroke Fire Department. Upon finalizing the plan, a date for the exercise has been set as February 9, 2015, and observers from both the CNSC and the City of Pembroke will be on site during the exercise to provide critical feedback.

The information and data gained from this exercise will help inform a planned revision to the SRBT Emergency Plan in 2015. This revision will also align the plan with newly published CNSC Regulatory Document REGDOC 2.10.1, *Nuclear Emergency Preparedness and Response.*

3.1.3.8 FIRE PROTECTION

CNSC staff notified SRBT in June 2014 that CSA N393-13 was to form the new regulatory requirements applied to our facility relating to fire protection. As a result, SRBT undertook a gap analysis[64] between our current Fire Protection Program[62] and the new standard. This gap analysis[64] and a proposed implementation plan[64] was accepted by CNSC staff in December 2014[65], and SRBT expects a new revision of our Fire Protection Program to be issued by July 31, 2015.

The Fire Protection Committee will look at possibly adding a new member in 2015 that will bring additional fire protection expertise to the committee.

3.1.3.9 ORGANIZATIONAL IMPROVEMENTS

In 2015, additional technical resources are expected to be hired with expertise in Engineering and Injection Molding. We also expect to take on additional workers in each department to manage the expected increase in processing.

3.1.3.10 GROUNDWATER

Current concentrations in the wells are expected to eventually gradually decrease once all historical emissions have flushed through the system and/or decayed with some influence of higher concentrations in nearby wells from lateral underground water flow.

In 2014, groundwater monitoring data continued to show that the modelled behavior of the local aquifer system has remained valid, and average tritium concentrations continue to trend downward for the majority of wells, year over year. All wells remain well below historical maximums, with nearly every monitoring point decreasing drastically since processing strategies have been modified to reduce tritium deposition in the local environment.

Only two wells exhibit tritium concentrations in excess of the Ontario Drinking Water Guideline value of 7,000 Bq/L. Both of these wells are on the facility property, and neither are used for any purpose other than monitoring. Groundwater conditions will be monitored by continuing to sample the existing network of wells well into the future.

3.1.3.11 HEALTH PHYSICS AND RADIATION SAFETY EQUIPMENT

In 2014, SRBT invested significant resources into modernizing equipment related to radiation safety and health physics, including new bubbler units, real-time stack monitoring equipment, tritium in air monitors (both portable and stationary), and liquid scintillation counting equipment.

Going forth into 2015, it is expected that additional equipment will be procured, tested, commissioned and put into service in support of our continuing ALARA-initiatives. Staff will be trained in the use of any new items as per our Training Program.

As a result of the lessons learned from SSI, we have decided to increase the frequency of our third-party supported stack monitoring verification activities from once every two years to annually. Currently it is projected that verification will be conducted within the first two months of each calendar year.

SRBT has ordered a new ‘surface activity monitor’ that has the capability of measuring tritium directly on conductive surfaces. We expect to take delivery of this item in 2015 and will undertake a comprehensive testing program in order to determine if this instrument can be integrated into our health physics and radiation safety processes.

The Health Physics Team also intends on exploring the integration of the measurement capabilities of our in-room stationary tritium in air monitors with the recording capacity of the newly acquired and commissioned digital data recorder. If each of the active-area tritium-in-air monitors is connected to the recorder, we can trend room air concentrations in real time to assist in any investigation of abnormal events.

By the end of 2015, as part of the new Maintenance Program, the set of critical spare parts relating to health physics related equipment will be 100% available. We will have two spare bubbler systems, six spare flow meters, and one spare real-time stack monitor TAM all available for use should in-service equipment become unavailable.

Finally, a proposal has been put forth by SRBT to the Radiation Safety Program at Algonquin College in Pembroke to donate the two ‘Wallac’ liquid scintillation counters to the college for educational purposes. It is expected that the counters will be donated in early 2015, and SRBT plans on providing support on an ‘as required’ basis so that students can have familiarity with the concepts behind tritium quantification and liquid scintillation counting.

3.1.3.12 TRAINING

Early in 2015, we expect to have documented and submitted the SRBT Training Program Manual, as we endeavor to comply with CNSC Regulatory Document REGDOC 2.2.2, *Personnel Training.*

Upon acceptance of this manual by CNSC Staff, we will continue to implement the processes documented in order to implement the initial seven training activities that were determined to be required as part of our analysis. These seven activities include:

- Weekly Stack Monitoring
- Advanced Health Physics Instrumentation
- Bioassay and Dosimetry
- Liquid Effluent Management and Control
- Bulk Splitter Operations
- Handling Pyrophoric Uranium Tritium Traps
- Tritium Processing - Filling and Sealing Light Sources

All seven activities are slated to be completely developed, and implementation started, by the end of 2015. In addition, as training activities at SRBT are now being managed using a systematic approach, the cycle is expected to be renewed in early 2016 in order to incorporate information obtained during the evaluation phase of training.

Other training that is required to be implemented during 2015 includes any required Indoctrination Training for new employees, as well as the annual all-staff training session focused on radiation protection, security, fire protection, waste management, and other key aspects of our operations.

3.1.3.13 PRODUCT DEVELOPMENT IN SAFETY APPLICATIONS

We are committed to ensuring that our products are developed with a focus on contributing to the safety of people in situations where reliable illumination is needed.

In 2015, SRBT is planning to embark on a campaign of new product development, solely aimed at areas where our innovative and unique technology can augment safety for people in hazardous or challenging situations. We will be applying for regulatory certification of these new devices during the next licence term.

SRBT will continue to distribute our products only to responsible and reputable customers for purposes that are safety-oriented or certified by relevant jurisdictional authorities.

3.1.3.14 INTEGRATION WITH SCIENTIFIC AND NUCLEAR COMMUNITY

In addition, we plan on increasing our integration with the scientific and nuclear community to advance education, our emission reduction and environmental monitoring initiatives.

Recently, SRBT became a member of the Canadian Nuclear Association, a partnership which will provide ample opportunity to network and learn from industry peers.

3.1.3.15 RESEARCH OF EMISSION REDUCTION INITIATIVES

We are committed to ensuring that our products are manufactured safely and responsibly and to continually reduce our environmental impact on our local community.

Senior Management is fully committed to allocating increased financial and human resources to researching tritium emission-reduction strategies and technologies. These resources are planned to be directly proportional to our annual revenue levels, specifically, in 2015 for the first of 5 years, no less than 5% of our annual profit shall be allocated to this initiative.

3.1.4 SAFETY PERFORMANCE OBJECTIVES

3.1.4.1 TRITIUM PROCESSED

In 2014, a total of 28,714,118 GBq's of tritium was processed. We are expecting that tritium processed will increase by 15% in 2015.

3.1.4.2 AIR EMISSION TARGET

We expect that the ratio of tritium released to atmosphere to tritium processed will reduce from the 2014 value of 0.23% down to below the target level of 0.22% and that tritium released to atmosphere per week will not exceed a target value of 66,161 GBq for the year (or 1,272 GBq per week on average).

3.1.4.3 OCCUPATIONAL DOSE TARGET

Senior Management has set a goal of maintaining the average occupational dose achieved in 2015 at a level comparable to 2014, despite projected increases in tritium processing of 15%. Formally, our target is set at this level – 0.10 mSv – which was the average for 2014.

Senior Management has also committed to making every effort to maintain the maximum dose to any employee lower than that seen in 2014; as such, we have set our target for maximum staff dose as 1.29 mSv.

We are committed to ensuring that all of our employees who manufacture and ship our products are always protected and safe when working in our facility.

As always, the safety and protection of our workers is a key priority for our business. We are extremely proud of the level of safety that is experienced by any member of our team – our record continues to show that we effectively protect our staff from conventional and radiation hazards.

Despite this record, we are not satisfied, and will continue to strive to lower the doses to our workers to less than the public dose limit of 1 mSv.

3.1.5 MODIFICATIONS AND FORESEEN CHANGES

3.1.5.1 MODIFICATIONS THAT WILL REQUIRE THE COMMISSION'S APPROVAL

No modifications to the building or to our Programs and Procedures are currently planned that will require the Commission's authorization in calendar year 2015.

3.1.5.2 PROPOSED OR FORESEEN CHANGES TO EQUIPMENT

There are no proposed or foreseen significant changes to equipment relating to our licensed activities for 2015 at the time of writing this report.

3.1.5.3 PROPOSED OR FORESEEN CHANGES TO PROCEDURES

In 2015, SRBT expects the following key programs and processes to undergo revision and change:

- Safety Analysis Report
- Emergency Plan
- Fire Protection Program
- Contractor Management Program
- Engineering Change Process
- Design Processes

As well, the following processes are planned to be documented and integrated into the management system in 2015:

- Safety Analysis Process
- Information Management Process
- Turnover Process
- Process for Graded Approach
- Communication Process
- Safety Culture Monitoring Process

These changes are planned as a result of new regulatory documents being made available, and as part of the renewal of our operating licence. Specifically, several of these changes arise as a result of our project to develop a management system that complies with CSA Standard N286-12.

In addition, a gap analysis will be conducted in 2015 between our current Environmental Monitoring Program[55] (EMP) and several CSA Standards pertaining to environmental monitoring, radioactive effluent management, and environmental risk assessments. The result of this gap analysis will inform the next revision of our EMP in 2016.

3.1.5.4 PROPOSED OR FORESEEN CHANGES TO ORGANIZATION

Small changes to the organization are expected to be made in 2015. Specifically, the addition of a second support position in the Engineering department will be effected in early 2015.

Otherwise, as of the writing of this report, the only changes to the organization are projected to be restricted to increases in the number of staff in each of the production departments, in line with projected manufacturing and production increases.

3.1.5.5 PROPOSED OR FORESEEN CHANGES TO LICENSING DOCUMENTS

Other than identified in section 3.1.5.3 titled “Proposed or Foreseen Changes to Procedures”, at the time of writing this report, there are no other foreseen changes to licensing documents planned in 2015.

SRBT expects a new Licence Conditions Handbook to be issued as part of the renewal of our operating licence; any changes to the documents that make up the licensing basis of the facility will be conducted according to the requirements and expectations of CNSC staff, as defined in the LCH.

4.0 CONCLUDING REMARKS

The year 2014 represents the final full year period under our current operating licence; in 2015, a renewed licence and licence conditions handbook are anticipated to be authorized by the Commission.

Throughout the year, the management and staff of SRBT complied with all regulatory and licensing requirements of the Canadian Nuclear Safety Commission and its staff. At the conclusion of 2014, no compliance actions remain unresolved.

Our management system has continued to grow and evolve with the ever-changing regulatory landscape. A significant amount of new and revised regulatory documents and CSA Standards have been issued in the last few years, and SRBT has made significant and firm commitments, in consultation with CNSC staff, to align ourselves with these developing requirements.

We were able to take the first steps towards implementing a systematic approach to how we train our staff to perform safety-critical work. Our training processes have always been successful in ensuring safety; however, we expect that the new training strategies being implemented will help us to reduce the number and safety significance of human errors even further.

Our facility remains within its designed safety basis, and continues to be fit for service; key systems have continued to be maintained diligently and effectively in throughout 2014. Our new maintenance program takes the relevant and applicable parts of the usual maintenance strategies for nuclear power plants, and applies them in a risk-informed fashion for our unique facility.

Exposures to ionizing radiation to both workers and members of the public continue to remain low, and are far less than the regulatory limits prescribed. The local environment has remained protected, and continues to recover from historical practices, as we continue to implement best practices each and every day. Licence limits for our nuclear substance effluent streams continue to be respected with significant margin.

There were no instances of any conventional injury that resulted in lost time to our workers. Security of the facility and all nuclear substances was maintained at all times. There were no instances of safety-related events with respect to the packaging and transport of our packages. We continue to be well protected from fire hazards, and have maintained an accepted plan should an emergency condition arise.

Our public information program fully satisfies the requirements of the CNSC, and we continue to look for new ways to reach out into our local community in a positive and constructive fashion. We strive to be as open and transparent as a nuclear facility can possibly be.

Our decommissioning responsibilities are fully documented and resourced, with additional funds being added in the next three years to meet the revised plans. Although we plan on operating the facility for at least the next two decades if not longer, having a complete, self-funded guarantee of financial resource availability is an additional testament to our commitment of being a good community partner.

4.0 CONCLUDING REMARKS (continued)

We continue to effectively manage all forms of waste generated by our operations, and incessantly look to minimize the amount of waste that must be managed and controlled. We are committed to investing a significant, profit-tied budget into effluent reducing initiatives and technologies in the coming years.

Although SRBT has always operated and maintained a safe and compliant nuclear substance processing facility, in 2014 a significant number of initiatives were started to increase many aspects of our operations. These projects are numerous and complex; however, to a person, the staff at SRBT understands the importance of executing these activities.

Improvement never ceases; it is one of our key values, and something that we take great pride in, today and into the future. This year saw the beginning of a significant period of growth and transition for our business, our facility and our employees, and we look forward to continuing on this path, in a sustainable and controlled manner, with safety remaining as the number one overall priority in everything we do.

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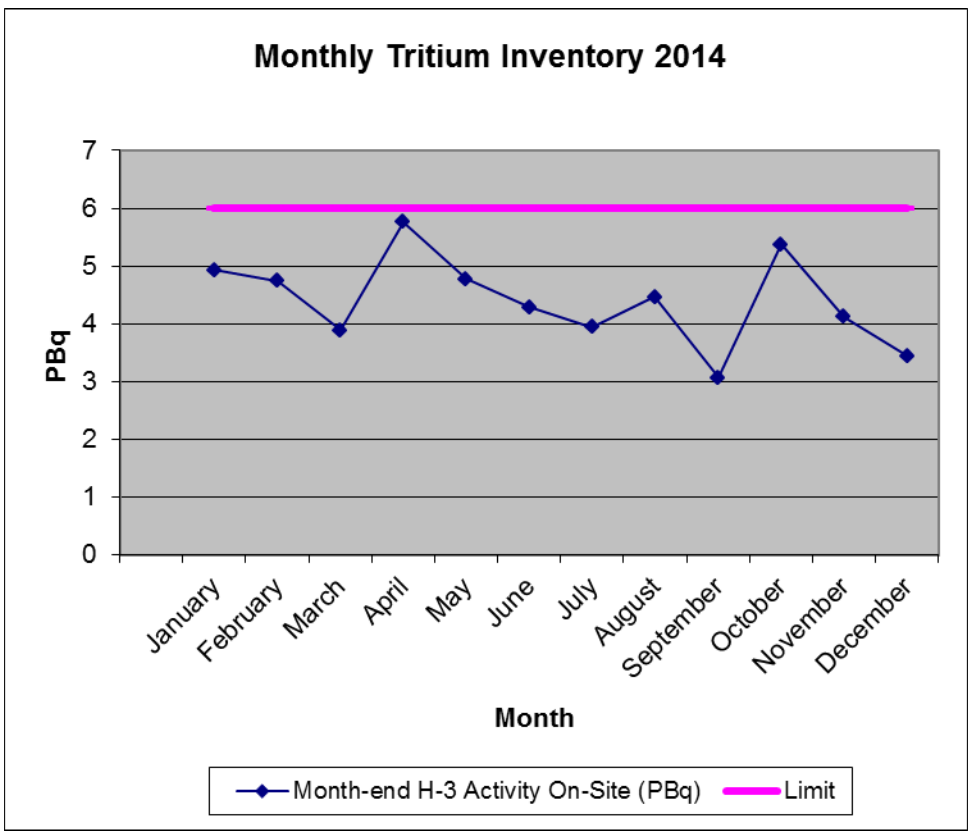
APPENDIX A

Tritium activity on site during 2014

TRITIUM ACTIVITY ON SITE DURING 2014

Month / 2014	Month-end H-3 Activity On-Site (PBq)	Percent of Licence Limit (%)
January	4.93	82
February	4.74	79
March	3.89	65
April	5.76	96
May	4.77	80
June	4.29	71
July	3.94	66
August	4.46	74
September	3.07	51
October	5.37	90
November	4.12	69
December	3.44	57
2014 Monthly Average	***4.40***	***73.33***

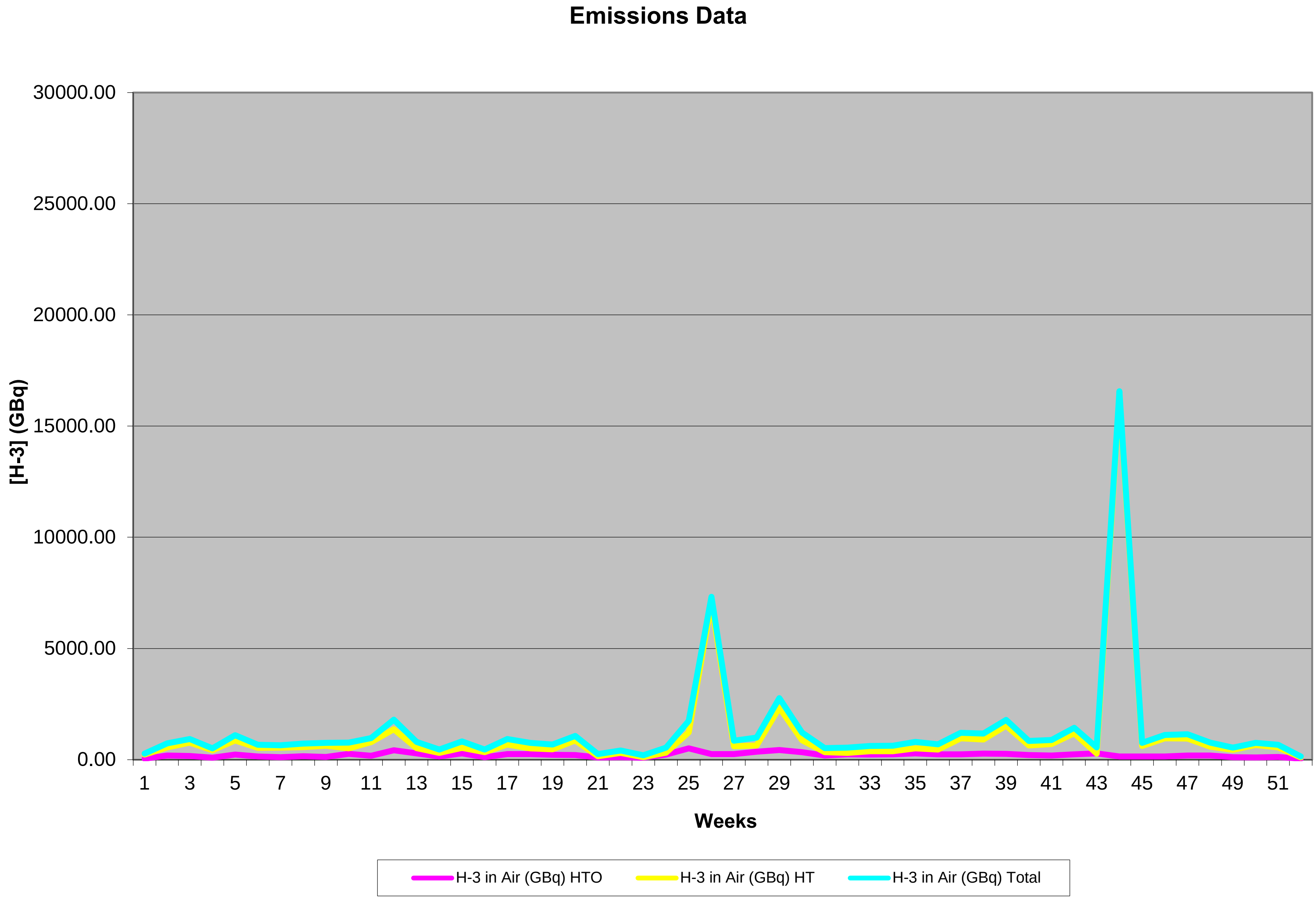
Note: Possession limit is 6.00 PBq.



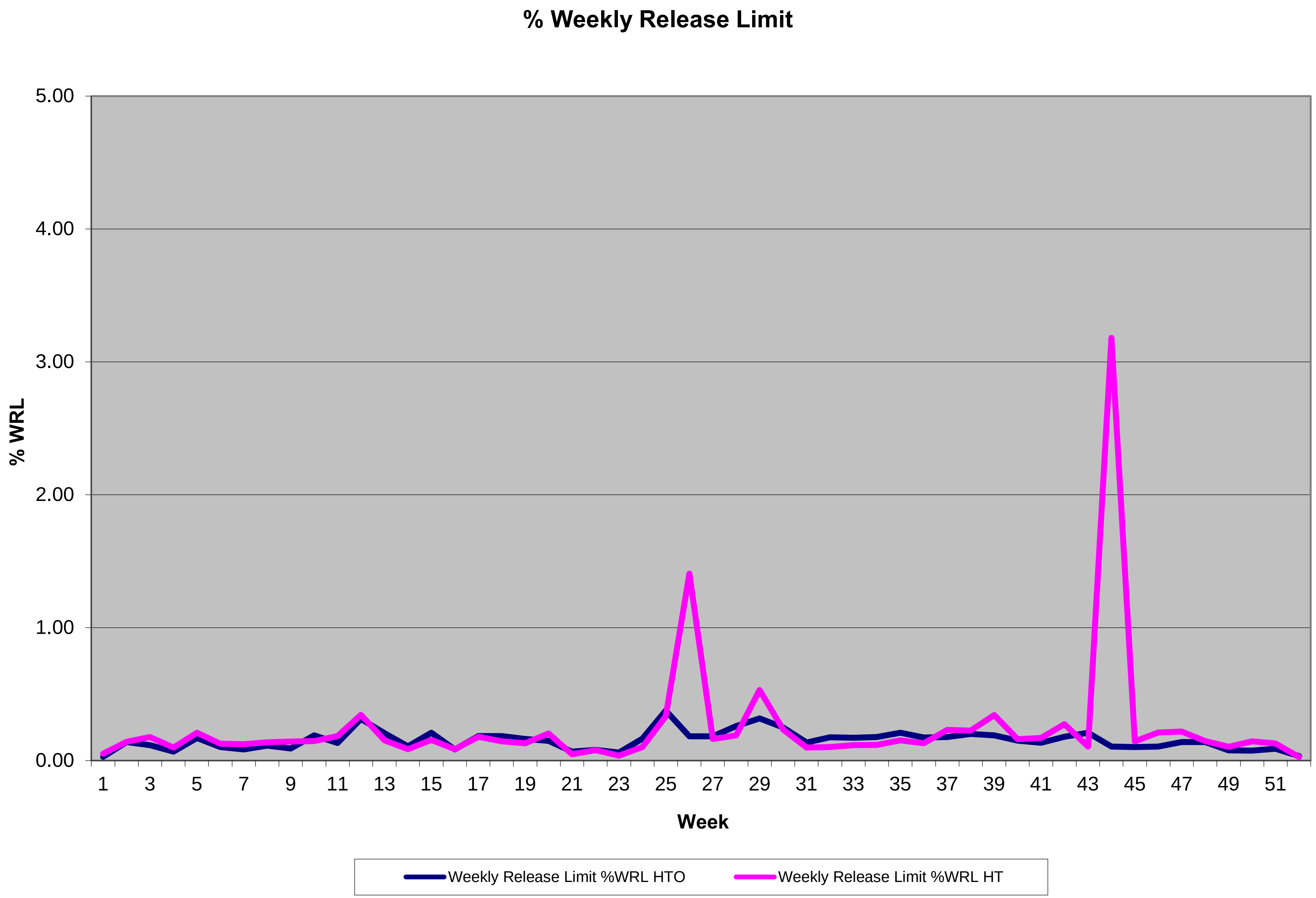
APPENDIX B

Facility Emissions Data for 2014

Week	Date		H-3 in Air (GBq)			(GBq)		Action Levels		1996 SRBT DEL %DEL			Weekly Release Limit %WRL		2006 SRBT DRL % DRL				
	Initial	Final	HTO	HT	Total	∑(HTO)	∑(HTO + HT)	HTO (840 GBq)	HTO+HT (7,753 GBq)	Adult Resident	Infant Resident	Adult Worker	HTO	HT	Adult Resident	Infant Resident	Nursing Infant	Nursing Mother	Adult Worker
1	31/12/2014	07/01/2014	38.95	227.89	266.84	38.95	266.84	5%	3%	0.01	0.00	0.01	0.03	0.05	0.03	0.02	0.05	0.03	0.03
2	07/01/2014	14/01/2014	188.45	548.13	736.58	227.40	1003.42	22%	10%	0.04	0.02	0.04	0.14	0.14	0.12	0.09	0.20	0.13	0.12
3	14/01/2014	21/01/2014	157.72	766.22	923.94	385.12	1927.36	19%	12%	0.03	0.02	0.04	0.12	0.18	0.11	0.08	0.18	0.11	0.11
4	21/01/2014	28/01/2014	90.47	421.09	511.56	475.59	2438.92	11%	7%	0.02	0.01	0.02	0.07	0.10	0.06	0.05	0.10	0.06	0.06
5	28/01/2014	04/02/2014	228.78	864.73	1093.51	704.37	3532.43	27%	14%	0.05	0.03	0.05	0.17	0.21	0.15	0.12	0.25	0.16	0.15
6	04/02/2014	11/02/2014	138.21	527.12	665.33	842.58	4197.76	16%	9%	0.03	0.02	0.03	0.10	0.13	0.09	0.07	0.15	0.10	0.09
7	11/02/2014	18/02/2014	113.13	534.60	647.73	955.71	4845.49	13%	8%	0.02	0.01	0.03	0.08	0.12	0.08	0.06	0.13	0.08	0.08
8	18/02/2014	25/02/2014	151.92	565.31	717.23	1107.63	5562.72	18%	9%	0.03	0.02	0.04	0.11	0.14	0.10	0.08	0.17	0.10	0.10
9	25/02/2014	04/03/2014	122.77	627.02	749.79	1230.40	6312.51	15%	10%	0.03	0.02	0.03	0.09	0.14	0.09	0.07	0.14	0.09	0.08
10	04/03/2014	11/03/2014	255.81	509.33	765.14	1486.21	7077.65	30%	10%	0.05	0.03	0.06	0.19	0.15	0.16	0.12	0.26	0.16	0.16
11	11/03/2014	18/03/2014	177.80	787.41	965.21	1664.01	8042.86	21%	12%	0.04	0.02	0.04	0.13	0.19	0.12	0.09	0.20	0.13	0.12
12	18/03/2014	25/03/2014	423.76	1370.27	1794.03	2087.77	9836.89	50%	23%	0.09	0.05	0.10	0.31	0.34	0.28	0.21	0.45	0.29	0.27
13	25/03/2014	01/04/2014	277.45	518.51	795.96	2365.22	10632.85	33%	10%	0.06	0.03	0.06	0.21	0.15	0.17	0.13	0.28	0.18	0.17
14	01/04/2014	08/04/2014	145.30	305.29	450.59	2510.52	11083.44	17%	6%	0.03	0.02	0.03	0.11	0.09	0.09	0.07	0.15	0.09	0.09
15	08/04/2014	15/04/2014	282.27	532.21	814.48	2792.79	11897.92	34%	11%	0.06	0.03	0.06	0.21	0.16	0.18	0.13	0.28	0.18	0.17
16	15/04/2014	22/04/2014	113.73	337.40	451.13	2906.52	12349.05	14%	6%	0.02	0.01	0.03	0.08	0.09	0.07	0.06	0.12	0.08	0.07
17	22/04/2014	29/04/2014	249.55	680.53	930.08	3156.07	13279.13	30%	12%	0.05	0.03	0.06	0.18	0.18	0.16	0.12	0.26	0.17	0.16
18	29/04/2014	06/05/2014	248.70	502.32	751.02	3404.77	14030.15	30%	10%	0.05	0.03	0.06	0.18	0.14	0.16	0.12	0.25	0.16	0.15
19	06/05/2014	13/05/2014	219.59	460.18	679.77	3624.36	14709.92	26%	9%	0.04	0.03	0.05	0.16	0.13	0.14	0.10	0.22	0.14	0.14
20	13/05/2014	20/05/2014	200.38	863.09	1063.47	3824.74	15773.39	24%	14%	0.04	0.02	0.05	0.15	0.20	0.14	0.11	0.22	0.14	0.13
21	20/05/2014	27/05/2014	92.62	154.96	247.58	3917.36	16020.97	11%	3%	0.02	0.01	0.02	0.07	0.05	0.06	0.04	0.09	0.06	0.06
22	27/05/2014	03/06/2014	107.79	301.54	409.33	4025.15	16430.30	13%	5%	0.02	0.01	0.02	0.08	0.08	0.07	0.05	0.11	0.07	0.07
23	03/06/2014	10/06/2014	82.78	109.13	191.91	4107.93	16622.21	10%	2%	0.02	0.01	0.02	0.06	0.04	0.05	0.04	0.08	0.05	0.05
24	10/06/2014	17/06/2014	222.34	311.93	534.27	4330.27	17156.48	26%	7%	0.04	0.02	0.05	0.16	0.10	0.14	0.10	0.22	0.14	0.13
25	17/06/2014	24/06/2014	509.07	1230.36	1739.43	4839.34	18895.91	61%	22%	0.10	0.06	0.12	0.38	0.33	0.32	0.25	0.52	0.33	0.32
26	24/06/2014	02/07/2014	245.74	7079.02	7324.76	5085.08	26220.67	29%	94%	0.06	0.05	0.07	0.18	1.41	0.32	0.26	0.57	0.33	0.31
27	02/07/2014	08/07/2014	247.37	606.29	853.66	5332.45	27074.33	29%	11%	0.05	0.03	0.06	0.18	0.16	0.16	0.12	0.25	0.16	0.15
28	08/07/2014	15/07/2014	351.81	638.79	990.60	5684.26	28064.93	42%	13%	0.07	0.04	0.08	0.26	0.19	0.22	0.17	0.35	0.22	0.21
29	15/07/2014	22/07/2014	428.20	2334.83	2763.03	6112.46	30827.96	51%	36%	0.09	0.05	0.10	0.32	0.53	0.31	0.24	0.50	0.31	0.30
30	22/07/2014	29/07/2014	335.53	877.05	1212.58	6447.99	32040.54	40%	16%	0.07	0.04	0.08	0.25	0.23	0.22	0.16	0.35	0.22	0.21
31	29/07/2014	05/08/2014	182.55	333.43	515.98	6630.54	32556.52	22%	7%	0.04	0.02	0.04	0.14	0.10	0.11	0.09	0.18	0.12	0.11
32	05/08/2014	12/08/2014	236.48	297.03	533.51	6867.02	33090.03	28%	7%	0.05	0.03	0.05	0.18	0.10	0.14	0.11	0.23	0.15	0.14
33	12/08/2014	19/08/2014	231.80	378.73	610.53	7098.82	33700.56	28%	8%	0.05	0.03	0.05	0.17	0.12	0.14	0.11	0.23	0.15	0.14
34	19/08/2014	26/08/2014	239.78	379.88	619.66	7338.60	34320.22	29%	8%	0.05	0.03	0.06	0.18	0.12	0.15	0.11	0.24	0.15	0.14
35	26/08/2014	02/09/2014	283.77	508.65	792.42	7622.37	35112.64	34%	10%	0.06	0.03	0.07	0.21	0.15	0.18	0.13	0.28	0.18	0.17
36	02/09/2014	09/09/2014	233.50	451.67	685.17	7855.87	35797.81	28%	9%	0.05	0.03	0.05	0.17	0.13	0.15	0.11	0.23	0.15	0.14
37	09/09/2014	16/09/2014	240.59	959.89	1200.48	8096.46	36998.29	29%	15%	0.05	0.03	0.06	0.18	0.23	0.16	0.12	0.27	0.17	0.16
38	16/09/2014	23/09/2014	269.70	902.26	1171.96	8366.16	38170.25	32%	15%	0.06	0.03	0.06	0.20	0.22	0.18	0.14	0.29	0.18	0.17
39	23/09/2014	30/09/2014	256.29	1529.29	1785.58	8622.45	39955.83	31%	23%	0.05	0.03	0.06	0.19	0.34	0.19	0.14	0.31	0.19	0.18
40	30/09/2014	07/10/2014	204.21	633.98	838.19	8826.66	40794.02	24%	11%	0.04	0.02	0.05	0.15	0.16	0.13	0.10	0.22	0.14	0.13
41	07/10/2014	14/10/2014	181.64	704.74	886.38	9008.30	41680.40	22%	11%	0.04	0.02	0.04	0.13	0.17	0.12	0.09	0.20	0.13	0.12
42	14/10/2014	21/10/2014	242.03	1187.37	1429.40	9250.33	43109.80	29%	18%	0.05	0.03	0.06	0.18	0.27	0.17	0.13	0.28	0.17	0.17
43	21/10/2014	28/10/2014	282.39	269.11	551.50	9532.72	43661.30	34%	7%	0.06	0.03	0.06	0.21	0.11	0.17	0.13	0.27	0.17	0.17
44	28/10/2014	04/11/2014	142.16	16428.31	16570.47	9674.88	60231.77	17%	214%	0.05	0.08	0.06	0.11	3.18	0.49	0.42	0.92	0.52	0.48
45	04/11/2014	11/11/2014	136.94	614.25	751.19	9811.82	60982.96	16%	10%	0.03	0.02	0.03	0.10	0.14	0.09	0.07	0.15	0.10	0.09
46	11/11/2014	18/11/2014	142.63	960.87	1103.50	9954.45	62086.46	17%	14%	0.03	0.02	0.03	0.11	0.21	0.11	0.08	0.18	0.11	0.10
47	18/11/2014	25/11/2014	187.65	949.05	1136.70	10142.10	63223.16	22%	15%	0.04	0.02	0.04	0.14	0.22	0.13	0.10	0.22	0.14	0.13
48	25/11/2014	02/12/2014	188.18	580.42	768.60	10330.28	63991.76	22%	10%	0.04	0.02	0.04	0.14	0.15	0.12	0.09	0.20	0.13	0.12
49	02/12/2014	09/12/2014	103.53	440.22	543.75	10433.81	64535.51	12%	7%	0.02	0.01	0.02	0.08	0.10	0.07	0.05	0.12	0.07	0.07
50	09/12/2014	16/12/2014	100.24	657.64	757.88	10534.05	65293.39	12%	10%	0.02	0.01	0.02	0.07	0.15	0.07	0.06	0.12	0.08	0.07
51	16/12/2014	23/12/2014	120.98	549.53	670.51	10655.03	65963.90	14%	9%	0.03	0.01	0.03	0.09	0.13	0.08	0.06	0.14	0.09	0.08
52	23/12/2014	30/12/2014	45.76	95.25	141.01	10700.79	66104.91	5%	2%	0.01	0.01	0.01	0.03	0.03	0.03	0.02	0.05	0.03	0.03
	Annual	Total	10700.79	55404.12	66104.91						Average % DEL		Average % WRL				Average % DRL		
	Weekly	Average	205.78	1065.46	1271.25					0.04	0.03	0.05	0.15	0.24	0.15	0.11	0.24	0.15	0.14
				(Bq/a)	% Release Limit						Projected Dose (uSv/a)						Projected Dose (uSv/a)		
% Annual Release Limit:			HTO	6.72E+13	15.92					0.43	0.26	0.48			1.45	1.12	2.39	1.50	1.42
			HTO + HT	4.48E+14	14.76					Adult Resident	Infant Resident	Adult Worker	HTO	HT	Adult Resident	Infant Resident	Nursing Infant	Nursing Mother	Adult Worker
Derived Weekly HTO Release/Emission Limit (GBq/week)										5.00E+05	9.40E+05	4.40E+05	2.90E+04	NA	1.73E+05	2.33E+05	1.10E+05	1.69E+05	1.77E+05
Derived Weekly HT Release/ Emission Limit (GBq/week)										6.60E+07	2.70E+07	6.40E+07	NA	1.80E+06	4.02E+06	4.52E+06	2.07E+06	3.80E+06	4.07E+06



Emissions Data
[H-3] (GBq)
30000.00
25000.00
20000.00
15000.00
10000.00
5000.00
0.00
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51
Weeks
H-3 in Air (GBq) HTO
H-3 in Air (GBq) HT
H-3 in Air (GBq) Total


% Weekly Release Limit
5.00
4.00
3.00
2.00
1.00
0.00
% WRL
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51
Week
Weekly Release Limit %WRL HTO
Weekly Release Limit %WRL HT

APPENDIX C

Annual Liquid Effluent Data for 2014

ANNUAL LIQUID EFFLUENT TRACKING TABLE			
Year = 2014			
WEEK ENDING	WEEKLY RELEASE (Bq)	WEEK	ANNUAL LICENCE LIMIT
			200,000,000,000
5-Jan-14	0	1	200,000,000,000
12-Jan-14	0	2	200,000,000,000
19-Jan-14	0	3	200,000,000,000
26-Jan-14	25,408,960	4	199,974,591,040
2-Feb-14	865,280	5	199,973,725,760
9-Feb-14	0	6	199,973,725,760
16-Feb-14	0	7	199,973,725,760
23-Feb-14	0	8	199,973,725,760
2-Mar-14	0	9	199,973,725,760
9-Mar-14	0	10	199,973,725,760
16-Mar-14	19,704,200	11	199,954,021,560
23-Mar-14	0	12	199,954,021,560
30-Mar-14	282,081,324	13	199,671,940,236
6-Apr-14	342,266,080	14	199,329,674,156
13-Apr-14	387,901,557	15	198,941,772,599
20-Apr-14	251,990,613	16	198,689,781,986
27-Apr-14	319,448,341	17	198,370,333,645
4-May-14	405,879,910	18	197,964,453,735
11-May-14	387,901,557	19	197,576,552,178
18-May-14	274,324,211	20	197,302,227,967
25-May-14	201,675,577	21	197,100,552,390
1-Jun-14	260,312,613	22	196,840,239,777
8-Jun-14	306,075,768	23	196,534,164,009
15-Jun-14	367,659,262	24	196,166,504,747
22-Jun-14	328,504,167	25	195,838,000,580
29-Jun-14	261,849,026	26	195,576,151,554
6-Jul-14	235,231,575	27	195,340,919,979
13-Jul-14	356,320,120	28	194,984,599,859
20-Jul-14	327,469,828	29	194,657,130,031
27-Jul-14	382,692,970	30	194,274,437,061
3-Aug-14	272,556,520	31	194,001,880,541
10-Aug-14	260,332,065	32	193,741,548,476
17-Aug-14	298,752,540	33	193,442,795,936
24-Aug-14	298,237,483	34	193,144,558,453
31-Aug-14	289,172,027	35	192,855,386,426
7-Sep-14	241,695,394	36	192,613,691,032
14-Sep-14	363,192,774	37	192,250,498,258
21-Sep-14	340,403,520	38	191,910,094,738
28-Sep-14	324,650,760	39	191,585,443,978
5-Oct-14	282,456,911	40	191,302,987,067
12-Oct-14	387,425,610	41	190,915,561,457
19-Oct-14	224,215,452	42	190,691,346,005
26-Oct-14	290,898,080	43	190,400,447,925
2-Nov-14	347,840,100	44	190,052,607,825
9-Nov-14	324,650,760	45	189,727,957,065
16-Nov-14	411,312,230	46	189,316,644,835
23-Nov-14	394,218,780	47	188,922,426,055
30-Nov-14	394,218,780	48	188,528,207,275
7-Dec-14	330,609,867	49	188,197,597,408
14-Dec-14	417,408,120	50	187,780,189,288
21-Dec-14	112,021,476	51	187,668,167,812
28-Dec-14	111,040,170	52	187,557,127,642
4-Jan-15	66,624,102	53	187,490,503,540
Annual Total (Bq)	12,509,496,460		
Annual Total (GBq)	13		
Limit (GBq)	200		
% of limit	**6.25**		

Generated: January 7, 2015

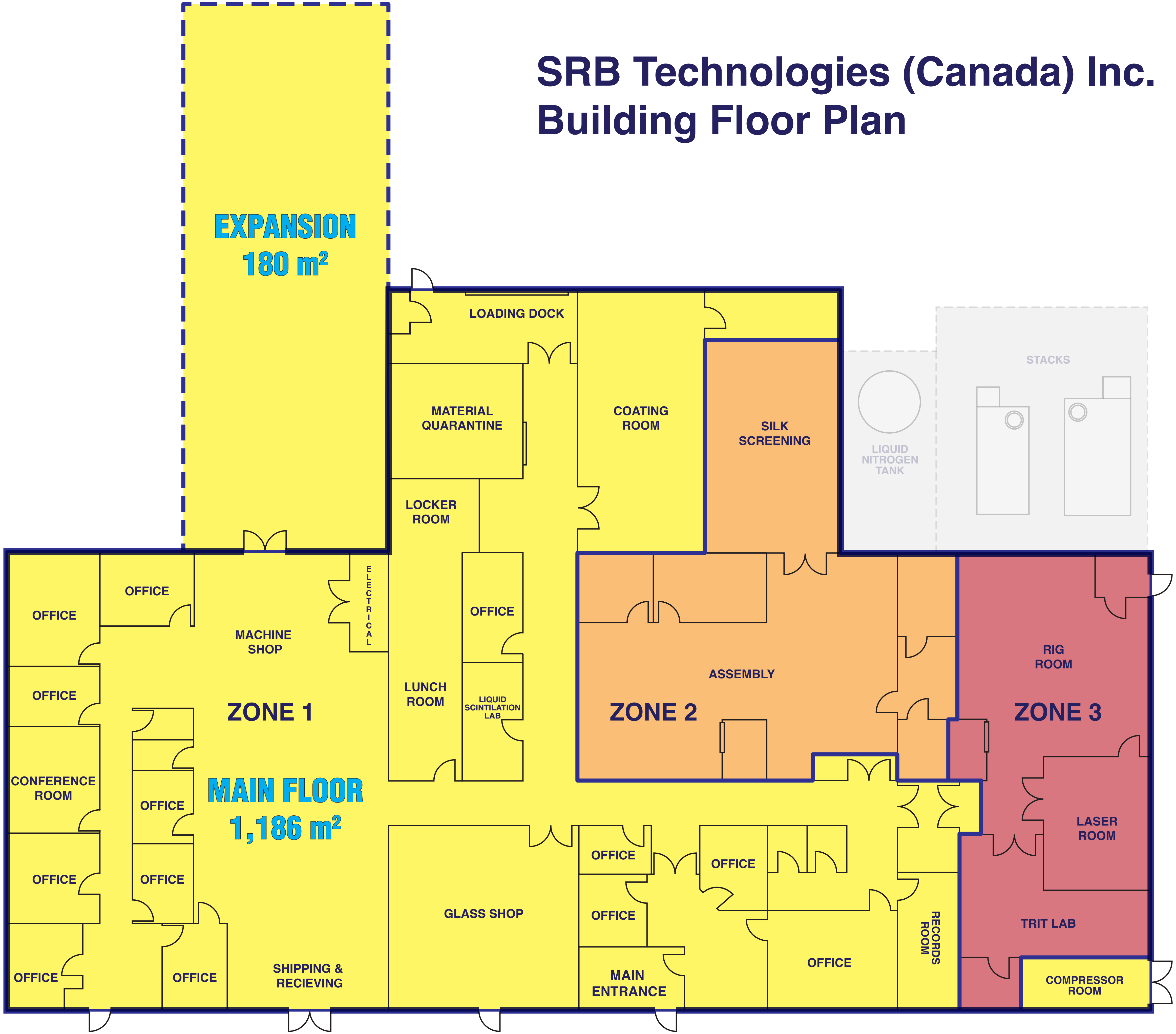
Compiled by:
Jamie MacDonald, Manager HP

APPENDIX C

APPENDIX D

Building Floor Plan

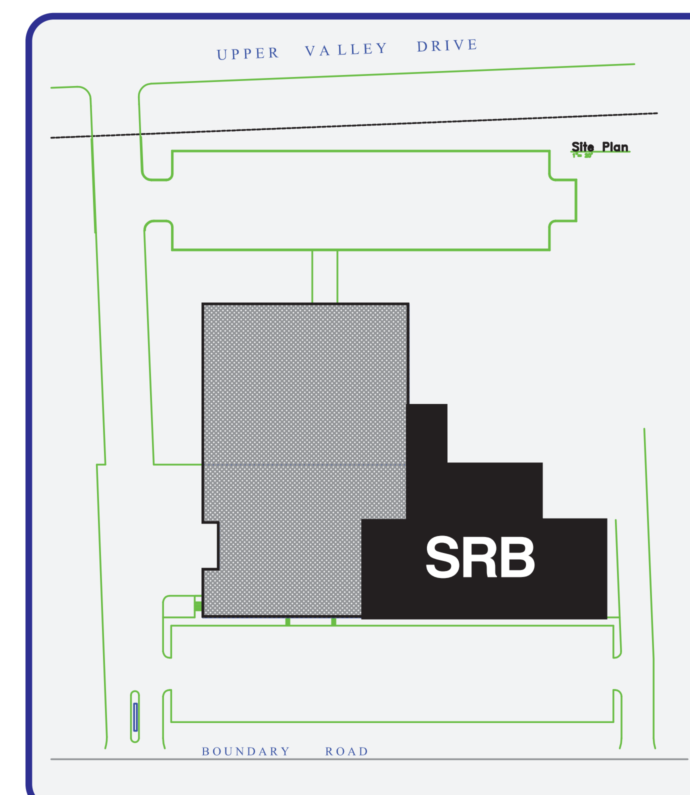
SRB Technologies (Canada) Inc.
Building Floor Plan



LEGEND

- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 1
- EXISTING BUILDING
- PROPOSED EXPANSION

AREA OF 320 BOUNDARY ROAD SITE CURRENTLY OCCUPIED BY SRB TECHNOLOGIES, INCLUDING PROPOSED EXPANSION.



REV. SEPTEMBER 18/2014

APPENDIX D

APPENDIX E

Ventilation equipment maintained in 2014

VENTILATION EQUIPMENT MAINTAINED IN 2014

	TYPE	ZONE	LOCATION
1	Heat Recovery unit	1	Mold area/Office
4	Unit heaters	1 & 3	Rig room, Glass shop, Molding area & office
2	A/C wall units	1	Coating room, Glass shop
2	Makeup air units	1 & 2	Coating room, Assembly room
4	Exhaust fans	1 & 2	Coating, Assembly, Glass room, Paint Booth
1	HRV with reheat	2	Assembly room
2	Fan coils	1	Office, Mold area/Office
2	Condenser	1	Mold area/Office
1	Mid efficient gas furnace & central air	1	Stores
1	Mid efficient gas furnace	1	Receiving
1	Bulk stack air handling unit	1	Compound
1	Rig stack air handling unit	1	Compound
2	Rig and Bulk stack air handling units pitot tubes	1	Compound

APPENDIX F

Equipment maintenance information for 2014

2014 Equipment Maintenance Information

Major maintenance carried out in 2014:	None
Semi-Annual Maintenance carried out in 2014: **Contract** J.W HVAC Services Ltd	June 10,2014 Dec 10,2014
Maintenance Schedule: **Contract:** Valley Compressor	April 11, 2014 July 14, 2014 Oct 15, 2014
Quarterly Maintenance carried out in 2014: **Contract:** J.W HVAC Services Ltd	March 31, 2014 June 10, 2014 Sept 30,2014 Dec 10,2014
Sprinkler System Maintenance by a Third Party in 2014: Drapeau Automatic Sprinkler Corp	March 13,2014 June 4,2014 Sept 03,2014 Dec 10,2014
Sprinkler System Check by SRB Technologies in 2014:	Weekly
Report of any weakening or possible major failure of any components:	None

All ventilation systems were maintained in fully operational condition with no major system failures during 2014.

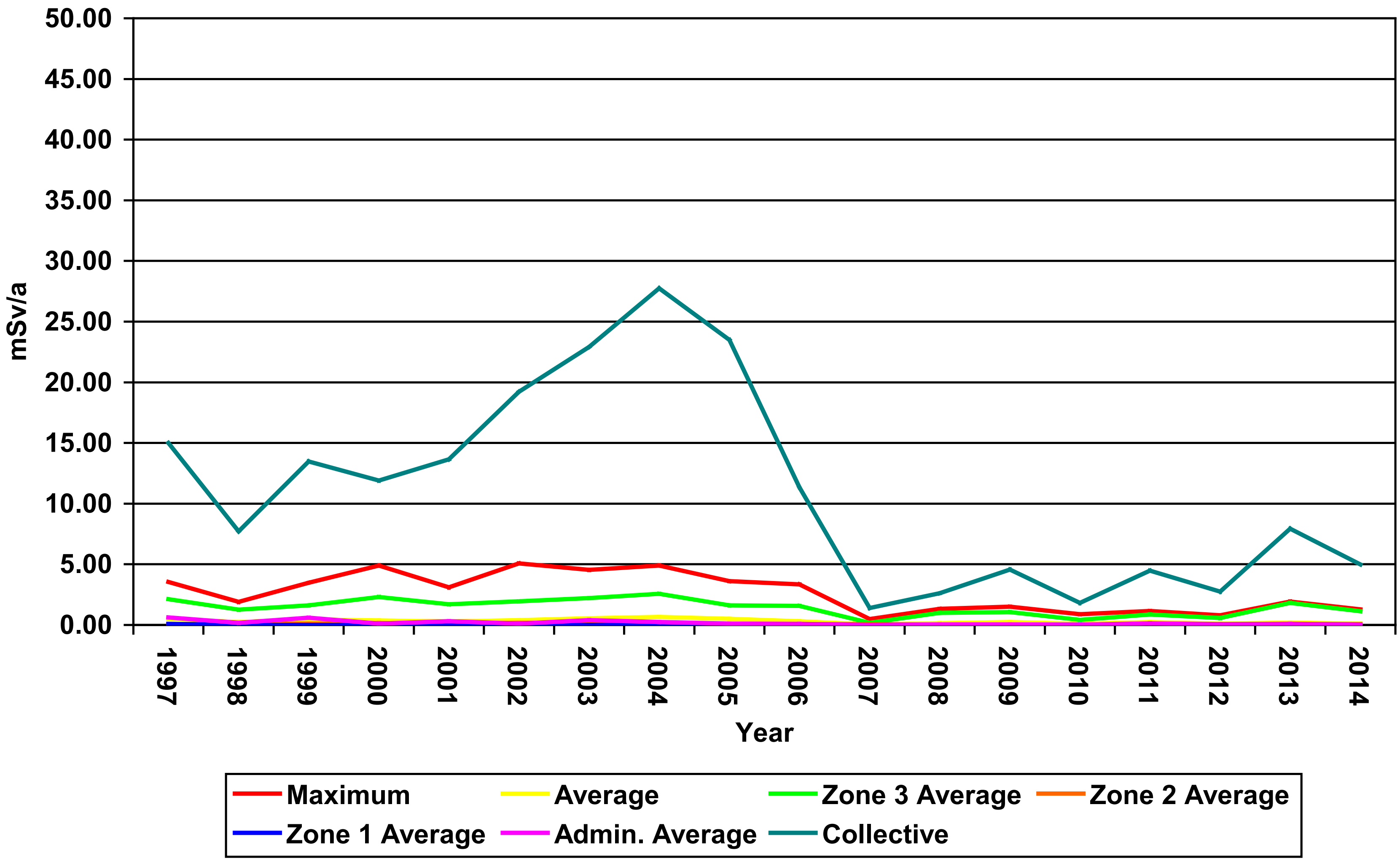
Equipment maintenance was performed under contract with a fully licensed maintenance and TSSA certified local HVAC contract provider.

All process equipment is serviced and maintained by qualified staff and through contract with companies that specialize in process control systems. All process equipment has been maintained in fully operational condition with no major equipment failures during 2014.

APPENDIX G

Radiological occupational annual dose data for 2014

SRBT Radiological Annual Dose Data (1997 – 2014)



SRB RADIOLOGICAL ANNUAL DOSE DATA (1997 – 2014)

ANNUAL DOSE (mSv/year)	1997	1998	1999	2000	2001	2002	2003	2004	2005	*2006	**2007	***2008	2009	2010	2011	2012	2013	2014	AVERAGE
Maximum Dose	3.55	1.91	3.48	4.89	3.11	5.08	4.54	4.90	3.61	3.35	0.48	1.34	1.50	0.88	1.15	0.80	1.93	1.29	2.66
Average	0.52	0.24	0.46	0.38	0.29	0.40	0.55	0.67	0.50	0.30	0.04	0.16	0.25	0.11	0.25	0.11	0.21	0.10	0.31
Average Zone 3	2.12	1.26	1.62	2.30	1.70	1.94	2.22	2.58	1.61	1.57	0.17	1.00	1.06	0.42	0.87	0.58	1.82	1.14	1.44
Average Zone 2	0.07	0.12	0.11	0.15	0.08	0.18	0.16	0.18	0.12	0.07	0.07	0.02	0.01	0.01	0.11	0.03	0.08	0.07	0.09
Average Zone 1	0.08	<0.01	<0.01	<0.01	0.01	0.01	0.01	0.02	<0.01	<0.01	0.00	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.02
Average Administration	0.61	0.17	0.60	0.12	0.31	0.11	0.39	0.24	0.12	0.09	<0.01	0.05	0.05	0.02	0.13	0.06	0.08	0.03	0.18
Collective Dose	15.01	7.72	13.47	11.91	13.65	19.21	22.91	27.75	23.50	11.34	1.40	2.62	4.57	1.82	4.47	2.75	7.94	4.98	10.95

DOSIMETRY RANGE (mSv/year)	1997	1998	1999	2000	2001	2002	2003	2004	2005	*2006	**2007	***2008	2009	2010	2011	2012	2013	2014	AVERAGE
0.00 – 0.99	23	29	28	33	43	43	39	30	39	34	32	15	15	17	16	24	34	47	30.06
1.00 – 1.99	4	3	4	1	4	2	0	5	3	3	0	1	3	0	2	0	4	1	2.22
2.00 – 2.99	1	0	0	1	1	2	3	2	3	0	0	0	0	0	0	0	0	0	0.72
3.00 – 3.99	1	0	2	1	1	0	2	2	2	1	0	0	0	0	0	0	0	0	0.67
4.00 – 4.99	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0.22
> 5.00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.06
> 50.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Staff Members	29	32	34	37	49	48	45	41	47	38	32	16	18	17	18	24	38	48	33.94

*** Operated 48 weeks**
**** Operated 5 weeks**
***** Operated 26 weeks**

APPENDIX H

Swipe Monitoring Results for 2014

2014 Routine Contamination Assessment Summary

Zone 3

Zone 3 Swipe Areas	No. of swipes	Average Value	Amount pass	Amount Fail	Average Pass
Rig 7 Floor	242	25.74	200	42	82.64%
Rig 7	242	8.80	234	8	96.69%
Rig 1 Floor	242	31.30	207	35	85.54%
Rig 1	242	5.74	237	5	97.93%
Flr @ Rig 6	242	172.44	201	41	83.06%
Rig 6	242	4.90	241	1	99.59%
Floor @ Rig 8	242	24.13	200	42	82.64%
Rig 8	242	3.78	241	1	99.59%
Flr @ Barrier	242	31.54	219	23	90.50%
Muffle F/H	242	13.41	229	13	94.63%
Laser rm flr random	242	14.74	231	11	95.45%
EIP Area	242	5.40	238	4	98.35%
Laser Rm F/H	242	37.26	219	23	90.50%
Trit Lab Flr random	242	23.25	213	29	88.02%
Diss. F hood	242	32.14	224	18	92.56%
Bulk f hood	242	165.48	224	18	92.56%
Storage Rm Shelves	242	10.69	233	9	96.28%
Shelf at Sink	186	44.77	176	10	94.62%
Storage Rm Floor	185	14.88	176	9	95.14%
Random Tools	174	15.44	162	12	93.10%
Waste Rm Walls	129	1.75	129	0	100.00%
Diss. F/H Cabinet	125	7.44	122	3	97.60%
Waste Rm Floor	113	11.98	110	3	97.35%
Photometer Door	65	2.08	65	0	100.00%
Scint Table	65	4.72	65	0	100.00%
Handheld Monitors	65	4.89	64	1	98.46%
Oven Handles	64	6.37	63	1	98.44%
Wash F/H	64	5.02	64	0	100.00%
Large Cabinet in L. Room	64	7.87	62	2	96.88%
Logbooks at Door	57	7.23	56	1	98.25%
Nitrogen Area	57	9.60	56	1	98.25%
Logbooks Trit Lab	57	6.24	56	1	98.25%
Computer Area	53	5.43	53	0	100.00%
Glove Holder - Rig Room	53	6.13	52	1	98.11%
Glove Holder - Laser Roo	53	3.48	53	0	100.00%
Glove Holder - Trit Lab	53	4.10	53	0	100.00%
Coat Rack Wall	3	1.96	3	0	100.00%
Crusher F/H Cabinet	3	6.03	3	0	100.00%
Trit Lab Desk Drawers	3	1.07	3	0	100.00%
Bulk Splitter Floor	3	13.70	3	0	100.00%
	5808	20.07	5440	368	93.66%

2014 Routine Contamination Assessment Summary

Zone 2

Zone 2 Swipe Areas	No. of swipes	Average Value	Amount pass	Amount Fail	Average Pass
Floor at Barrier	147	1.55	137	10	93.20
WIP Shelving	147	1.51	133	14	90.48
QA Shelving	147	2.01	128	19	87.07
Reflector Shelving	147	1.66	134	13	91.16
Work Counters	147	0.45	144	3	97.96
Counter @ Barrier	147	2.08	135	12	91.84
Storage Room Floor	114	0.82	112	2	98.25
Insp. Prep Counter	112	1.47	103	9	91.96
Bubbler Fume hood	108	1.56	98	10	90.74
Random Bins	77	1.75	69	8	89.61
Floor @ Assy Barrier	76	0.64	74	2	97.37
Safety Glasses Area	71	1.57	64	7	90.14
Desk Drawer Items	40	0.41	40	0	100.00
Photometer Area	38	1.08	37	1	97.37
Small Silkscreen	37	0.83	36	1	97.30
Insp. Prep Counter	37	0.24	37	0	100.00
Shelving by Window	37	1.14	36	1	97.30
Paint Room Floor	33	0.86	33	0	100.00
Silkscreen Room Floor	33	1.10	31	2	93.94
Photmeter Room Floor	31	0.97	30	1	96.77
Random Chairs	31	0.20	31	0	100.00
Paint Room Floor	4	0.64	4	0	100.00
Computer Desk Area	2	0.07	2	0	100.00
Fumehood Counter	2	0.19	2	0	100.00
	1765	1.03	1650	115	93.48%

Zone 1

Zone 1 Swipe Areas	No. of swipes	Average Value	Amount pass	Amount Fail	Average Pass
Lunch Room	51	0.16	51	0	100.00
LSC Room	51	0.19	51	0	100.00
RR Ante Room	51	0.62	50	1	98.04
Rig Room Barrier	51	1.36	48	3	94.12
Assembly Barrier	51	0.61	50	1	98.04
Random Utility Carts	37	0.89	34	3	91.89
Table @ Assy Barrier	24	0.65	24	0	100.00
Entrance Cabinet	13	0.04	13	0	100.00
Random Offices	13	0.22	13	0	100.00
Shipping Area Floor	13	0.22	13	0	100.00
Sink by Milling	11	0.14	11	0	100.00
Shipping Counter	1	0.10	1	0	100.00
	367	0.43	359	8	97.82%

2014 Routine Contamination Assessment Summary

Overall Facility Summary

Zone	No. of swipes	Amount pass	Amount Fail	Pass Rate
Zone 3	5808	5440	368	93.66
Zone 2	1765	1650	115	93.48
Zone 1	367	359	8	97.82
ALL ZONES	7940	7449	491	93.82

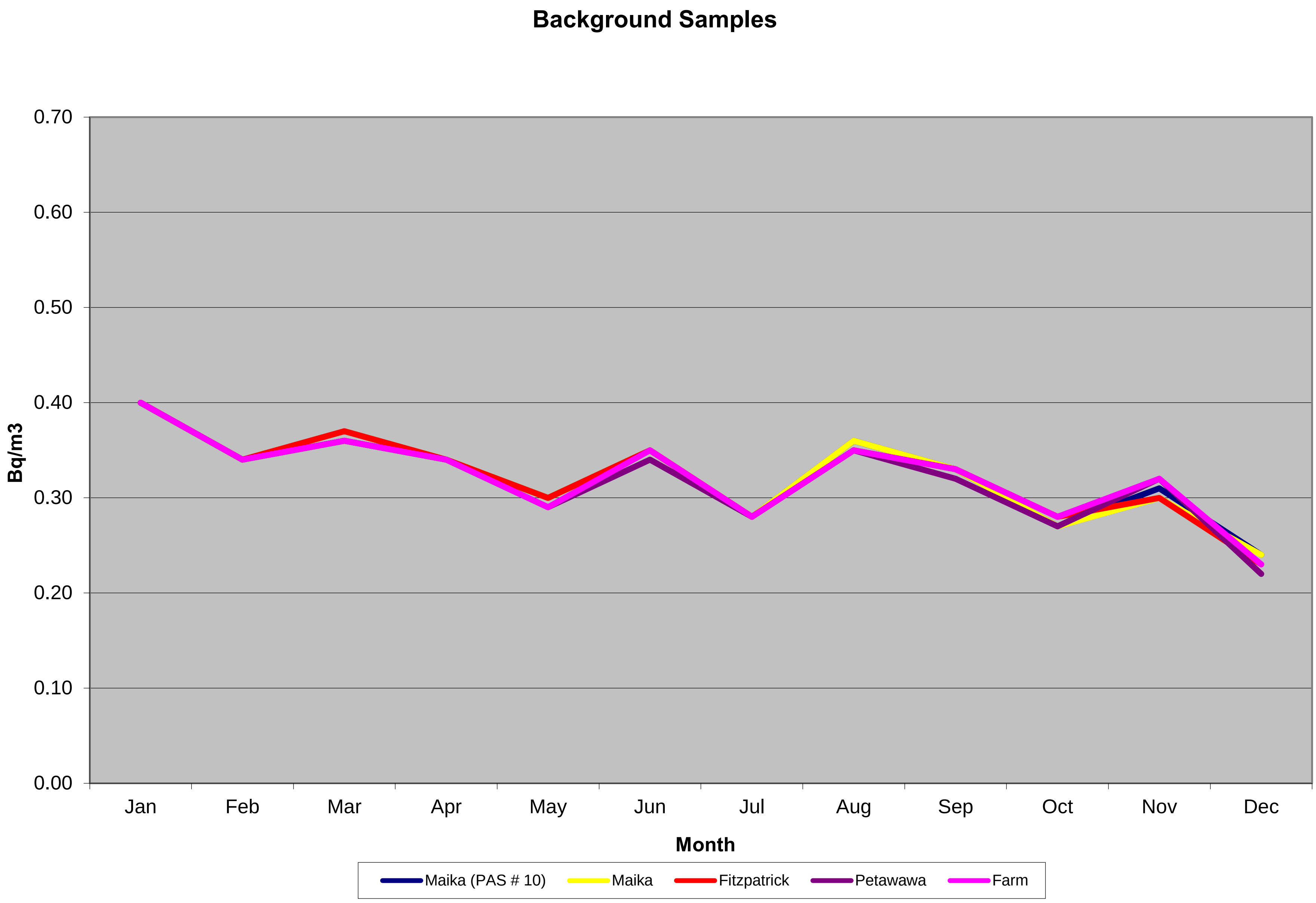
APPENDIX I

Passive Air Sampler Results 2014

2014 Environment Monitoring Program
Passive Air Sampling System

Sampler No.	Sampler ID	Location	Dist. to SRBT	(Bq/m3) Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average (Bq/m3)
				(Jan9-Feb4)	(Feb4-Mar4)	(Mar4-Apr2)	(Apr2-May1)	(May1-June4)	(June4--Jul3)	(Jul3-Aug6)	(Aug6-Sept3)	(Sept3-Oct2)	(Oct2-Nov4)	(Nov 4-Dec3)	(Dec3-Jan9)	
1	N250	N 45º 48.486' W 077º 07.092' Elev. 137m	322m	2.10	0.50	0.36	0.50	0.95	1.70	2.00	2.50	2.80	1.60	1.60	0.23	1.40
2	N500	N 45º 48.572' W 077º 07.008' Elev. 134m	493m	0.72	0.45	0.36	0.62	0.50	0.80	1.30	0.94	0.65	0.69	0.82	0.24	0.67
3	N1000	N 45º 48.869' W 077º 06.997' Elev. 135m	1040m	0.40	0.34	0.36	0.34	0.29	0.35	0.42	0.36	0.33	0.28	0.30	0.23	0.33
4 (PAS #4)	NW250	N 45º 48.412' W 077º 07.189' Elev. 137m	222m	3.30	1.60	3.60	1.40	1.50	4.60	1.50	2.80	5.30	4.50	0.83	0.89	2.65
5	NW500	N 45º 48.577' W 077º 07.382' Elev. 134m	615m	0.82	0.57	0.93	0.35	0.43	1.10	0.43	0.81	1.60	1.10	0.31	0.23	0.72
6 (PAS # 8)	NW1000	N 45º 48.754' W 077º 07.599' Elev. 130m	1050m	0.51	0.50	0.45	0.34	0.36	0.35	0.28	0.39	0.63	0.30	0.31	0.23	0.39
7	NW2000	N 45º 49.141' W 077º 08.090' Elev. 139m	2000m	0.44	0.34	0.36	0.40	1.20	2.50	2.00	1.60	1.50	0.57	0.32	0.24	0.96
8	W250	N 45º 48.300' W 077º 07.323' Elev. 138m	297m	0.40	1.20	2.20	1.30	0.94	1.00	0.62	2.50	2.40	1.60	0.38	0.56	1.26
9	W500	N 45º 48.288' W 077º 07.393' Elev. 137m	389m	0.40	0.58	0.88	0.75	0.55	0.69	0.33	0.93	1.30	0.92	0.39	0.39	0.68
10	W1000	N 45º 48.306' W 077º 07.630' Elev. 134m	691m	0.40	0.58	1.30	0.34	0.33	0.34	0.28	0.79	0.50	0.42	0.32	0.23	0.49
11	SW250	N 45º 48.247' W 077º 07.206' Elev. 140m	183m	0.40	0.53	0.53	0.47	0.82	1.50	0.28	0.41	1.70	1.60	0.76	0.24	0.77
12	SW500	N 45º 47.896' W 077º 07.307' Elev. 148m	839m	0.40	0.34	0.36	0.35	0.30	0.35	0.28	0.35	0.79	0.49	*	0.23	0.39
13	SW1000	N 45º 47.599' W 077º 07.543' Elev. 149m	1470m	0.40	0.34	0.36	0.34	0.74	2.30	1.40	1.30	1.12	1.00	0.32	0.27	0.82
14	SW2000	N 45º 47.408' W 077º 07.866' Elev. 155m	2110m	0.40	0.34	0.37	0.36	0.31	0.35	0.29	0.36	0.34	0.31	0.32	0.24	0.33
15	S250	N 45º 48.129' W 077º 07.014' Elev. 131m	356m	0.72	0.74	1.40	1.32	1.20	1.40	1.40	1.10	1.20	0.92	0.51	0.50	1.03
16	S500	N 45º 48.029' W 077º 07.110' Elev. 143m	532m	0.40	0.34	0.48	0.34	0.32	0.46	0.28	0.36	0.58	0.29	0.31	0.23	0.37
17 (PAS # 12)	S1000	N 45º 46.466' W 077º 07.441' Elev. 158m	1450m	0.40	0.34	0.36	0.34	0.29	0.34	0.27	0.35	0.33	0.28	0.31	0.24	0.32
18	SE250	N 45º 48.189' W 077º 06.874' Elev. 132m	365m	3.10	2.20	4.80	2.80	1.90	4.10	3.90	3.20	2.00	2.00	1.20	3.00	2.85
19	SE500	N 45º 48.108' W 077º 06.783' Elev. 123m	554m	1.10	0.83	2.40	2.10	0.63	1.10	1.10	0.93	0.67	0.98	0.76	1.30	1.16
20	SE1000	N 45º 47.894' W 077º 06.501' Elev. 120m	1090m	*	0.34	0.64	0.47	0.30	0.46	0.28	0.35	0.33	0.31	0.34	0.25	0.37
21	SE2000	N 45º 47.505' W 077º 05.978' Elev. 137m	2080m	0.40	0.34	0.36	0.34	0.29	0.35	0.28	1.60	0.33	0.32	0.31	0.23	0.43
22	E250	N 45º 48.234' W 077º 06.807' Elev. 131m	401m	2.20	1.50	1.90	1.10	0.87	1.30	5.60	2.60	1.30	2.30	2.00	1.80	2.04
23	E500	N 45º 48.333' W 077º 06.693' Elev. 132m	520m	0.50	0.34	0.37	0.41	0.41	0.34	1.40	0.97	0.61	0.46	0.81	0.23	0.57
24	E1000	N 45º 48.303' W 077º 06.260' Elev. 143m	1080m	0.40	0.34	0.36	0.34	0.42	0.35	0.55	0.40	0.33	0.28	0.31	0.24	0.36
25	NE250	N 45º 48.371' W 077º 06.964' Elev. 124m	198m	4.00	5.00	2.00	2.40	2.00	2.20	6.70	4.30	2.40	5.50	9.20	0.71	3.87
26	NE500	N 45º 48.421' W 077º 06.732' Elev. 131m	508m	0.61	1.30	0.39	0.67	0.42	0.35	1.10	0.93	0.64	0.98	1.40	0.23	0.75
27	NE1000	N 45º 48.683' W 077º 06.441' Elev. 148m	1100m	0.40	0.34	0.36	0.34	0.29	0.34	0.41	0.48	0.33	0.30	0.34	0.24	0.35
28	NE2000	N 45º 49.116' W 077º 05.843' Elev. 156m	2200m	0.40	0.34	0.36	0.34	0.45	0.58	0.28	0.35	0.33	0.27	0.31	0.23	0.35
Pre-Sample Points																
(PAS #1)		N 45º 48.287' W 077º 07.123' Elev. 129m	94.1m	0.40	1.10	1.50	1.20	3.60	12.20	4.50	4.00	13.00	4.90	2.50	0.69	4.13
(PAS #2)		N 45º 48.325' W 077º 07.132' Elev. 132m	52.8m	1.20	1.90	6.40	7.30	4.00	4.40	2.70	6.30	7.90	4.80	1.70	2.20	4.23
(PAS #13)		N 45º 48.262' W 077º 07.093' Elev. 132m	61.5m	0.40	2.40	5.60	2.00	6.30	9.80	1.60	3.00	5.50	12.60	2.50	0.23	4.33
Replicates																
4-2	NW250	N 45º 48.412' W 077º 07.189' Elev. 137m	222m	3.20	1.50	3.50	1.20	1.40	4.40	1.30	2.50	5.30	4.30	0.64	0.72	2.50
11-2	SW250	N 45º 48.247' W 077º 07.206' Elev. 140m	183m	0.40	0.45	0.49	0.38	0.70	1.30	0.28	0.35	1.60	0.89	0.72	0.23	0.65
18-2	SE250	N 45º 48.189' W 077º 06.874' Elev. 132m	365m	2.20	2.10	4.50	2.70	1.20	2.40	2.50	2.10	1.60	1.90	1.20	2.90	2.28
25-2	NE250	N 45º 48.371' W 077º 06.964' Elev. 124m	198m	3.60	2.90	1.40	2.00	1.80	2.10	6.40	4.10	1.90	4.80	8.40	0.65	3.34
Background Samples																
Maika (PAS # 10)	SW	N 45º 46.367' W 077º 11.447' Elev. 149m	6690m	0.40	0.34	0.36	0.34	0.30	0.35	0.28	0.36	0.33	0.27	0.31	0.24	0.32
Maika	Duplicate	Same as above	6690m	0.40	0.34	0.36	0.34	0.30	0.35	0.28	0.36	0.33	0.27	0.30	0.24	0.32
Fitzpatrick	SE	N 45º 44.818' W 076º 59.822' Elev. 159m	11400m	0.40	0.34	0.37	0.34	0.30	0.35	0.28	0.35	0.33	0.28	0.30	0.23	0.32
Petawawa	NW	N 45º 51.497' W 077º 12.828' Elev. 149m	9480m	0.40	0.34	0.36	0.34	0.29	0.34	0.28	0.35	0.32	0.27	0.32	0.22	0.32
Farm	NE	N 45º 53.071' W 076º 56.768' Elev. 142m	16000m	0.40	0.34	0.36	0.34	0.29	0.35	0.28	0.35	0.33	0.28	0.32	0.23	0.32
			Sum	39.12	36.55	53.80	39.65	39.49	69.94	55.64	58.08	70.78	66.13	44.30	22.66	49.74

* No Sample Available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0.20
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Bq/m3
Jan
Feb
Mar
Apr
May
Jun
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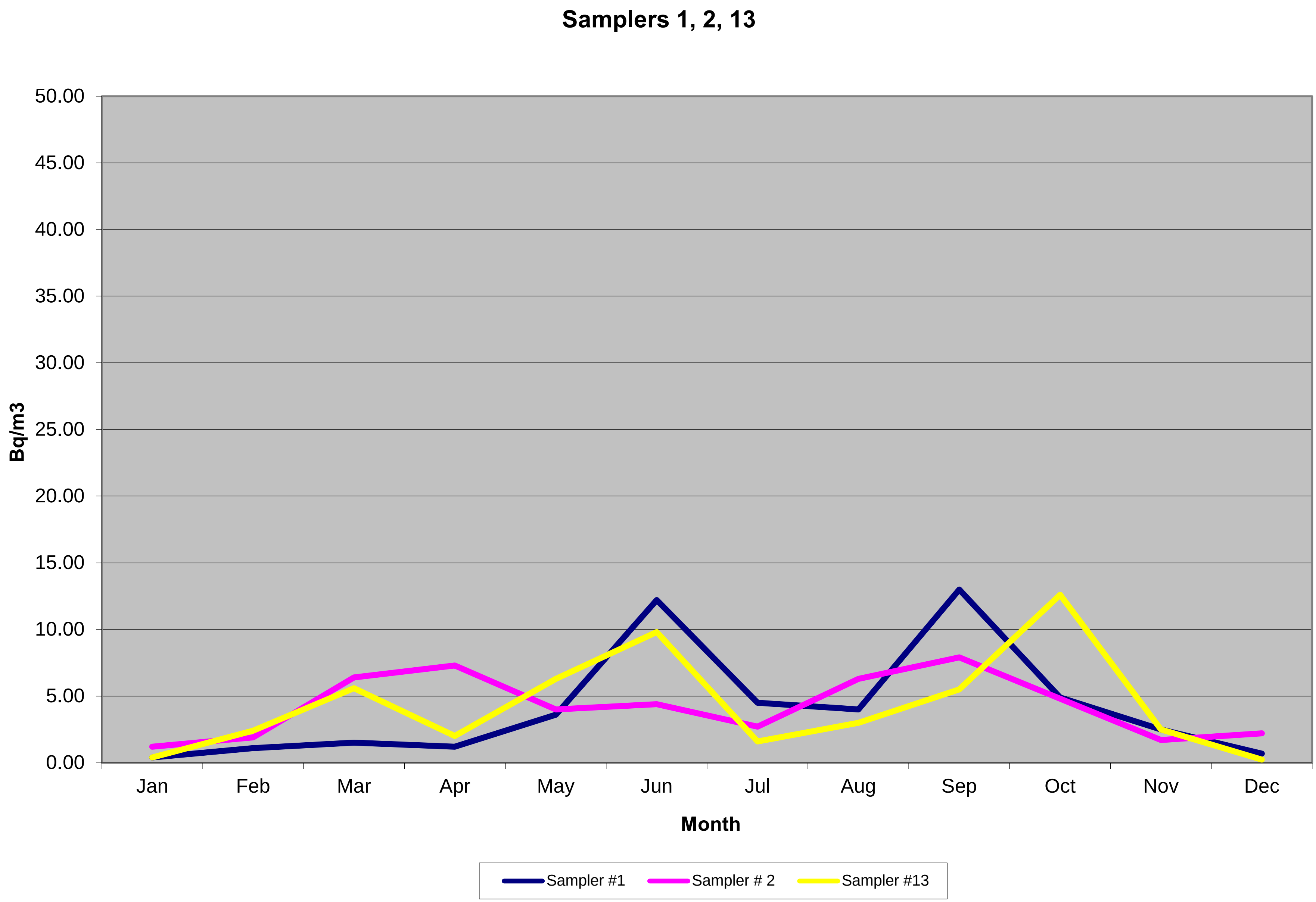
Sep
Oct
Nov
Dec
Month
Maika (PAS # 10)
Maika
Fitzpatrick
Petawawa
Farm



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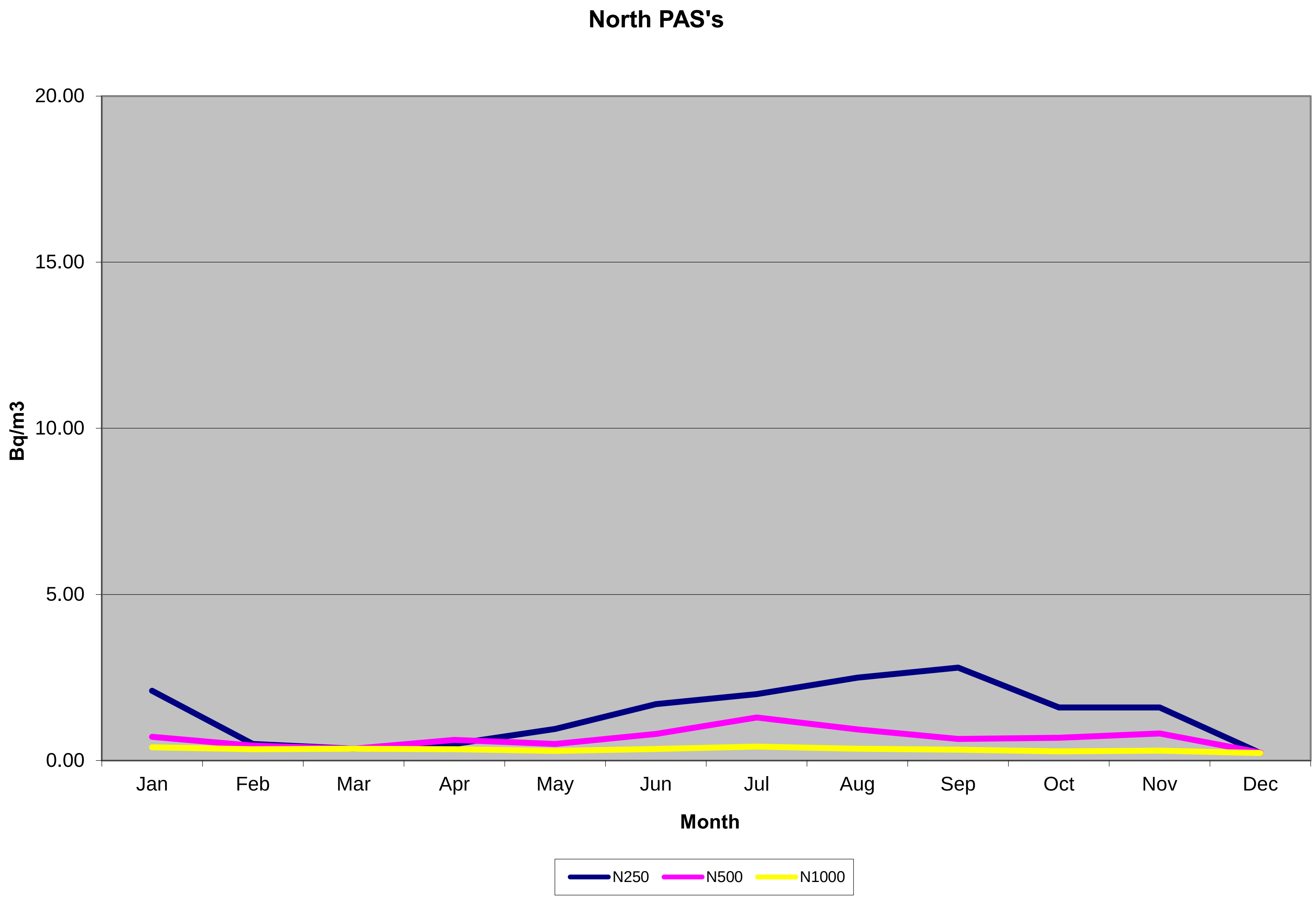
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Bq/m3
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
Sampler #1
Sampler # 2
Sampler #13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Bq/m3
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Month
N250
N500
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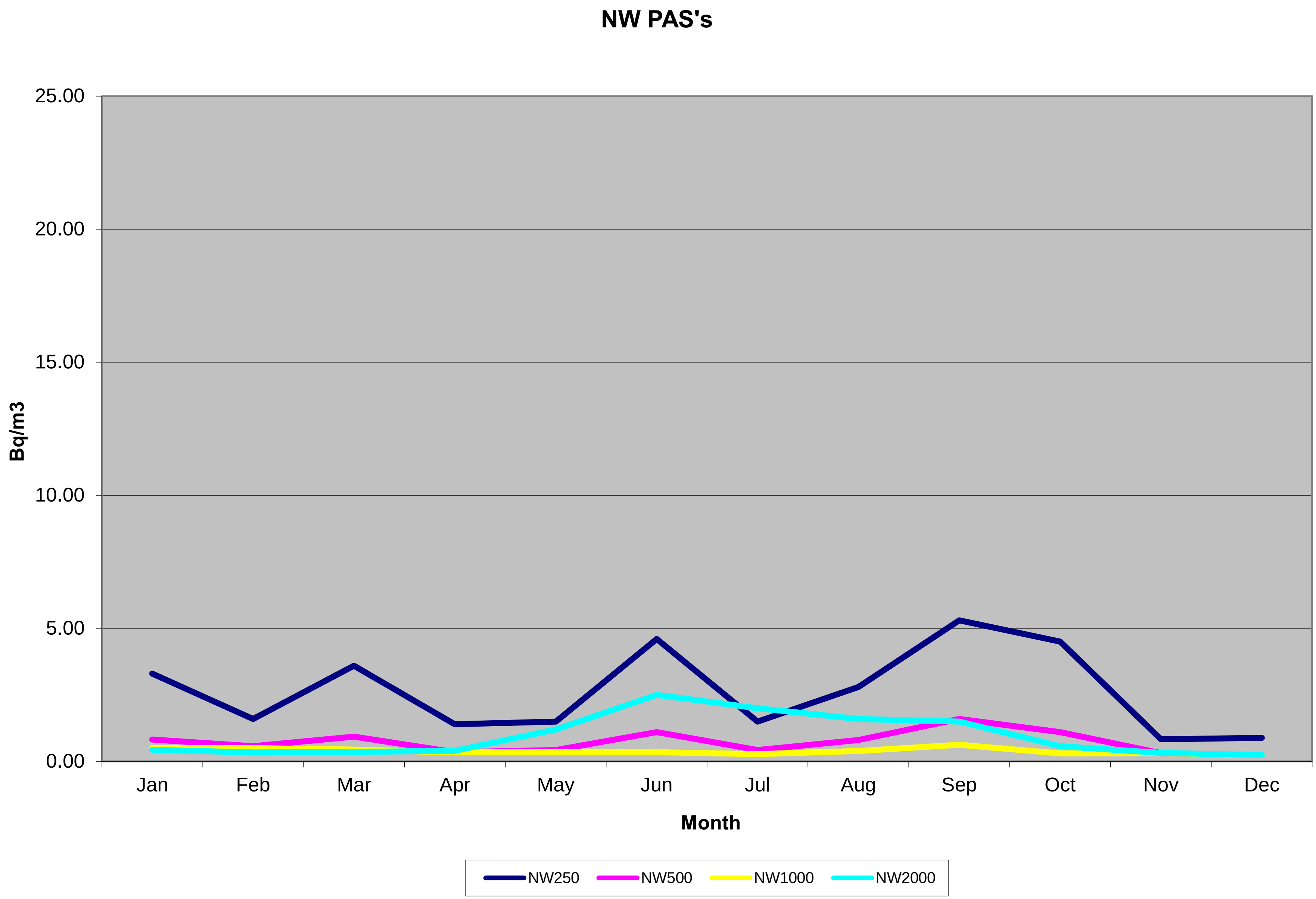
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Bq/m3
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NW500
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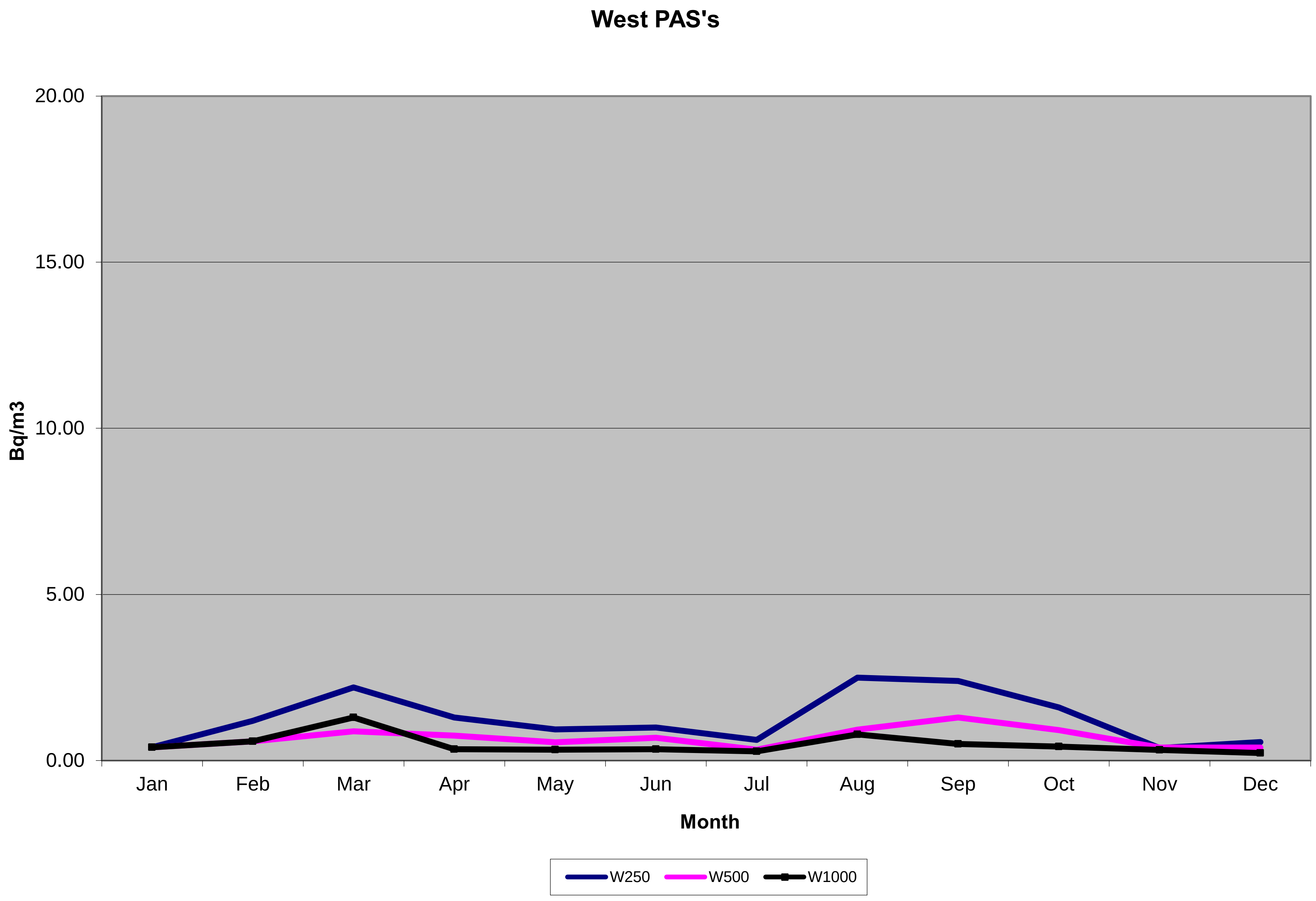
NW2000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Bq/m3
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Feb
Mar
Apr
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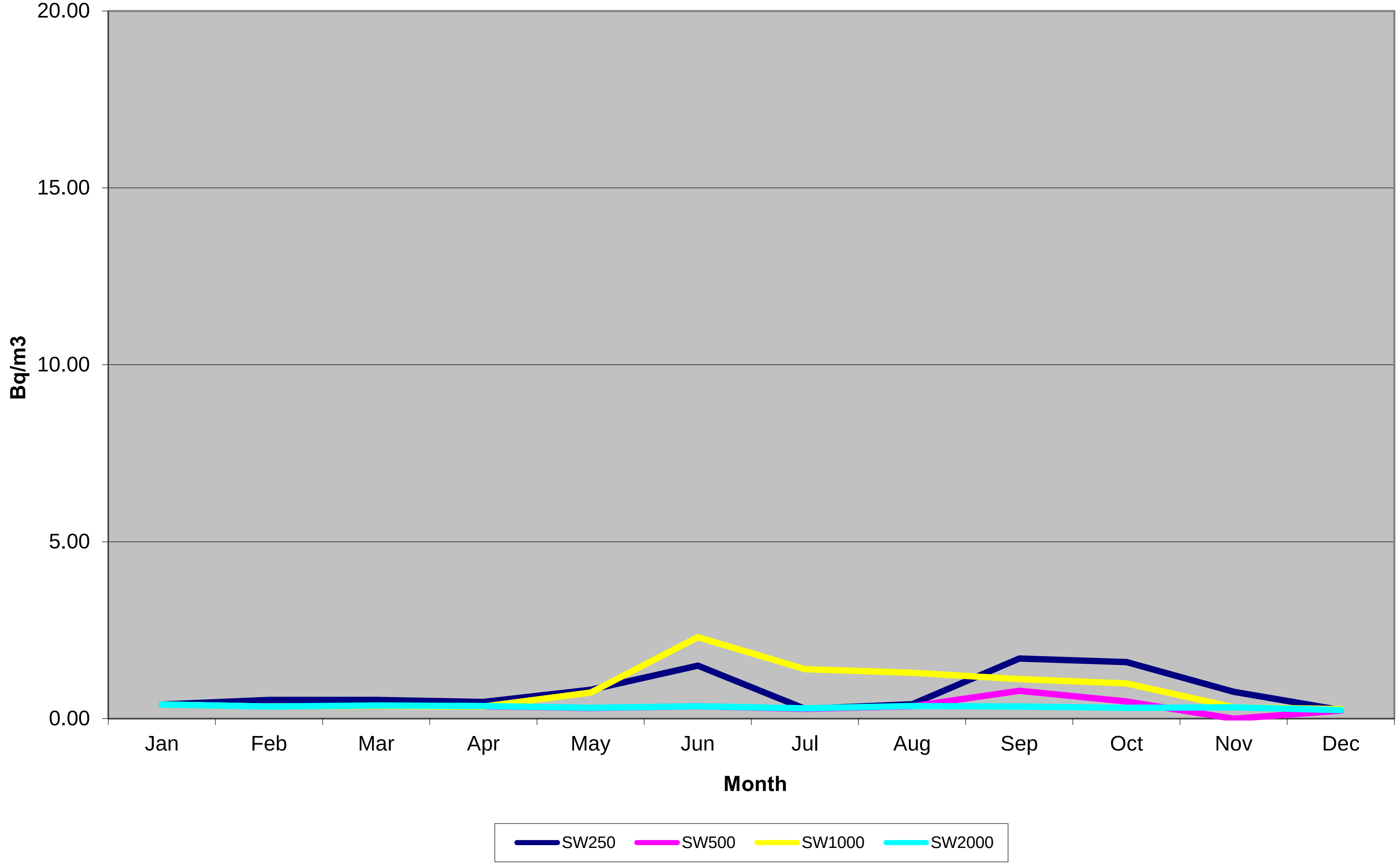
W250
W500
W1000

SW PAS's



20.00
15.00
10.00
5.00
0.00
Bq/m3
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
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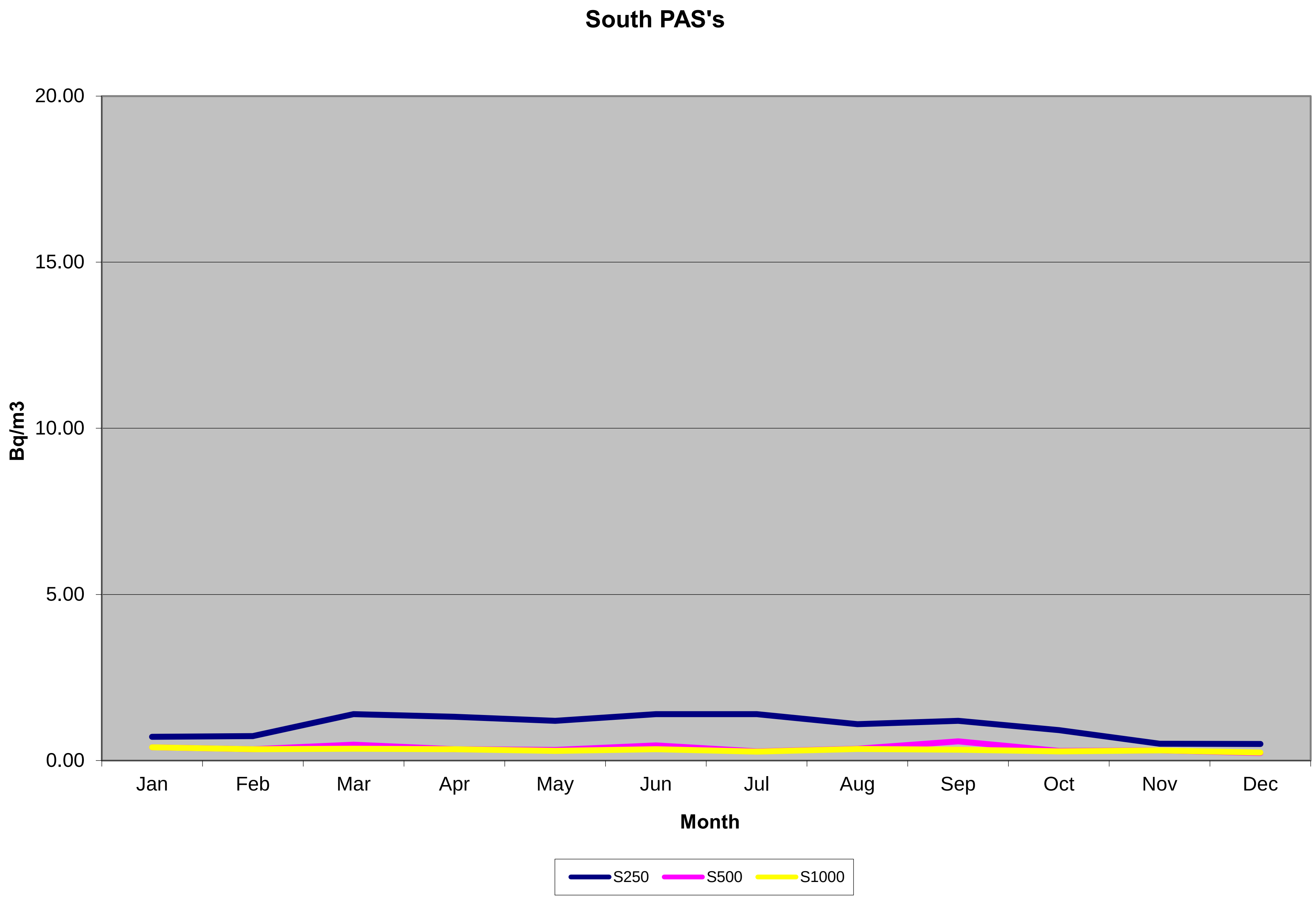
SW250
SW500
SW1000
SW2000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10.00
5.00
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Bq/m3
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Feb
Mar
Apr
May
Jun
Jul
Aug
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Oct
Nov
Dec
Month
S250
S500
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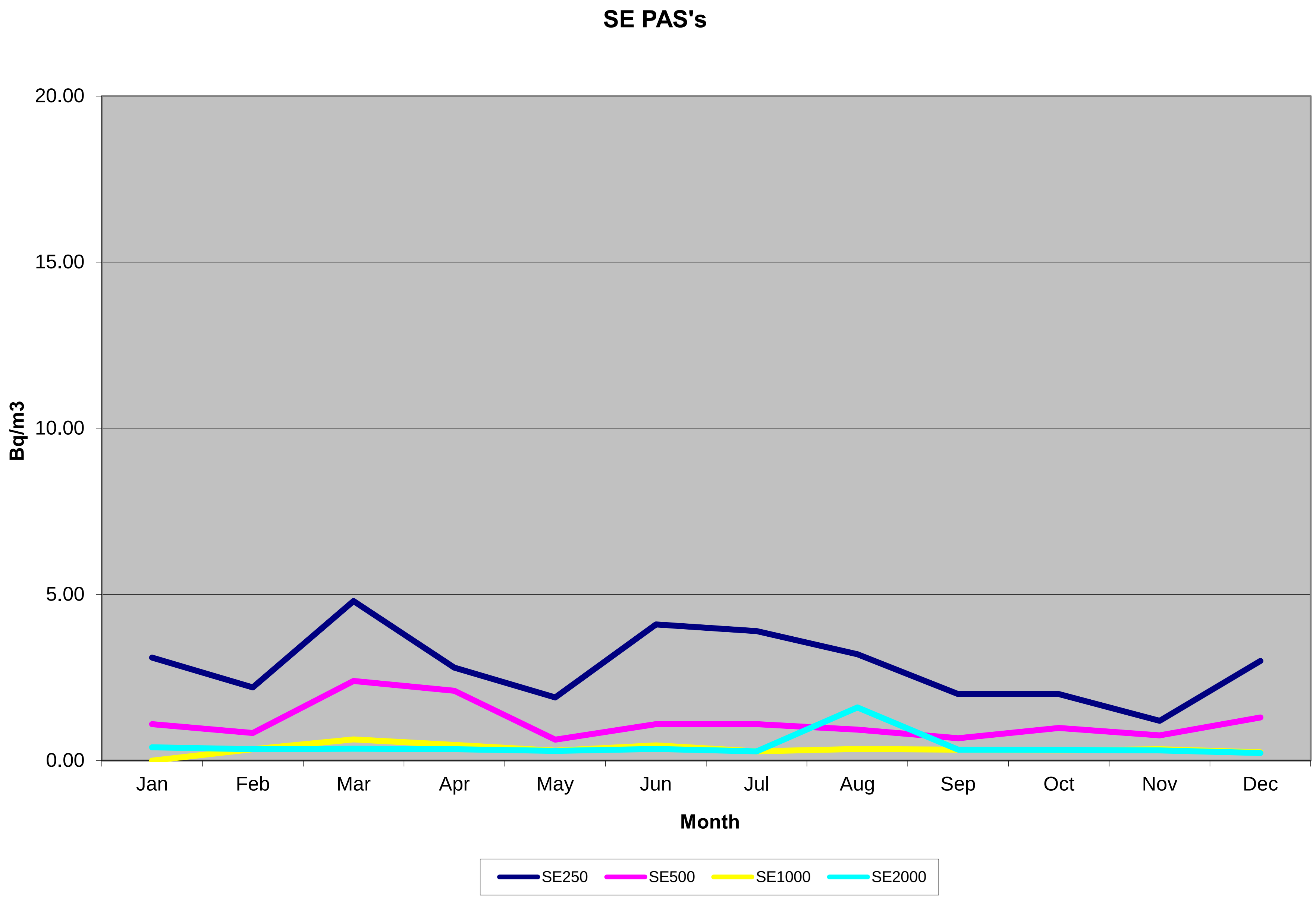
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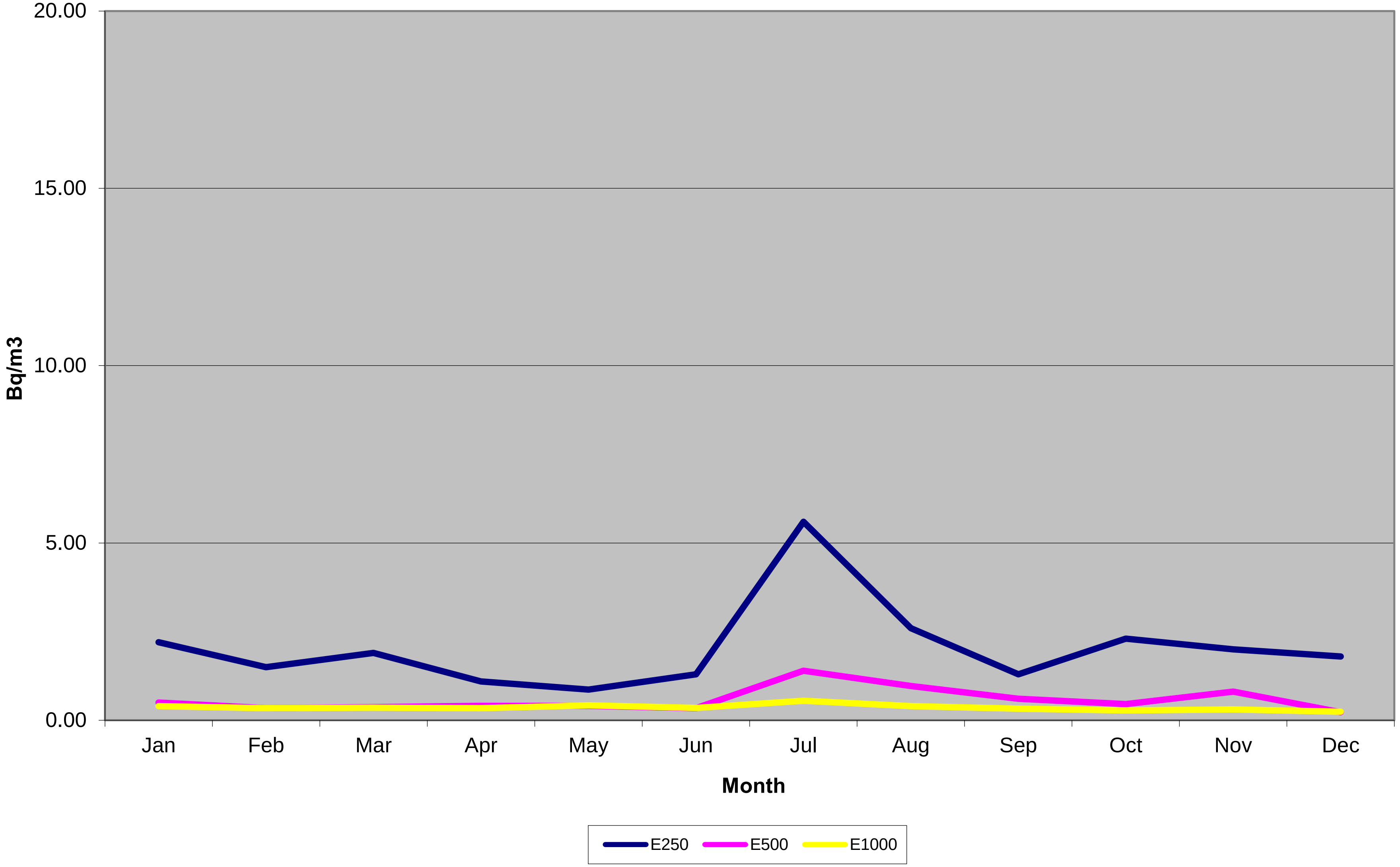
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
SE250
SE500
SE1000
SE2000

East PAS's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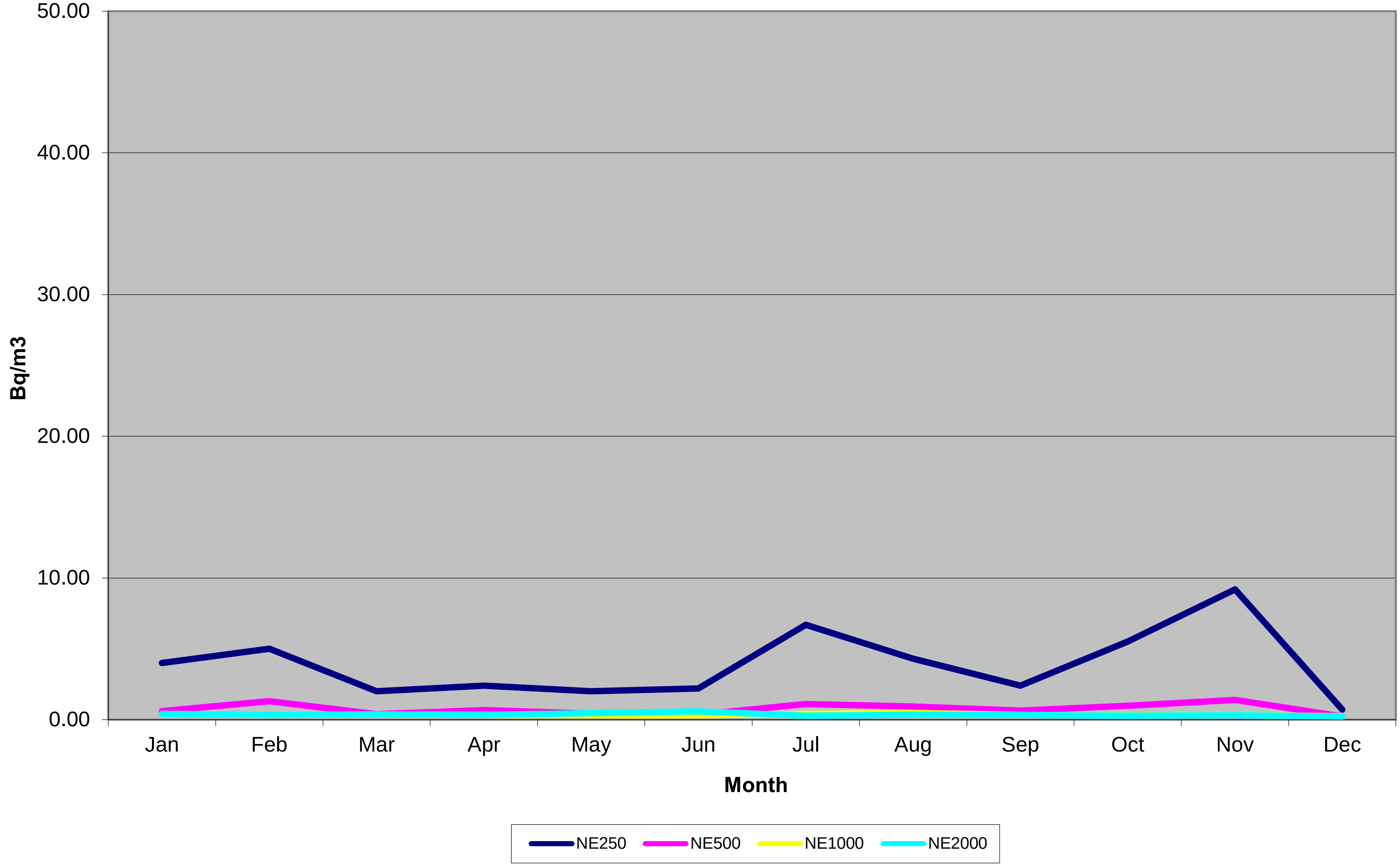
15.00
10.00
5.00
0.00
Bq/m3
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
E250
E500
E1000

NE PAS's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0.00
Bq/m3
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
NE250
NE500
NE1000
NE2000

APPENDIX J

Wind Direction Graphs for 2014

Passive Air Sampling Data (Results in Bq/m3)

1st Quarter

Direction	January				February				March			
	250 M	500 M	1000 M	2000 M	250 M	500 M	1000 M	2000 M	250 M	500 M	1000 M	2000 M
North	2.10	0.72	0.40		0.50	0.45	0.34		0.36	0.36	0.36	
North West	3.30	0.82	0.51	0.44	1.60	0.57	0.50	0.34	3.60	0.93	0.45	0.36
West	0.40	0.40	0.40		1.20	0.58	0.58		2.20	0.88	1.30	
Southwest	0.40	0.40	0.40	0.40	0.53	0.34	0.34	0.34	0.53	0.36	0.36	0.37
South	0.72	0.40	0.40		0.74	0.34	0.34		1.40	0.48	0.36	
South East	3.10	1.10 *		0.40	2.20	0.83	0.34	0.34	4.80	2.40	0.64	0.36
East	2.20	0.50	0.40		1.50	0.34	0.34		1.90	0.37	0.36	
North East	4.00	0.61	0.40	0.40	5.00	1.30	0.34	0.34	2.00	0.39	0.36	0.36

2nd Quarter

Direction	April				May				June			
	250 M	500 M	1000 M	2000 M	250 M	500 M	1000 M	2000 M	250 M	500 M	1000 M	2000 M
North	0.50	0.62	0.34		0.95	0.50	0.29		1.70	0.80	0.35	
North West	1.40	0.35	0.34	0.40	1.50	0.43	0.36	1.20	4.60	1.10	0.35	2.50
West	1.30	0.75	0.34		0.94	0.55	0.33		1.00	0.69	0.34	
Southwest	0.47	0.35	0.34	0.36	0.82	0.30	0.74	0.31	1.50	0.35	2.30	0.35
South	1.32	0.34	0.34		1.20	1.20	0.29		1.40	0.46	0.34	
South East	2.80	2.10	0.47	0.34	1.90	0.63	0.30	0.29	4.10	1.10	0.46	0.35
East	1.10	0.41	0.34		0.87	0.41	0.42		1.30	0.34	0.35	
North East	2.40	0.67	0.34	0.34	2.00	0.42	0.29	0.45	2.20	0.35	0.34	0.58

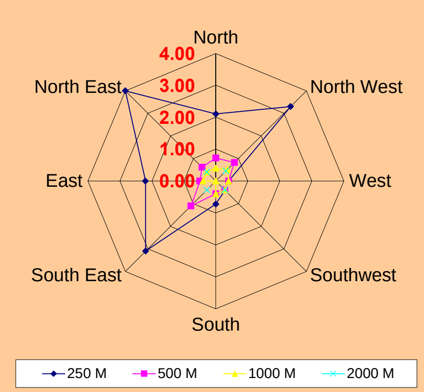
3rd Quarter

Direction	July				August				September			
	250 M	500 M	1000 M	2000 M	250 M	500 M	1000 M	2000 M	250 M	500 M	1000 M	2000 M
North	2.00	1.30	0.42		2.50	0.94	0.36		2.80	0.65	0.33	
North West	1.50	0.43	0.28	2.00	2.80	0.81	0.39	1.60	5.30	1.60	0.63	1.50
West	0.62	0.33	0.28		2.50	0.93	0.79		2.40	1.30	0.50	
Southwest	0.28	0.28	1.40	0.29	0.41	0.35	1.30	0.36	1.70	0.79	1.12	0.34
South	1.40	0.28	0.27		1.10	0.36	0.35		1.20	0.58	0.33	
South East	3.90	1.10	0.28	0.28	3.20	0.93	0.35	1.60	2.00	0.67	0.33	0.33
East	5.60	1.40	0.55		2.60	0.97	0.40		1.30	0.61	0.33	
North East	6.70	1.10	0.41	0.28	4.30	0.93	0.48	0.35	2.40	0.64	0.33	0.33

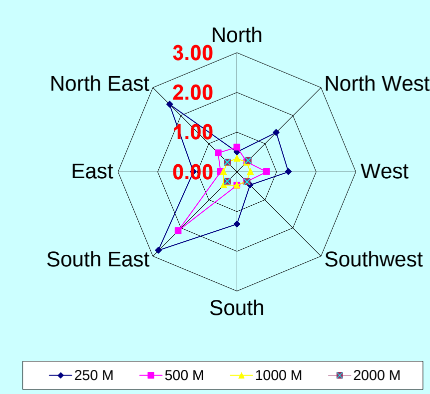
4th Quarter

Direction	October				November				December			
	250 M	500 M	1000 M	2000 M	250 M	500 M	1000 M	2000 M	250 M	500 M	1000 M	2000 M
North	1.60	0.69	0.28		1.60	0.82	0.30		0.23	0.24	0.23	
North West	4.50	1.10	0.30	0.57	0.83	0.31	0.31	0.32	0.89	0.23	0.23	0.24
West	1.60	0.92	0.42		0.38	0.39	0.32		0.56	0.39	0.23	
Southwest	1.60	0.49	1.00	0.31	0.76 *		0.32	0.32	0.24	0.23	0.27	0.24
South	0.92	0.29	0.28		0.51	0.31	0.31		0.50	0.23	0.24	
South East	2.00	0.98	0.31	0.32	1.20	0.76	0.34	0.31	3.00	1.30	0.25	0.23
East	2.30	0.46	0.28		2.00	0.81	0.31		1.80	0.23	0.24	
North East	5.50	0.98	0.30	0.27	9.20	1.40	0.34	0.31	0.71	0.23	0.24	0.23

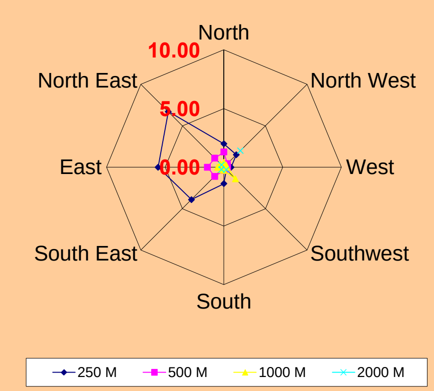
January (Jan 9-Feb 4)



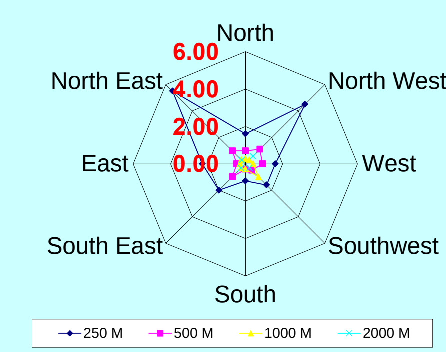
April (Apr 2-May 1)



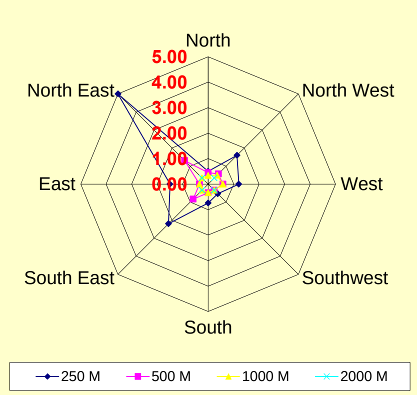
July (July 3-Aug 6)



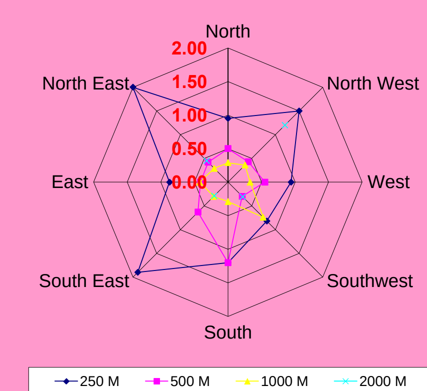
October (Oct 2-Nov 4)



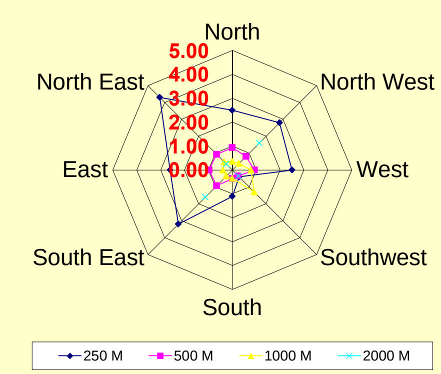
February (Feb 4-Mar 4)



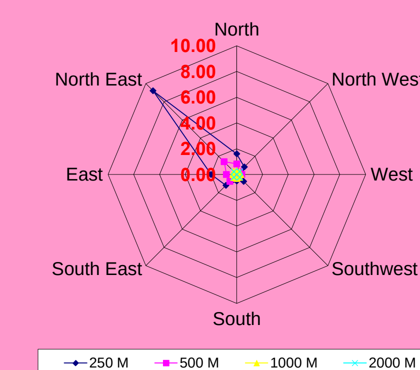
May (May1-June4)



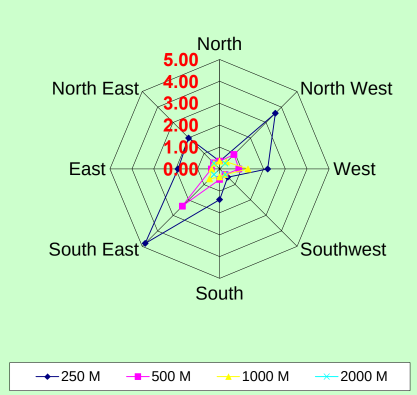
August (Aug 2-Sept 3)



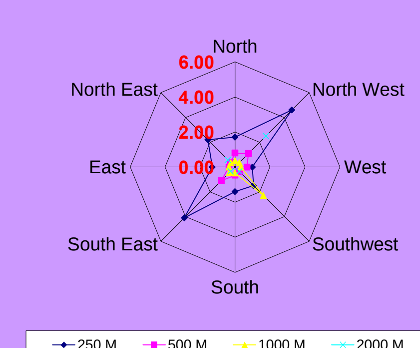
November (Nov 4-Dec 3)



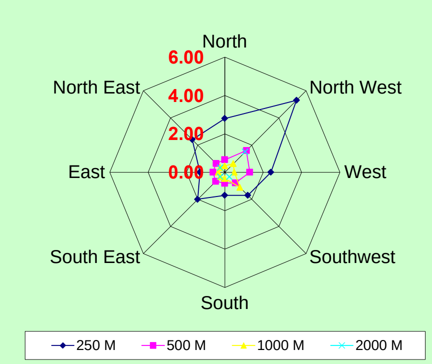
March (Mar 4-Apr 2)



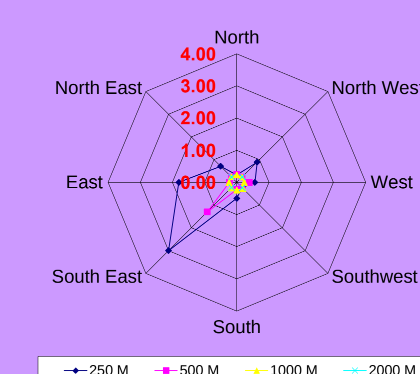
June (June 4-July 3)



September (Sept 3-Oct 2)



December (Dec 3-Jan 9)



APPENDIX J

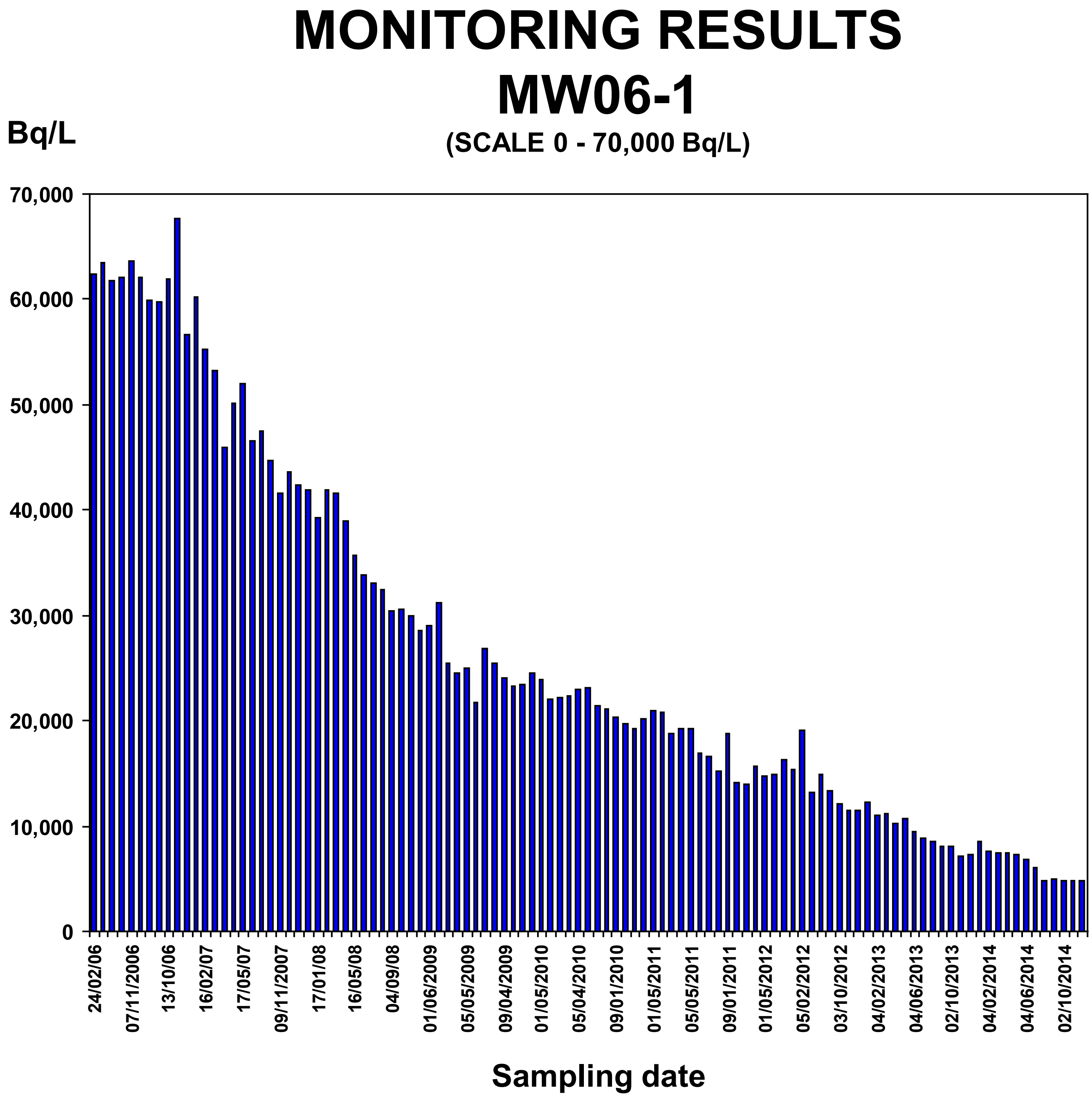
APPENDIX K

Well Monitoring Results for 2014

WELL I.D.	DESCRIPTION	DISTANCE FROM STACKS (m)	10/1/14	4/2/14	5/3/14	2/4/14	1/5/14	4/6/14	3/7/14	6/8/14	3/9/14	2/10/14	4/11/14	3/12/14	AVG
RW-2	185 MUD LAKE ROAD	1,100			No Sample	92			97				87		92
RW-3	183 MUD LAKE ROAD	1,100			99				89				109		99
RW-5	171 SAWMILL ROAD	2,300			12				13				12		12
RW-6	40987 HWY 41	1,400			20				19				21		20
RW-7	40925 HWY 41	1,600			No Sample	4			7				4		5
RW-8	204 BOUNDARY ROAD	700			214				201				236		217
RW-9	206 BOUNDARY ROAD	650			95				81				45		74
RW-10	208 BOUNDARY ROAD	625			3				<4				<3		3
RW-12	202 MUD LAKE ROAD	753			3				<4.6				4		3
B-1	SUPERIOR PROPANE OFFICE	160			798				867				959		875
B-3	INTERNATIONAL LUMBER OFFICE	385			3				<4				<3		3
														AVG	128

WELL I.D.	DESCRIPTION		DISTANCE FROM STACKS (m)	4/1/13	4/2/13	6/3/13	2/4/13	2/5/13	4/6/13	1/7/13	1/8/13	5/9/13	2/10/13	5/11/13	8/12/13	10/1/14	4/2/14	5/3/14	2/4/14	1/5/14	4/6/14	3/7/14	6/8/14	3/9/14	2/10/14	4/11/14	3/12/14	WELL I.D.
MW06-1	SRB SITE	IN SOIL	50	12,198	11,078	11,113	10,237	10,666	9,518	8,791	8,538	8,040	8,017	7,143	7,289	8,461	7,563	7,400	7,461	7,357	6,856	6,096	4,887	4,946	4,780	4,764	4,747	MW06-1
MW06-2	SRB SITE	IN SOIL	75	2,787	2,560	2,581	1,876	1,371	1,988	1,925	2,015	2,274	2,237	2,326	2,419	2,303	2,084	2,303	2,298	1,691	1,883	1,948	1,710	2,017	1,979	1,976	1,997	MW06-2
MW06-3	SRB SITE	IN SOIL	50	DRY	1,791	DRY	1,632	1,652	1,600	1,526	1,541	1,621	DRY	1,605	1,605	DRY	DRY	DRY	1,326	1,400	1,325	1,247	1,173	1,193	1,060	1,226	1,185	MW06-3
MW06-4S	JOHNSTON MEADOWS		300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MW06-4S
MW06-4D	JOHNSTON MEADOWS		300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MW06-4D
MW06-5	RENFREW COUNTY HEALTH UNIT		500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MW06-5
MW06-6	KI, 600 m		600	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MW06-6
MW06-8	SRB SITE	IN SOIL	55	1,274	1,084	1,171	1,112	1,123	1,084	1,018	1,047	1,130	1,156	1,111	1,079	1,030	1,054	1,013	1,070	1,020	965	958	858	937	821	879	944	MW06-8
MW06-9	SRB SITE	IN SOIL	25	3,810	3,538	3,224	3,493	3,354	3,210	3,144	3,184	3,448	3,244	3,252	3,511	2,931	3,047	DRY	2,884	2,985	2,847	2,903	2,810	2,808	2,290	2,791	2,893	MW06-9
MW06-10	SRB SITE	SURFACE OF BEDROCK	0	46,062	44,223	62,932	17,576	14,342	16,818	13,975	28,409	58,320	37,793	11,730	12,390	17,133	54,468	46,331	59,495	22,631	37,477	30,370	33,694	54,344	64,102	44,197	51,263	MW06-10
MW07-11	SRB SITE	SURFACE OF BEDROCK	75	1,922	1,925	1,886	1,835	2,010	1,451	1,383	1,657	1,725	1,814	1,884	1,800	1,629	1,834	1,743	1,784	1,827	1,353	1,398	1,392	1,333	1,274	1,407	2,673	MW07-11
MW07-12	SRB SITE	SURFACE OF BEDROCK	55	361	365	405	475	463	517	497	461	462	493	537	415	352	352	362	509	533	424	468	410	442	440	433	478	MW07-12
MW07-13	SRB SITE	SURFACE OF BEDROCK	50	19,755	19,800	DRY	18,088	17,434	No Sample	17,791	16,674	18,460	19,265	16,464	15,751	17,269	17,518	16,741	14,323	14,176	14,922	14,082	14,269	12,650	12,372	13,698	14,865	MW07-13
MW07-14	SRB SITE	SURFACE OF BEDROCK	40	2,675	2,584	No Sample	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MW07-14
MW07-15	SRB SITE	SURFACE OF BEDROCK	25	1,268	1,424	1,427	1,761	1,978	1,866	1,821	1,776	1,620	1,619	1,554	1,586	1,435	1,568	1,418	1,862	1,872	1,929	1,860	1,430	1,582	1,034	1,505	1,946	MW07-15
MW07-16	SRB SITE	SURFACE OF BEDROCK	15	2,863	3,759	4,039	3,030	3,183	3,125	3,050	2,648	2,590	2,983	2,836	2,765	2,386	2,505	DRY	DRY	2,854	2,655	2,626	2,380	2,077	1,994	2,239	2,275	MW07-16
MW07-17	SRB SITE	DEEPER BEDROCK	15	1,359	1,339	1,256	1,144	963	733	866	843	988	1,051	1,066	1,133	936	1,049	982	982	827	554	471	466	577	681	793	723	MW07-17
MW07-18	SRB SITE	SURFACE OF BEDROCK	10	12,076	10,907	12,320	10,551	7,660	8,079	9,144	9,062	10,859	9,857	9,452	8,221	8,931	9,323	9,994	11,382	6,558	6,286	6,771	7,228	5,884	7,227	5,746	6,059	MW07-18
MW07-19	SRB SITE	SURFACE OF BEDROCK	20	6,377	6,140	5,628	4,289	4,711	3,438	3,784	4,541	5,336	4,080	3,722	3,062	No Sample	4,732	3,322	2,091	2,985	3,655	3,746	2,824	3,225	3,452	3,142	4,025	MW07-19
MW07-20	SUPERIOR PROPANE PROPERTY	SURFACE OF BEDROCK	90	1,095	1,032	1,060	1,047	991	1,060	961	1,009	991	975	985	991	845	989	918	837	896	809	860	797	768	788	766	845	MW07-20
MW07-21	SUPERIOR PROPANE PROPERTY	SURFACE OF BEDROCK	110	1,885	1,645	1,783	1,480	1,381	1,372	1,440	1,618	1,778	1,821	1,732	1,599	1,437	1,640	1,354	1,513	818	1,158	1,051	1,079	1,081	655	977	No Sample	MW07-21
MW07-22	SRB SITE	SURFACE OF BEDROCK	70	1,085	1,087	860	1,095	1,138	1,134	1,124	1,200	1,272	1,327	1,257	1,212	1,228	1,129	1,156	1,190	1,017	1,055	1,056	1,081	876	1,160	1,143	1,316	MW07-22
MW07-23	SRB SITE	SURFACE OF BEDROCK	90	2,814	2,745	2,451	2,774	2,645	2,723	2,735	2,553	2,689	2,745	2,727	2,585	DRY	2,634	2,524	2,559	2,545	2,376	2,392	2,131	1,898	2,247	2,214	2,303	MW07-23
MW07-24	HARRINGTON PROPERTY	SURFACE OF BEDROCK	115	2,183	2,297	2,319	2,473	2,435	2,436	2,408	2,647	2,487	2,523	2,319	2,432	2,310	No Sample	2,441	2,411	2,345	2,334	2,329	2,135	1,876	2,115	2,127	2,308	MW07-24
MW07-25	HARRINGTON PROPERTY	SURFACE OF BEDROCK	105	1,020	1,071	1,523	919	741	840	983	1,166	1,049	635	1,270	827	669	1,346	1,154	1,071	936	862	830	881	837	1,318	N/A	N/A	MW07-25
MW07-26	SRB SITE	SURFACE OF BEDROCK	50	2,932	2,935	2,772	1,371	2,167	2,938	2,849	2,846	2,868	2,797	2,596	2,561	2,360	DRY	DRY	1,921	1,232	2,077	2,334	2,109	1,815	2,074	2,090	2,229	MW07-26
MW07-27	CITY PROPERTY	SURFACE OF BEDROCK	55	DRY	5,502	4,805	5,731	5,786	6,107	6,051	6,015	6,093	5,830	5,784	5,825	5,344	5,528	DRY	5,315	5,336	5,181	5,375	4,790	3,993	4,888	4,827	5,037	MW07-27
MW07-28	CITY PROPERTY	DEEPER BEDROCK	55	2,417	2,328	1,782	2,616	2,455	2,639	2,672	2,041	1,776	2,355	2,025	2,342	1,435	1,581	1,249	1,097	1,595	1,624	1,414	1,366	1,673	1,865	1,257	1,812	MW07-28
MW07-29	SRB SITE	DEEPER BEDROCK	10	4,840	5,404	5,931	5,929	5,541	3,859	3,691	6,566	6,572	7,998	6,002	5,432	6,423	6,141	7,209	7,971	2,799	3,954	4,459	4,826	3,911	4,584	3,270	4,676	MW07-29
MW07-30	SRB SITE	DEEPER BEDROCK	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MW07-30
MW07-31	SRB SITE	DEEPER BEDROCK	70	1,261	1,500	1,129	1,020	224	734	1,067	1,139	1,304	1,313	1,176	914	751	738	584	434	127	192	210	525	686	629	223	206	MW07-31
MW07-32	HARRINGTON PROPERTY	DEEPER BEDROCK	115	350	478	389	342	<108	<107	<119	109	184	300	312	331	280	299	268	289	<107	<105	<102	<100	95	<96	<96	<81	MW07-32
MW07-33	HARRINGTON PROPERTY	DEEPER BEDROCK	105	550	649	561	668	509	703	536	615	434	602	409	565	491	600	552	548	463	554	582	520	358	466	N/A	N/A	MW07-33
MW07-34	SRB SITE	SHALLOW BEDROCK	10	4,894	4,353	3,970	4,125	4,364	5,007	4,577	4,778	4,350	5,084	5,090	4,790	3,625	3,568	2,815	3,341	3,563	3,889	3,663	3,621	3,004	3,734	3,340	3,469	MW07-34
MW07-35	CITY PROPERTY	SHALLOW BEDROCK	55	4,696	4,395	3,997	4,239	4,801	4,964	4,938	4,722	4,399	4,789	4,472	4,658	4,241	4,688	4,319	4,363	4,248	4,252	4,441	4,012	3,289	3,827	3,974	3,847	MW07-35
MW07-36	CITY PROPERTY	SHALLOW BEDROCK	80	5,067	5,219	4,501	4,552	3,052	2,871	3,436	3,774	3,955	4,317	4,252	4,040	3,683	3,881	3,175	4,279	2,845	2,387	2,551	3,077	2,931	3,268	2,298	3,259	MW07-36
MW07-37	SRB SITE	SHALLOW BEDROCK	60	1,483	1,401	1,352	1,303	1,131	1,121	1,065	1,090	1,146	1,413	1,404	1,364	1,354	1,377	1,287	1,277	935	895	944	960	906	1,021	1,113	1,094	MW07-37
CN-1S	CN PROPERTY		125			683				755				DRY				DRY				469				586		CN-1S
CN-1D	CN PROPERTY		130			DRY				739				DRY				DRY				526				532		CN-1D
CN-2	CN PROPERTY		150			655				336				953				824				814				844		CN-2
CN-3S	CN PROPERTY		165			DRY				495				296				DRY				DRY				DRY		CN-3S
CN-3D	CN PROPERTY		160			DRY				494				729				DRY				396				471		CN-3D
RW-1	413 BOUNDARY ROAD		465			No Sample				N/A				N/A				N/A				N/A				N/A		RW-1
RW-2	185 MUD LAKE ROAD		1,100			124				115				103				No Sample	92			97				87		RW-2
RW-3	183 MUD LAKE ROAD		1,100			127				110				114				99				89				109		RW-3
RW-4	711 BRUHAM AVENUE		2,200			No Sample				N/A				N/A				N/A				N/A				N/A		RW-4
RW-5	171 SAWMILL ROAD		2,300			11				10				15				12				13				12		RW-5
RW-6	40987 HWY 41		1,400			28				27				25.0				20				19				21		RW-6
RW-7	40925 HWY 41		1,600			5				6				6				No Sample	4			7				4		RW-7
RW-8	204 BOUNDARY ROAD		700			224				209				226				214				201				236		RW-8
RW-9	206 BOUNDARY ROAD		650			190				10				66				95				81				45		RW-9
RW-10	208 BOUNDARY ROAD		625			4				4				4				3				<4				<3		RW-10
RW-11	200 MUD LAKE ROAD		794			N/A				N/A				N/A				N/A				N/A				N/A		RW-11
RW-12	202 MUD LAKE ROAD		753			14				40				10				3				<4.6				4		RW-12
B-1	SUPERIOR PROPANE OFFICE		160			966				1,101				1,029				798				867				959		B-1
B-2	SUPERIOR PROPANE TRUCK WASH		250			1,830				1,457				1,562				1,434				1,190				1,089		B-2
B-3	INTERNATIONAL LUMBER OFFICE		385			4				4				4				3				<4				<3		B-3

APPENDIX K

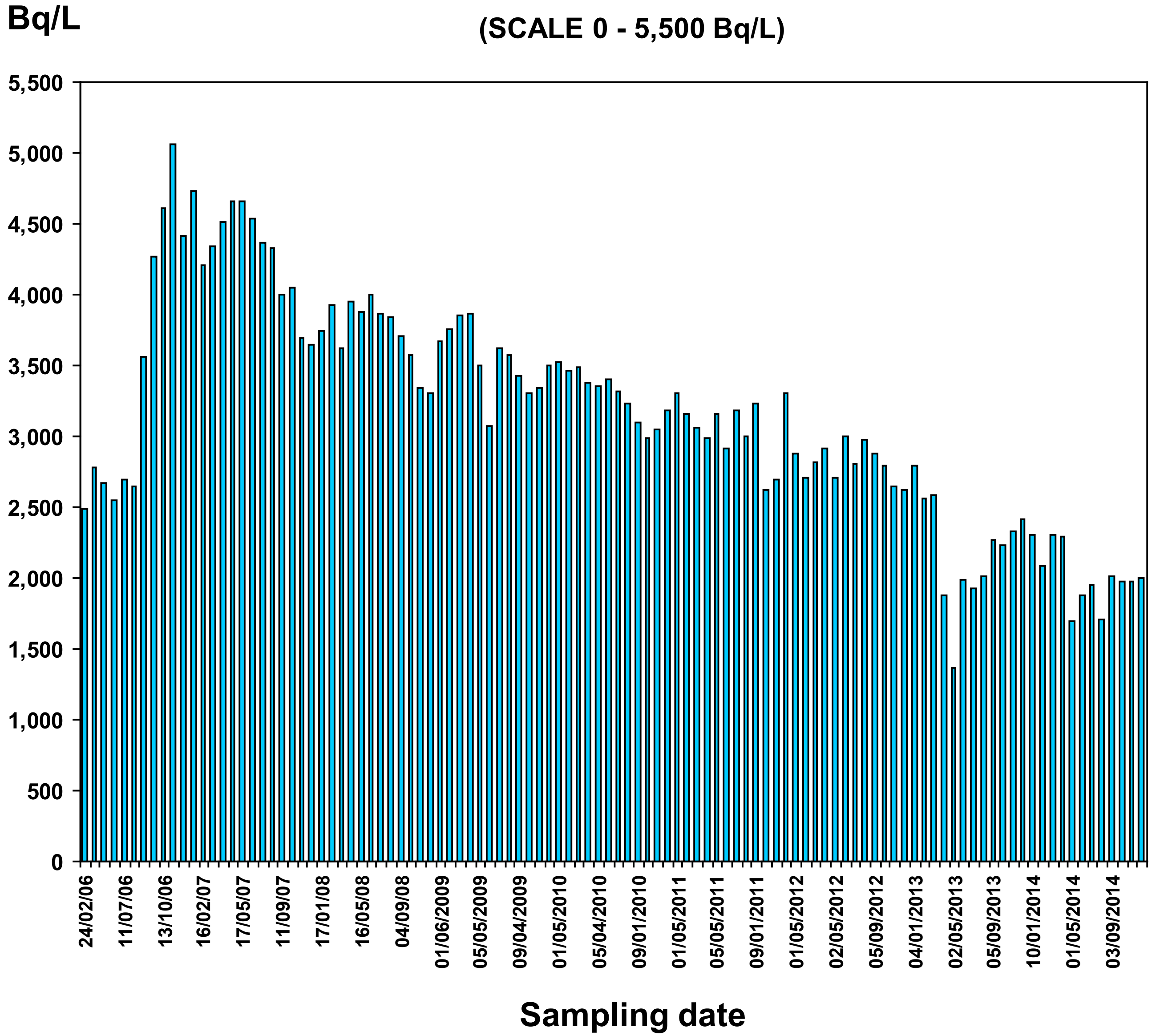


MONITORING RESULTS
MW06-1
(SCALE 0 - 70,000 Bq/L)
Bq/L
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
24/02/06
07/11/2006
13/10/06
16/02/07
17/05/07
09/11/2007
17/01/08
16/05/08
04/09/08
01/06/2009
05/05/2009
09/04/2009
01/05/2010
05/04/2010
09/01/2010
01/05/2011
05/05/2011
09/01/2011
01/05/2012
05/02/2012
03/10/2012
04/02/2013
04/06/2013
02/10/2013
04/02/2014
04/06/2014
02/10/2014
Sampling date

APPENDIX K

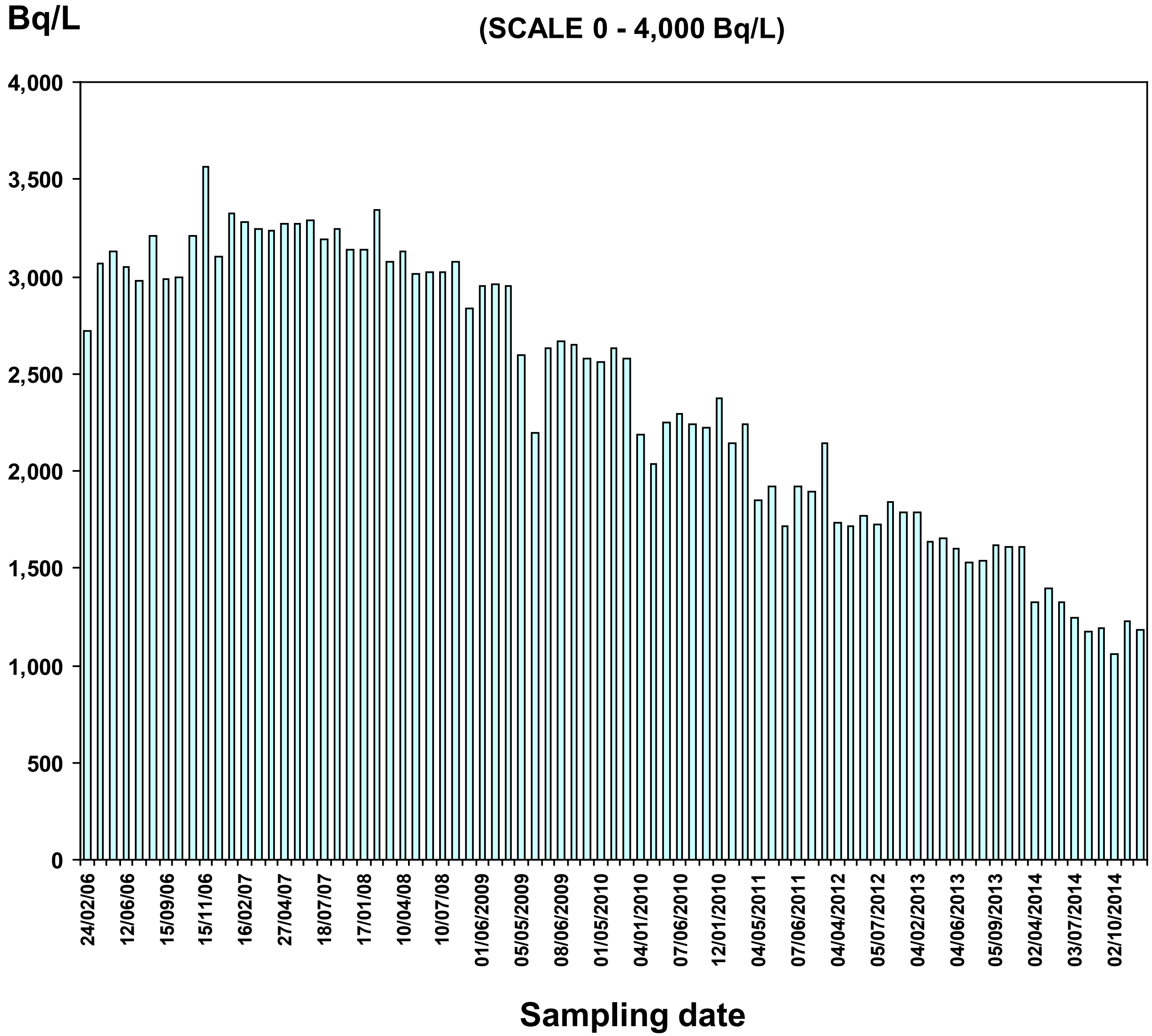
MONITORING RESULTS
MW06-2

(SCALE 0 - 5,500 Bq/L)



APPENDIX K

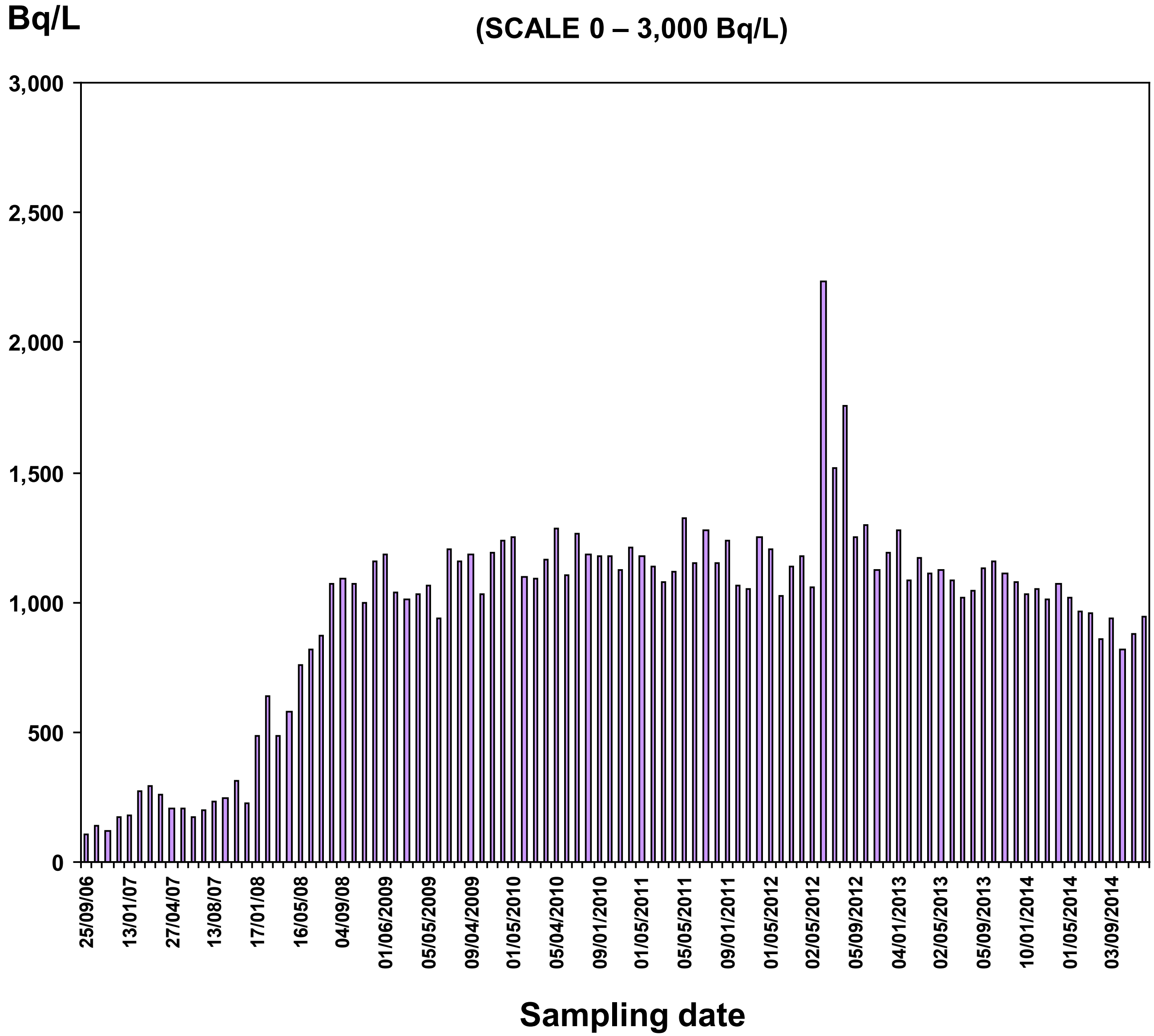
MONITORING RESULTS
MW06-3



APPENDIX K

MONITORING RESULTS
MW06-8

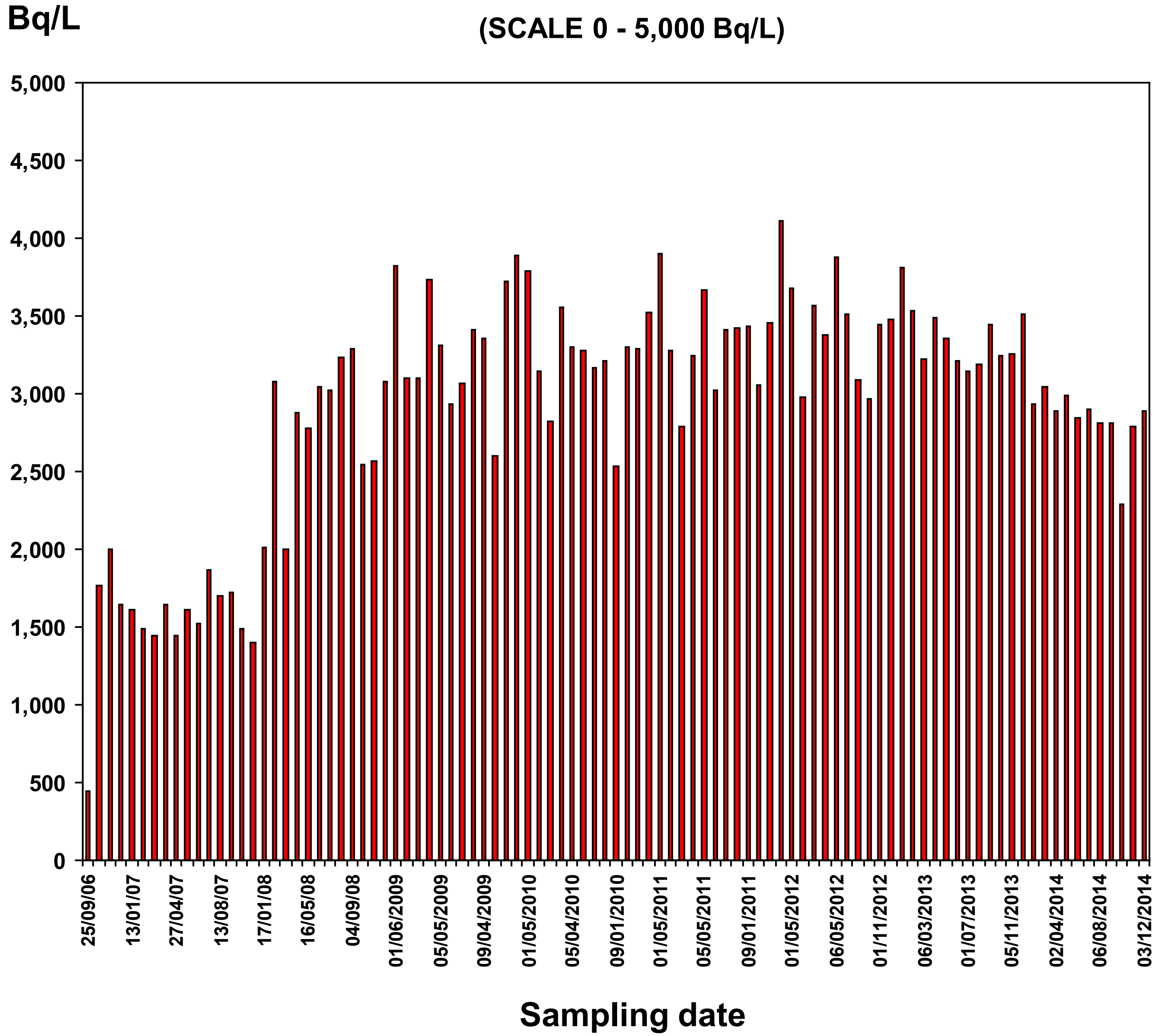
(SCALE 0 – 3,000 Bq/L)



APPENDIX K

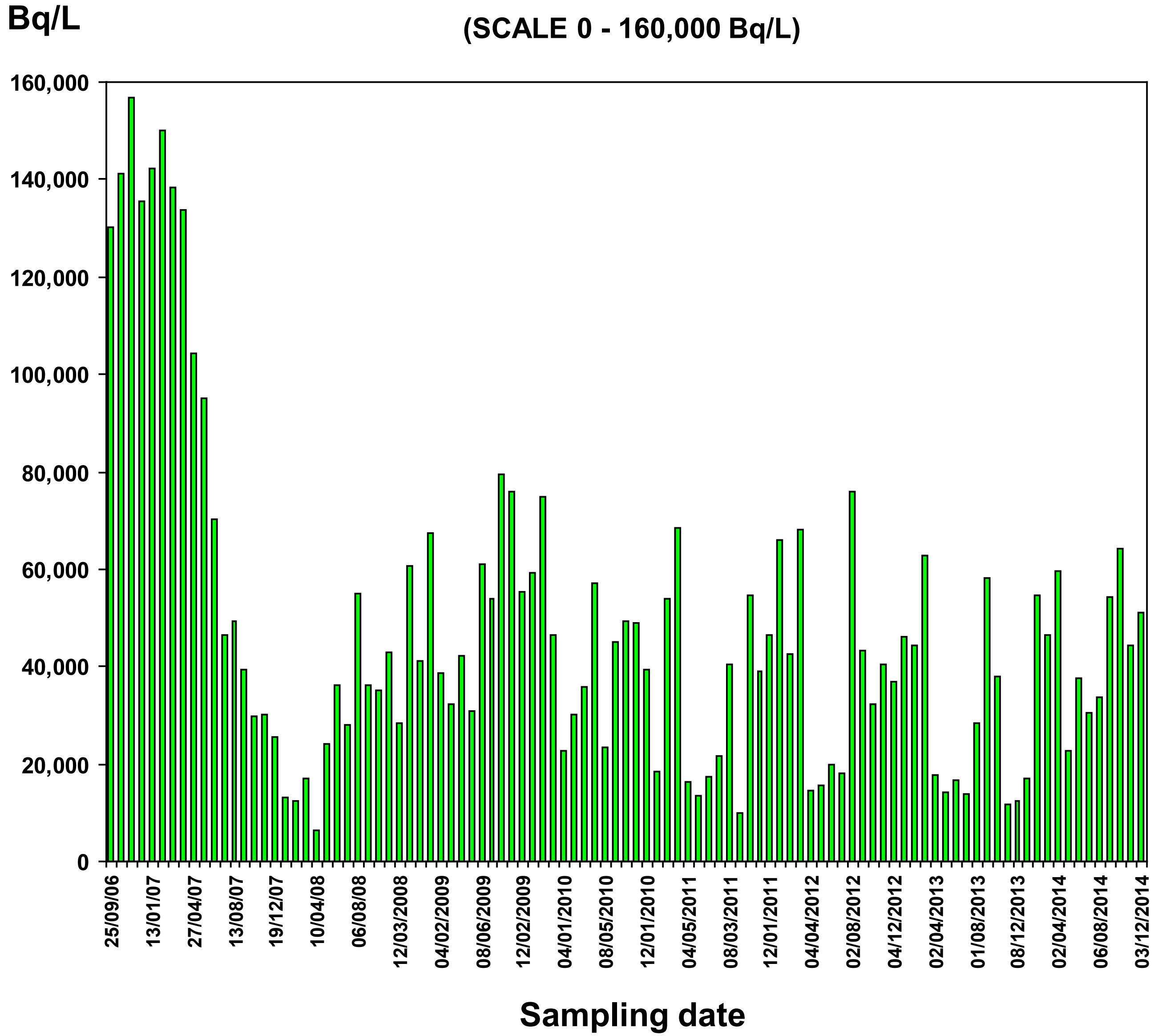
MONITORING RESULTS
MW06-9

(SCALE 0 - 5,000 Bq/L)



APPENDIX K

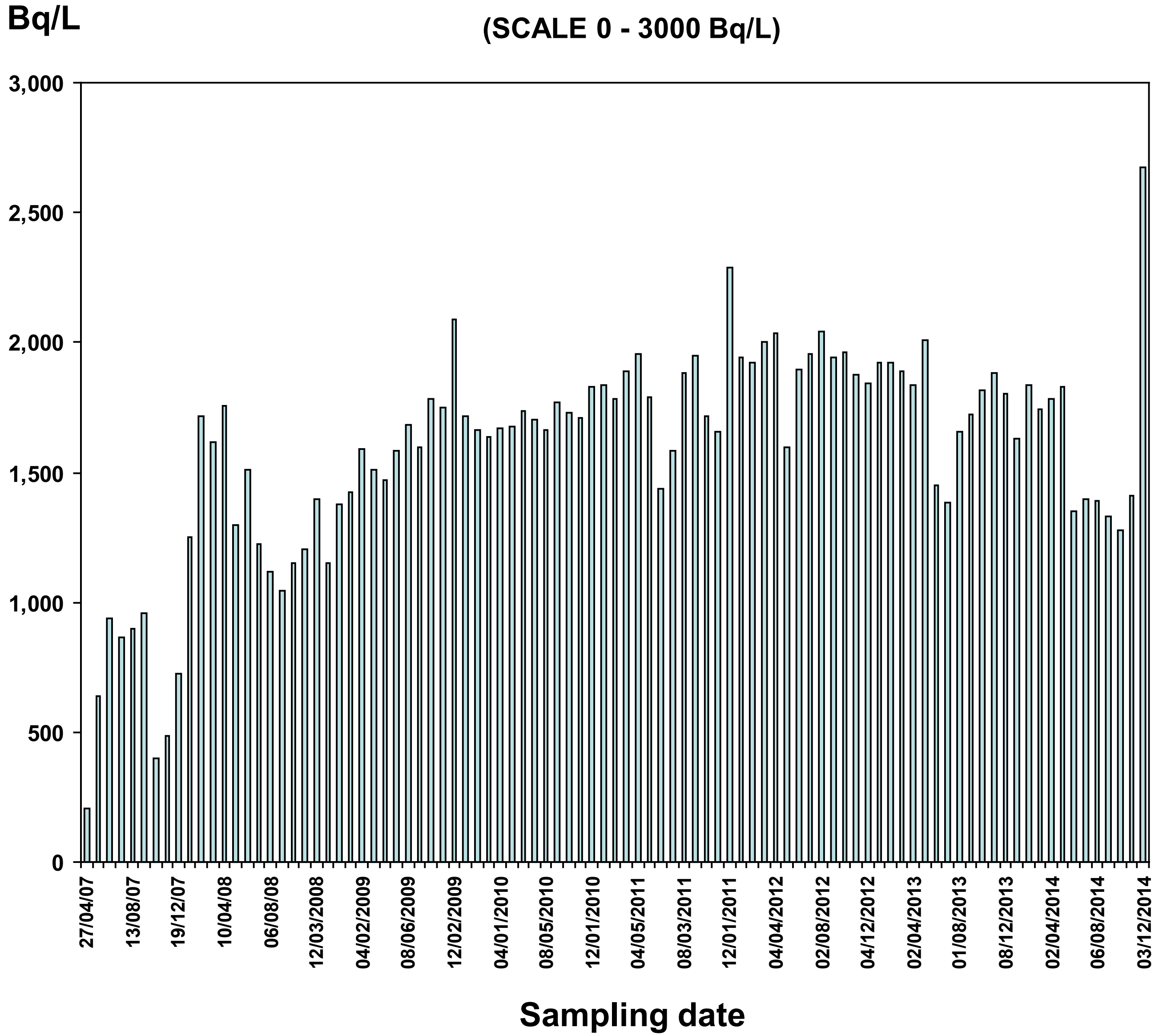
MONITORING RESULTS
MW06-10
(SCALE 0 - 160,000 Bq/L)



APPENDIX K

MONITORING RESULTS
MW07-11

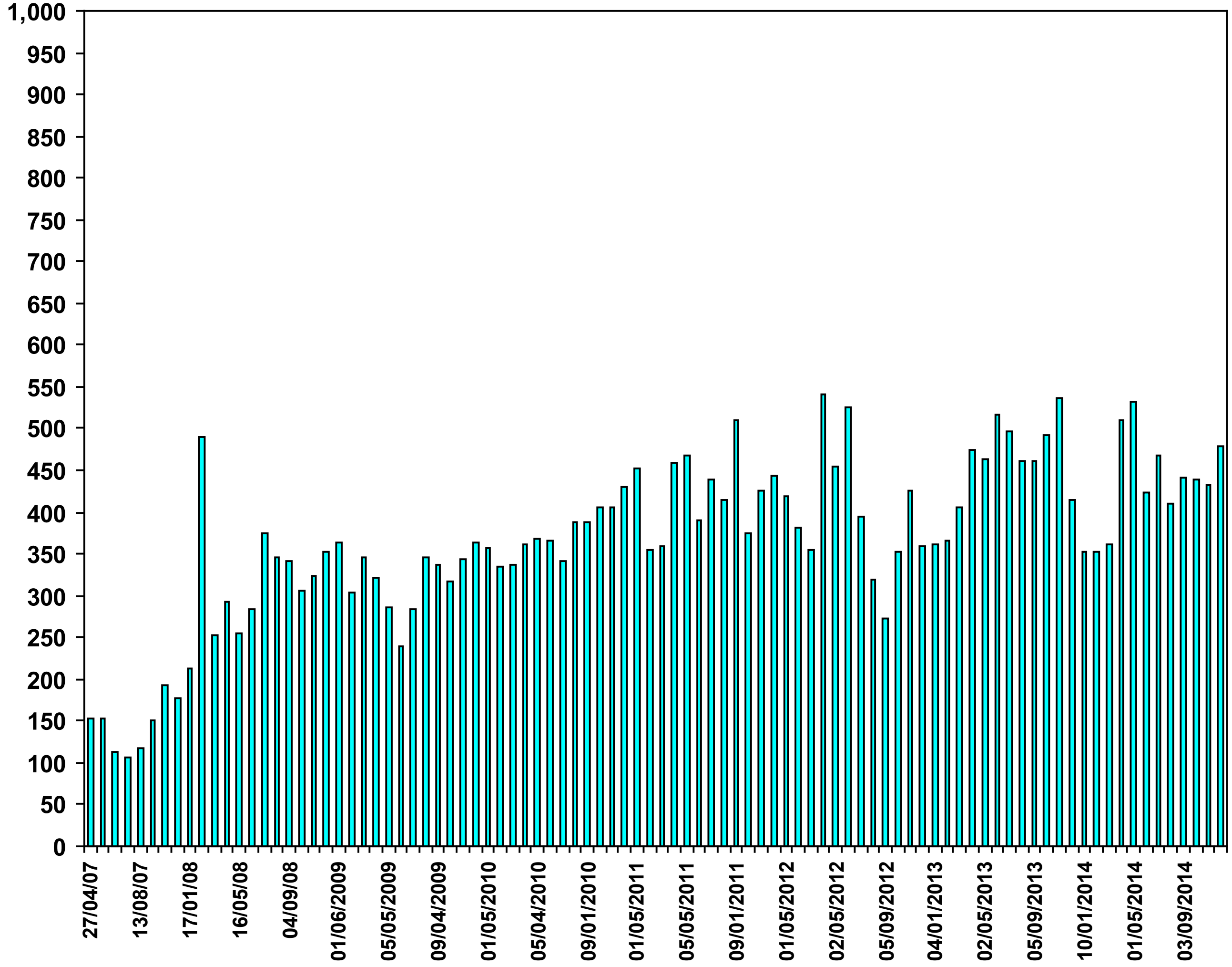
(SCALE 0 - 3000 Bq/L)



MONITORING RESULTS
MW07-12

Bq/L

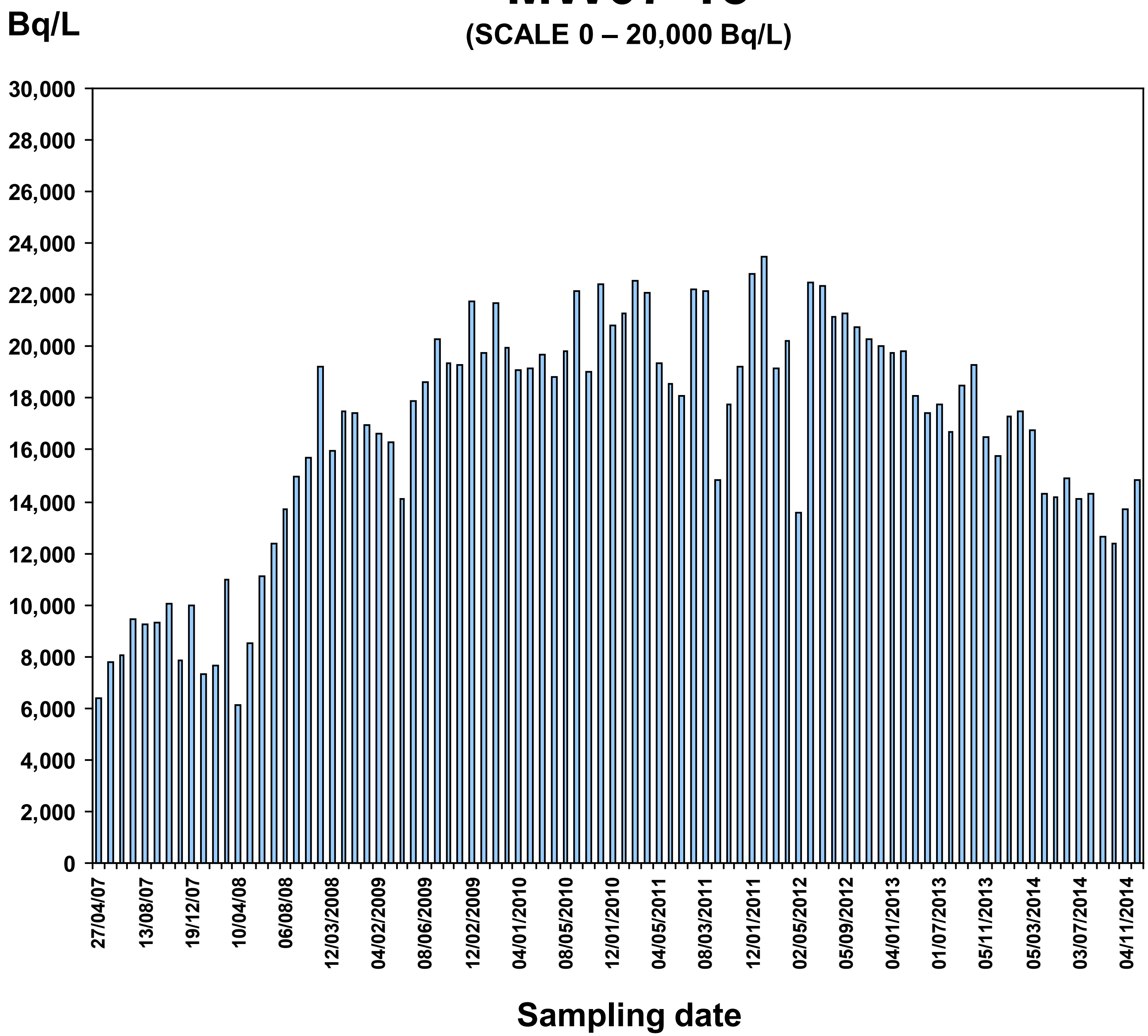
(SCALE 0 – 1,000 Bq/L)



Sampling date

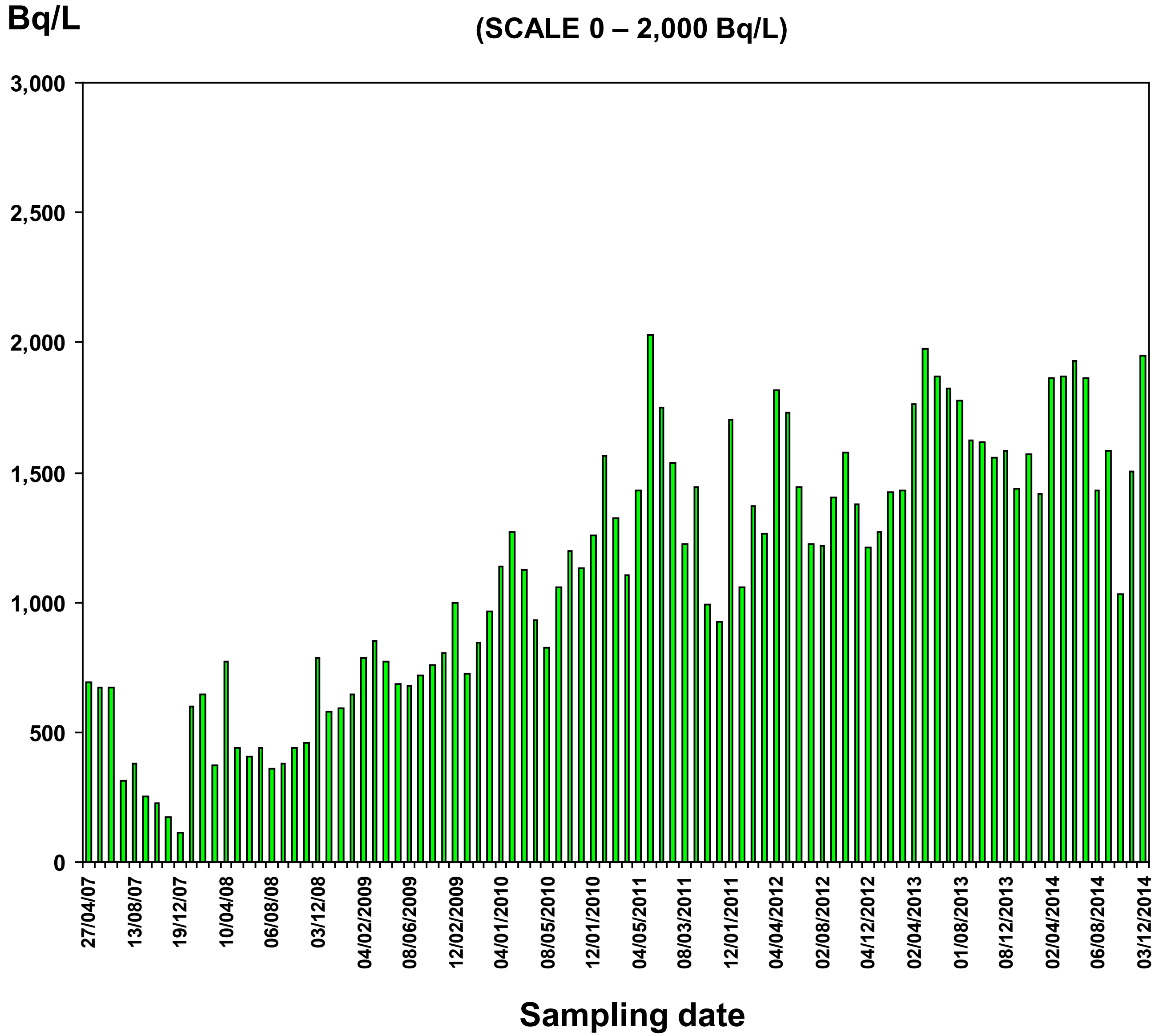
MONITORING RESULTS
MW07-13

(SCALE 0 – 20,000 Bq/L)



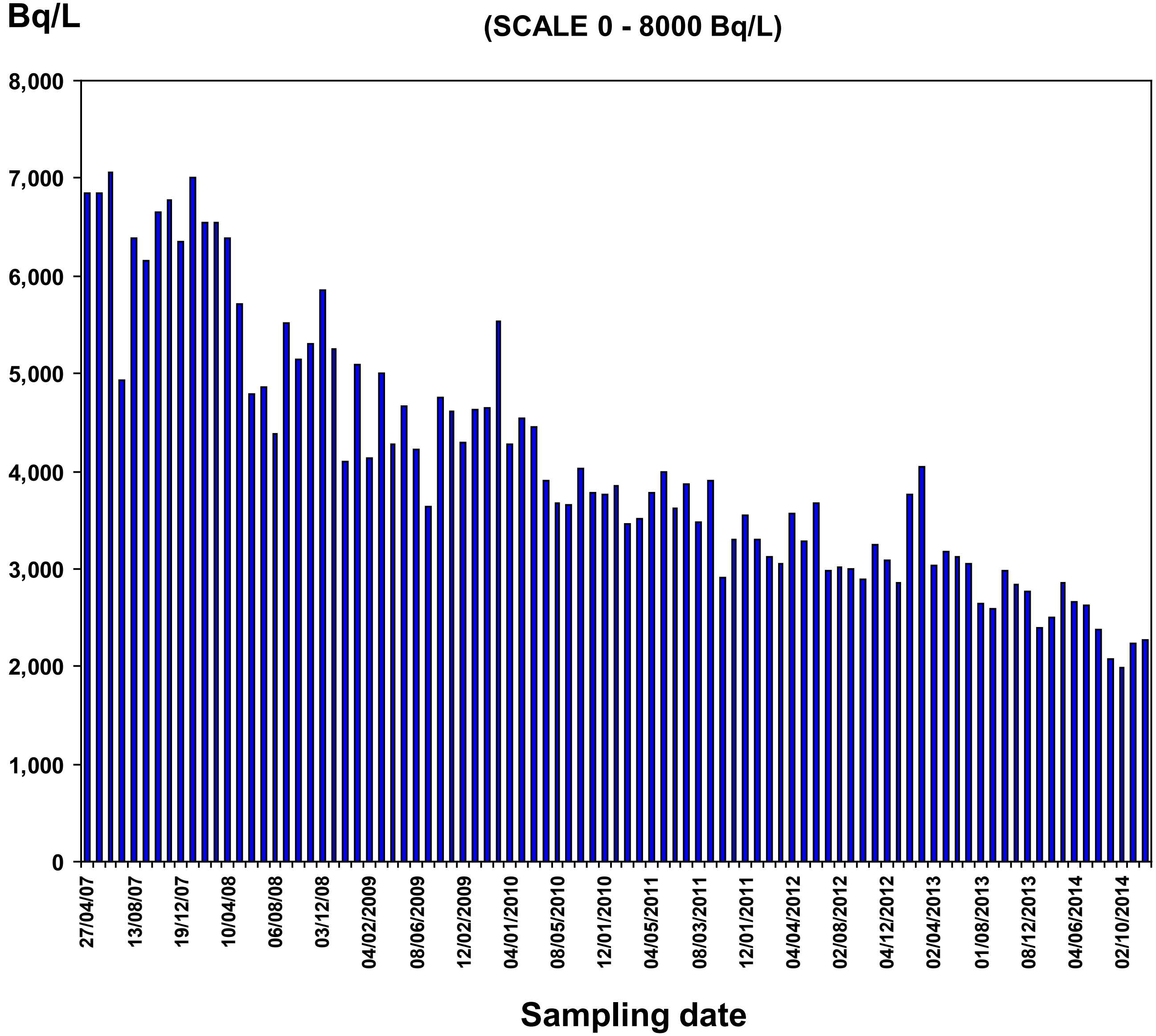
APPENDIX K

MONITORING RESULTS
MW07-15



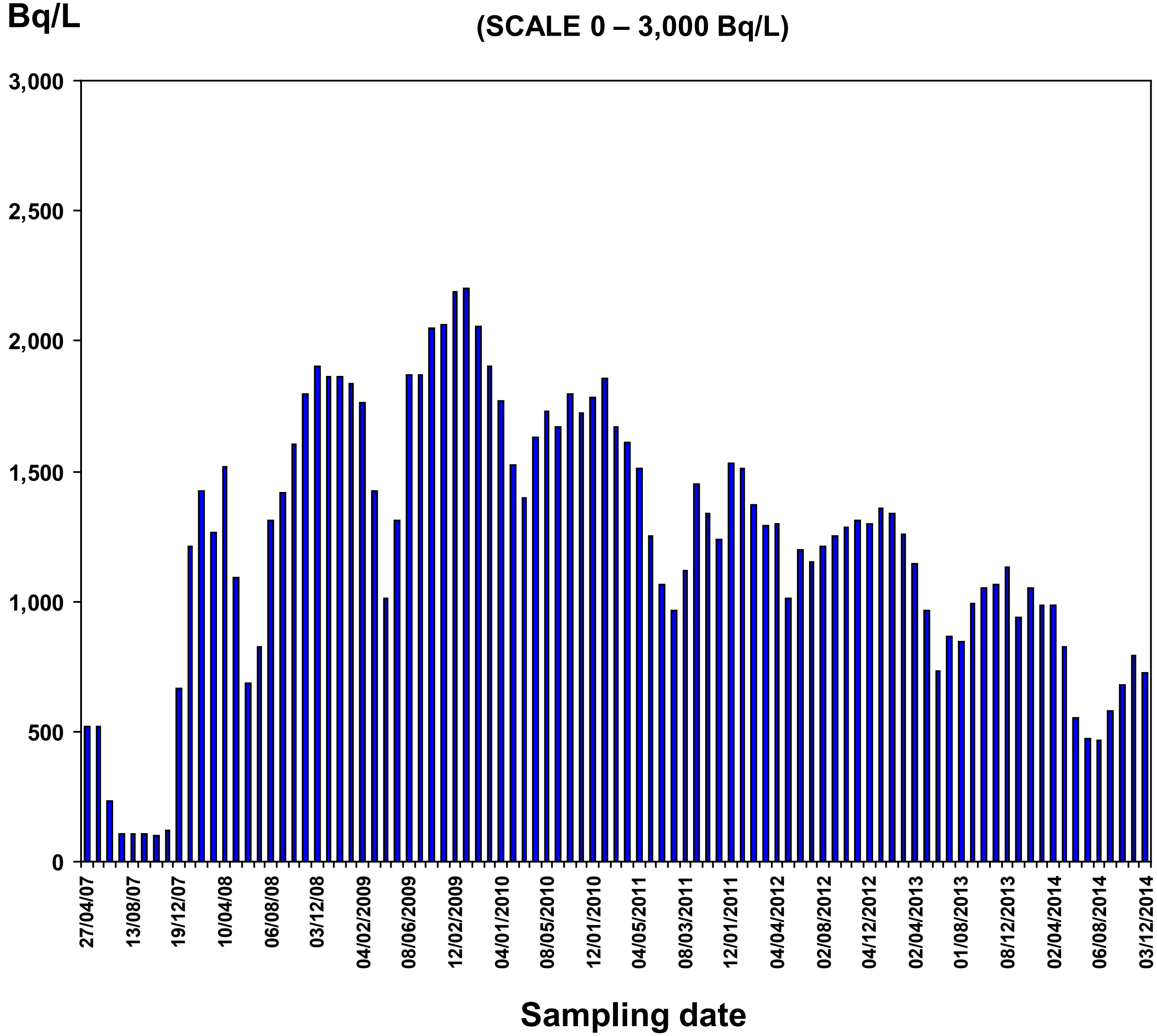
APPENDIX K

MONITORING RESULTS
MW07-16



APPENDIX K

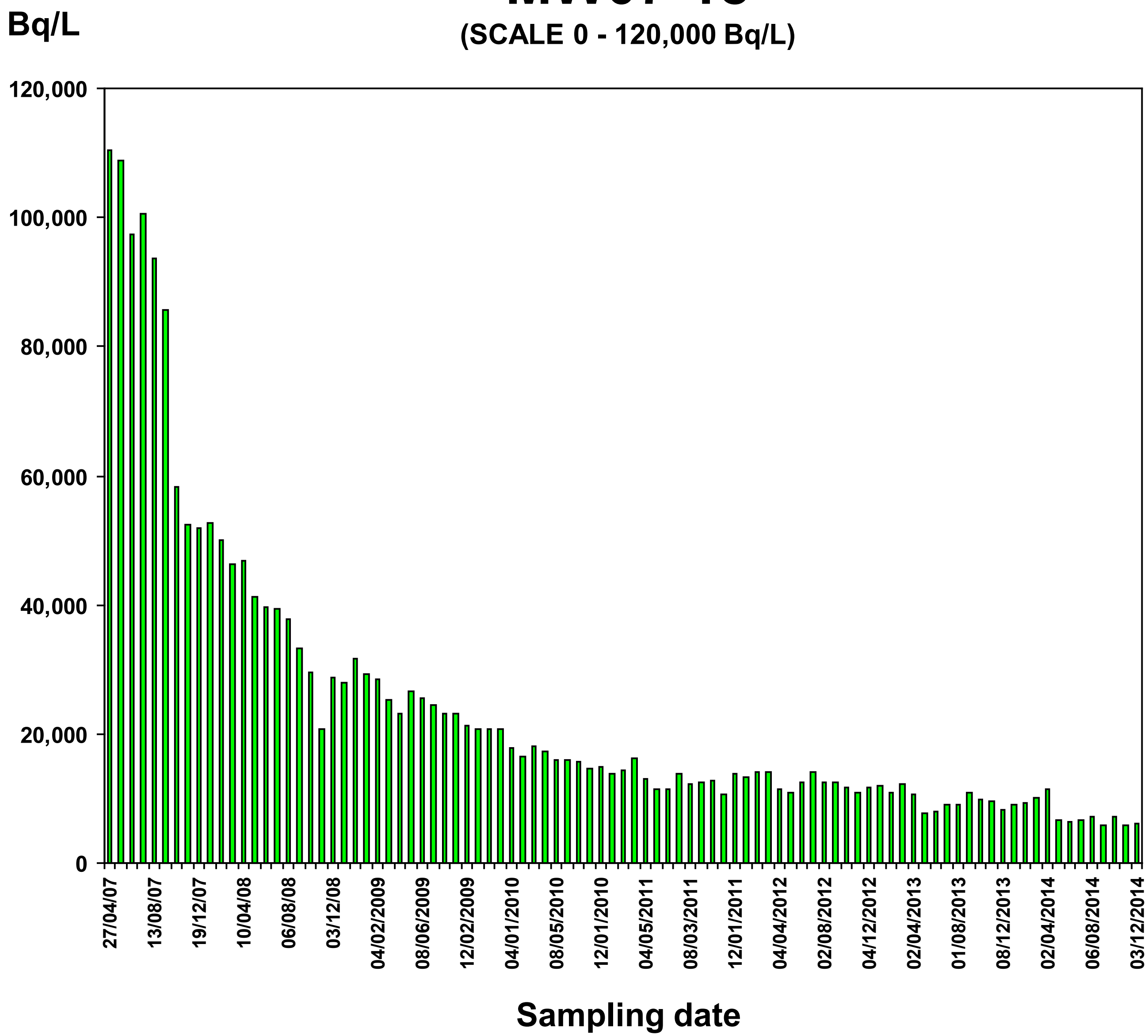
MONITORING RESULTS
MW07-17



APPENDIX K

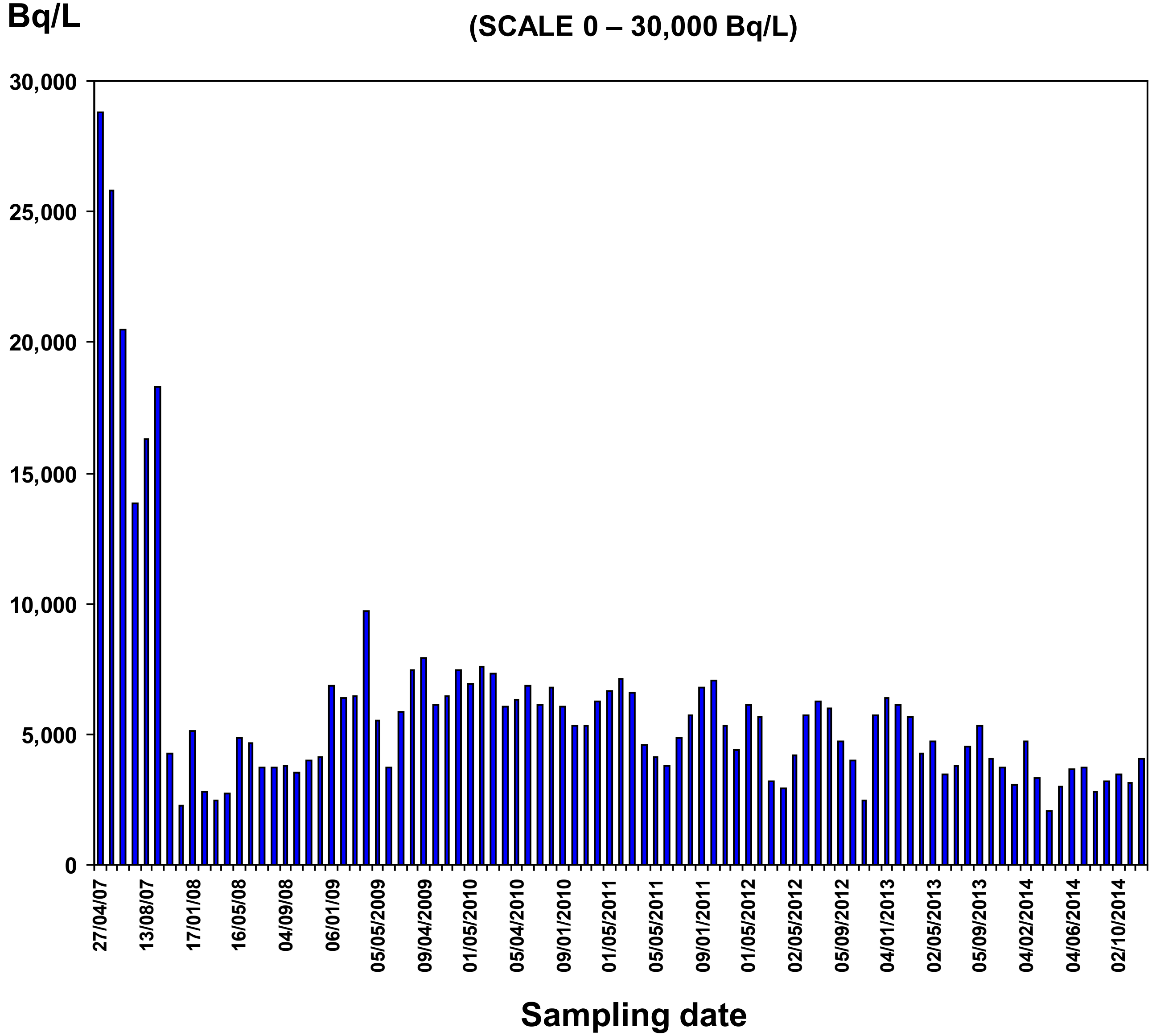
MONITORING RESULTS
MW07-18

(SCALE 0 - 120,000 Bq/L)



APPENDIX K

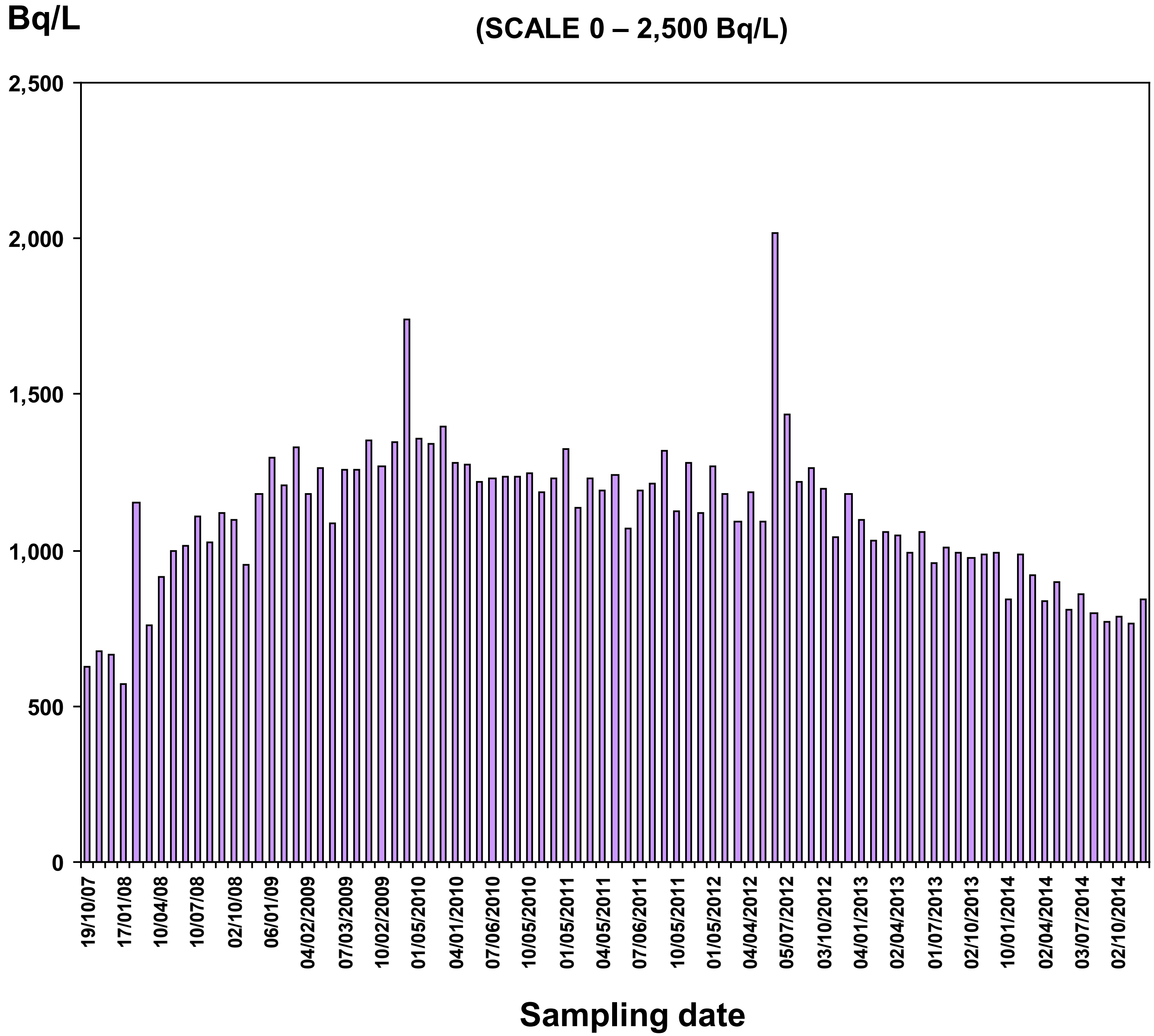
MONITORING RESULTS
MW07-19



APPENDIX K

MONITORING RESULTS
MW07-20

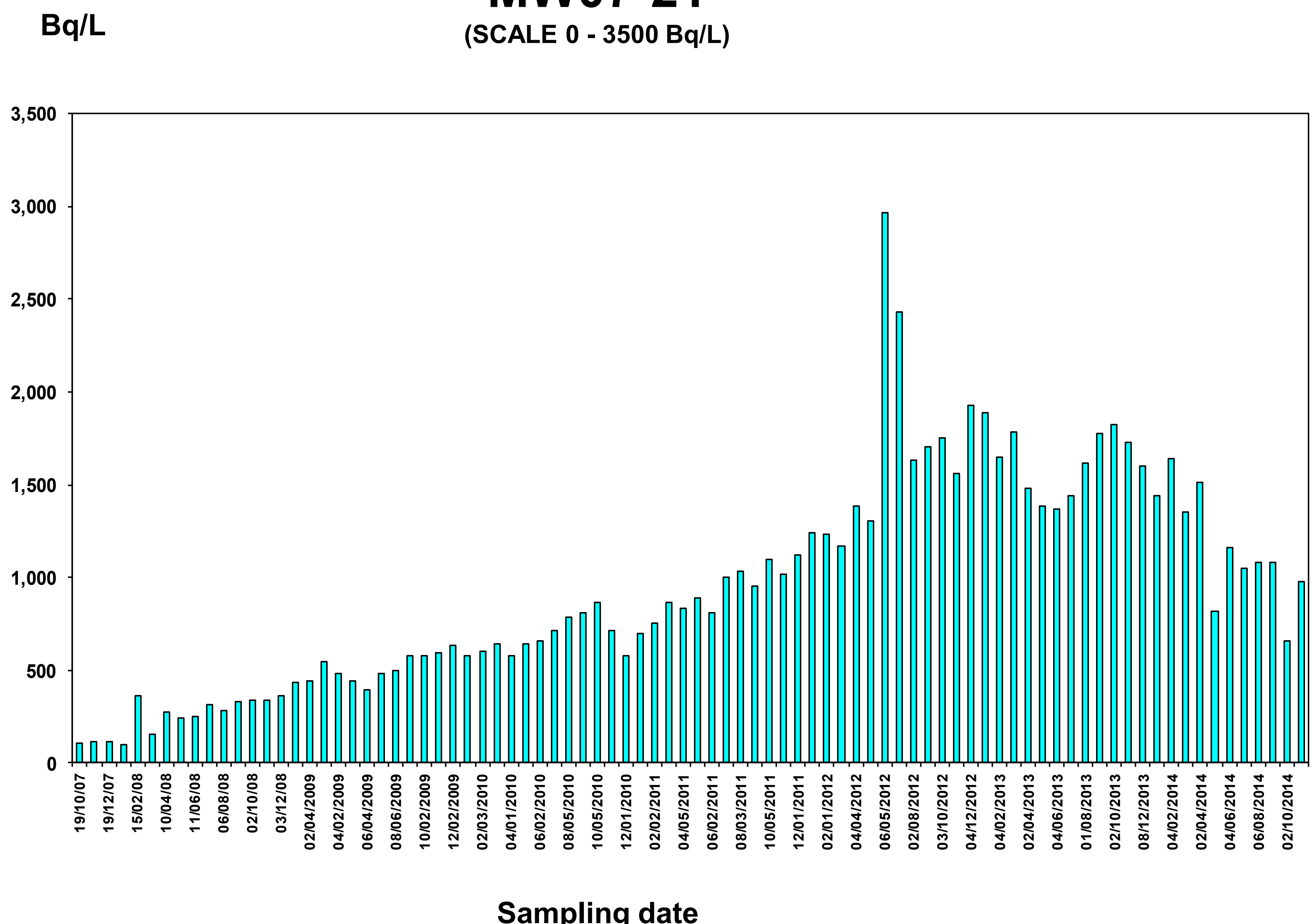
(SCALE 0 – 2,500 Bq/L)



APPENDIX K

MONITORING RESULTS
MW07-21

(SCALE 0 - 3500 Bq/L)

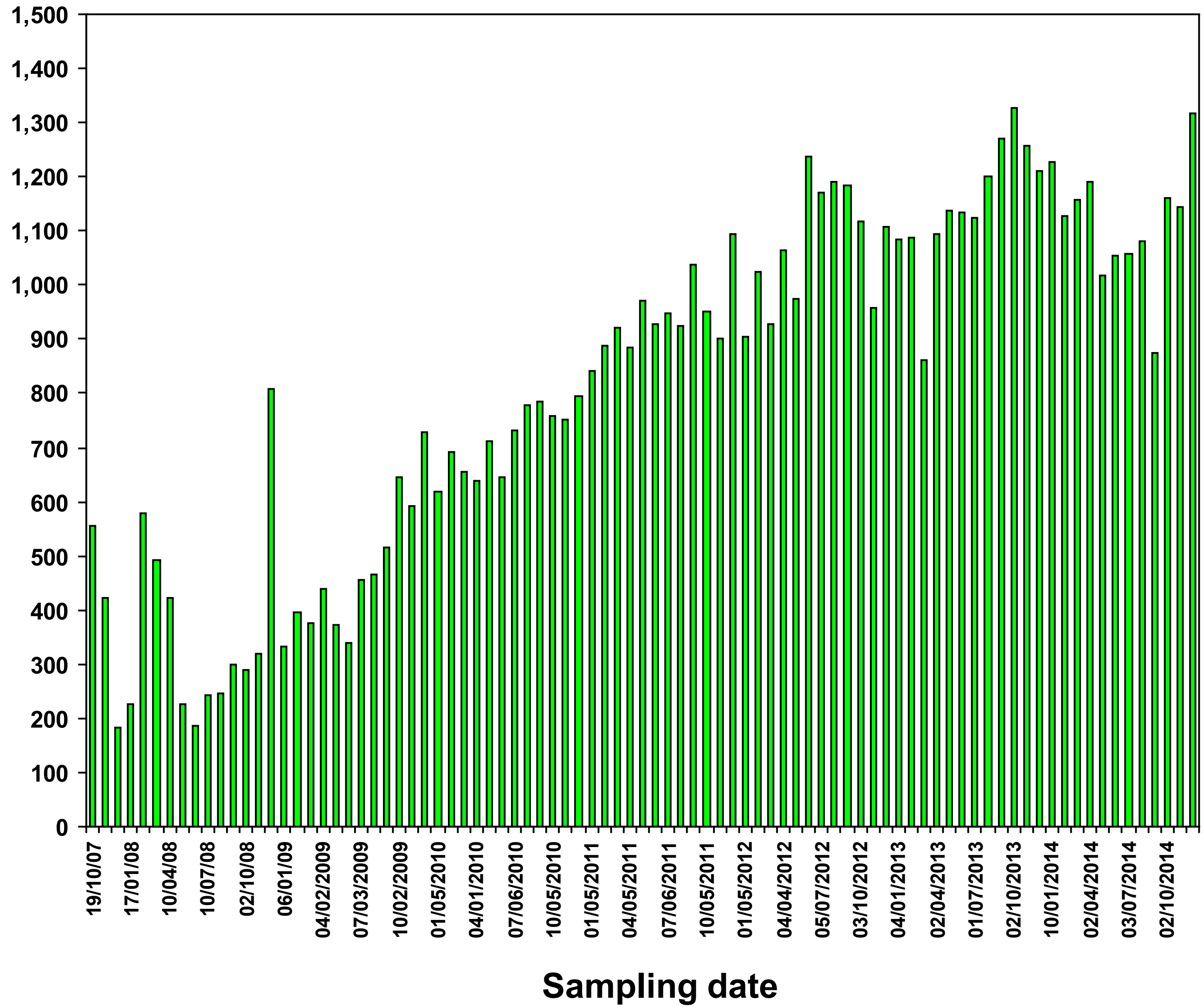


APPENDIX K

MONITORING RESULTS
MW07-22

Bq/L

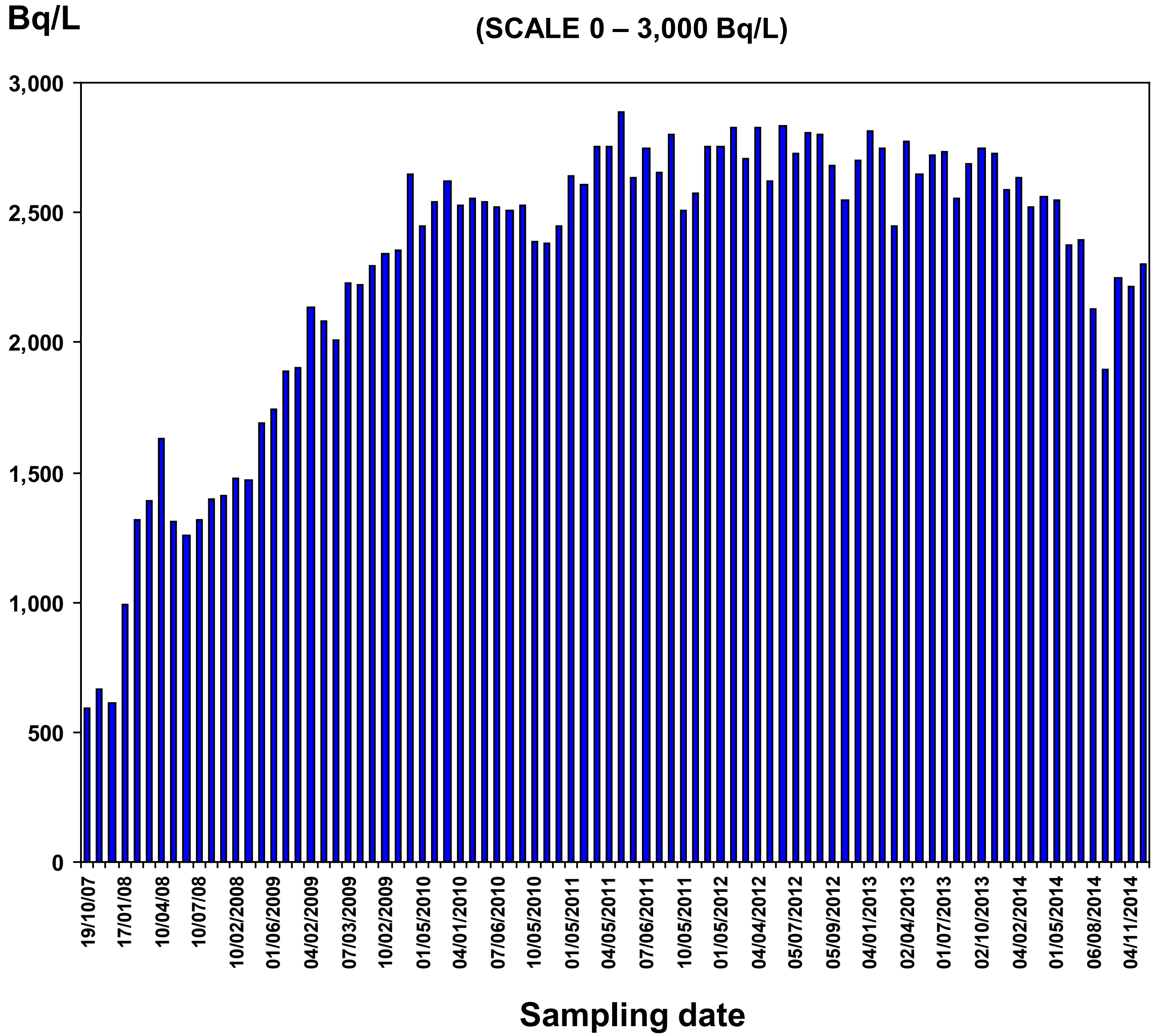
(SCALE 0 – 1,500 Bq/L)



APPENDIX K

MONITORING RESULTS
MW07-23

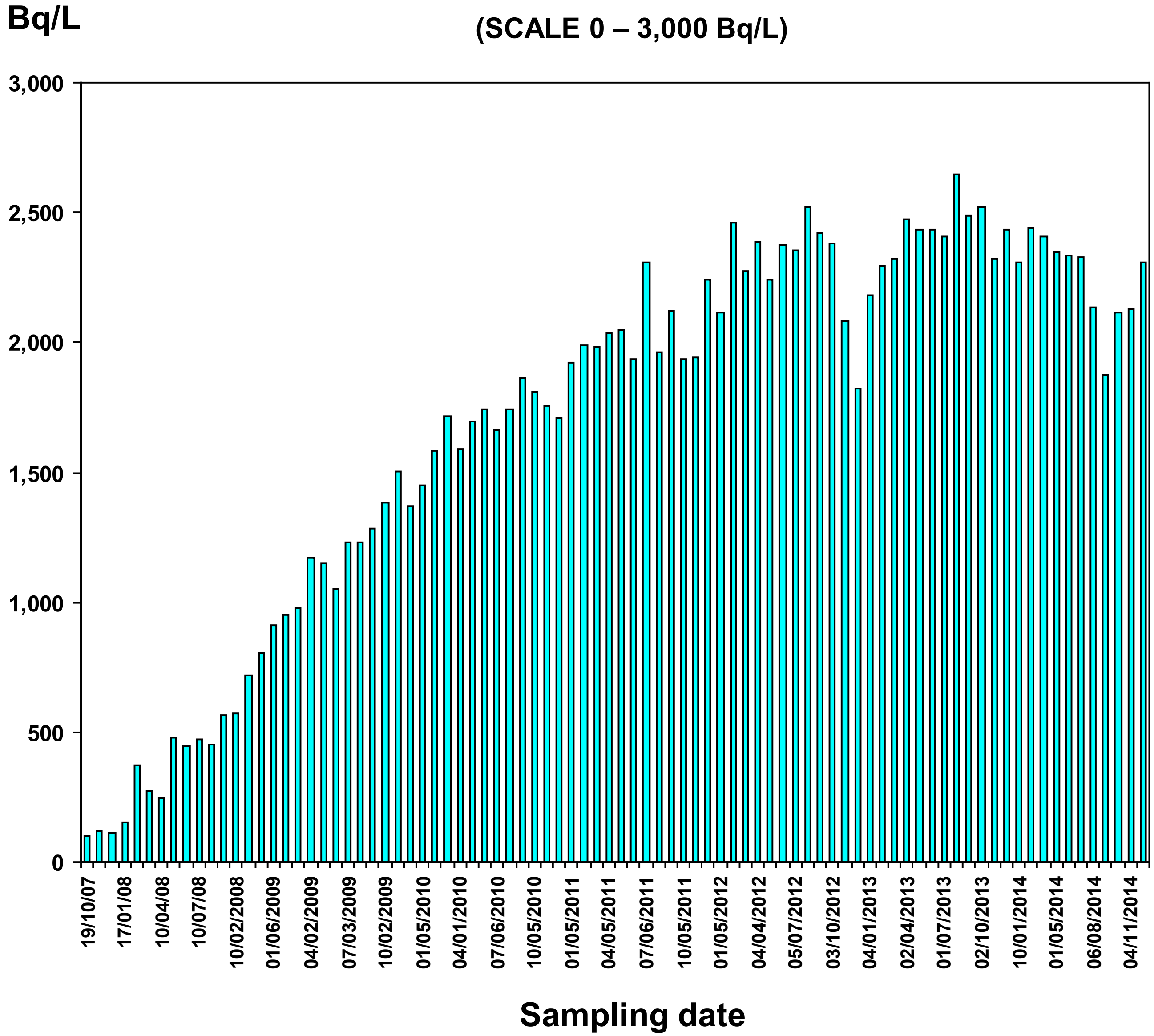
(SCALE 0 – 3,000 Bq/L)



APPENDIX K

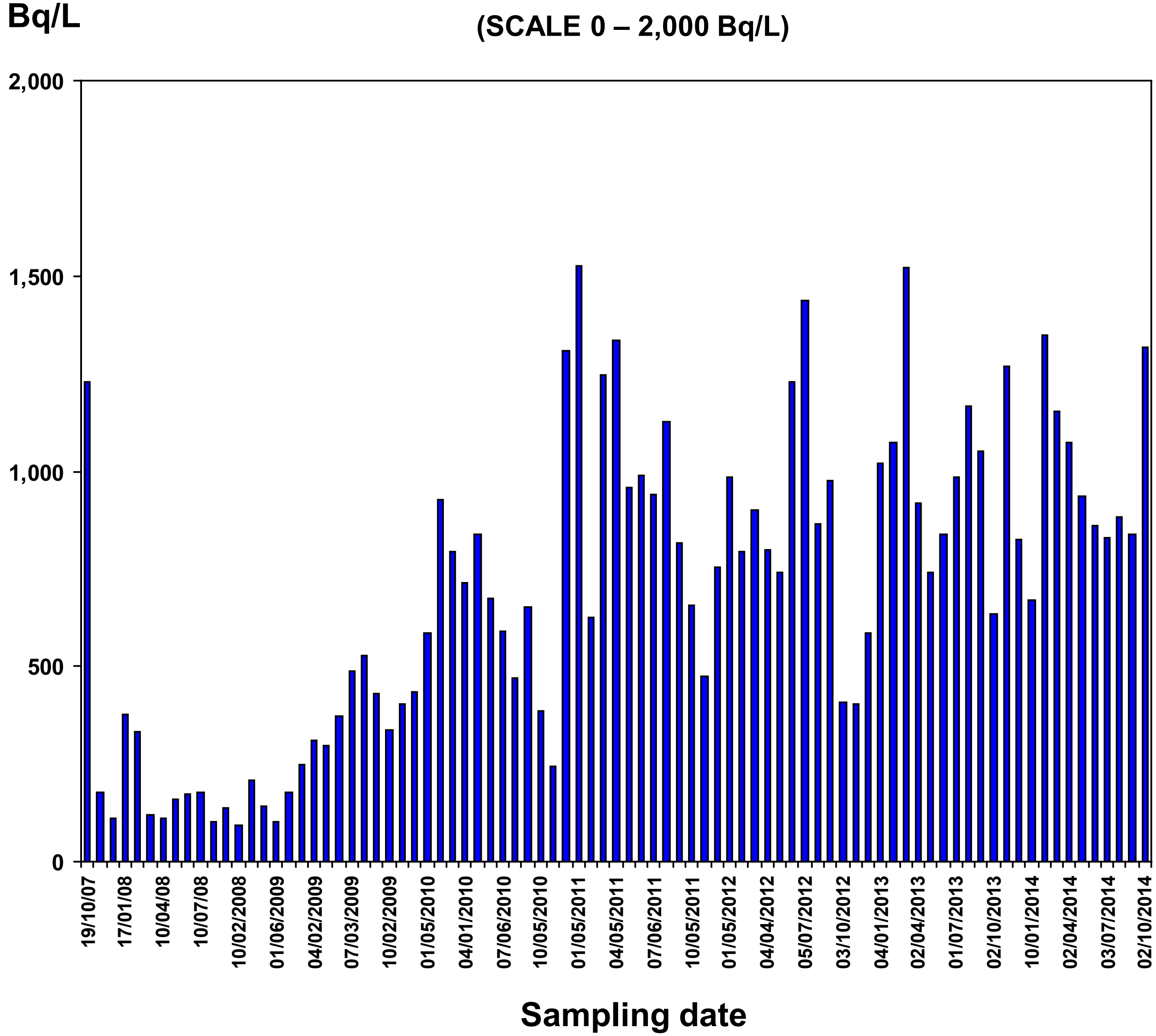
MONITORING RESULTS
MW07-24

(SCALE 0 – 3,000 Bq/L)



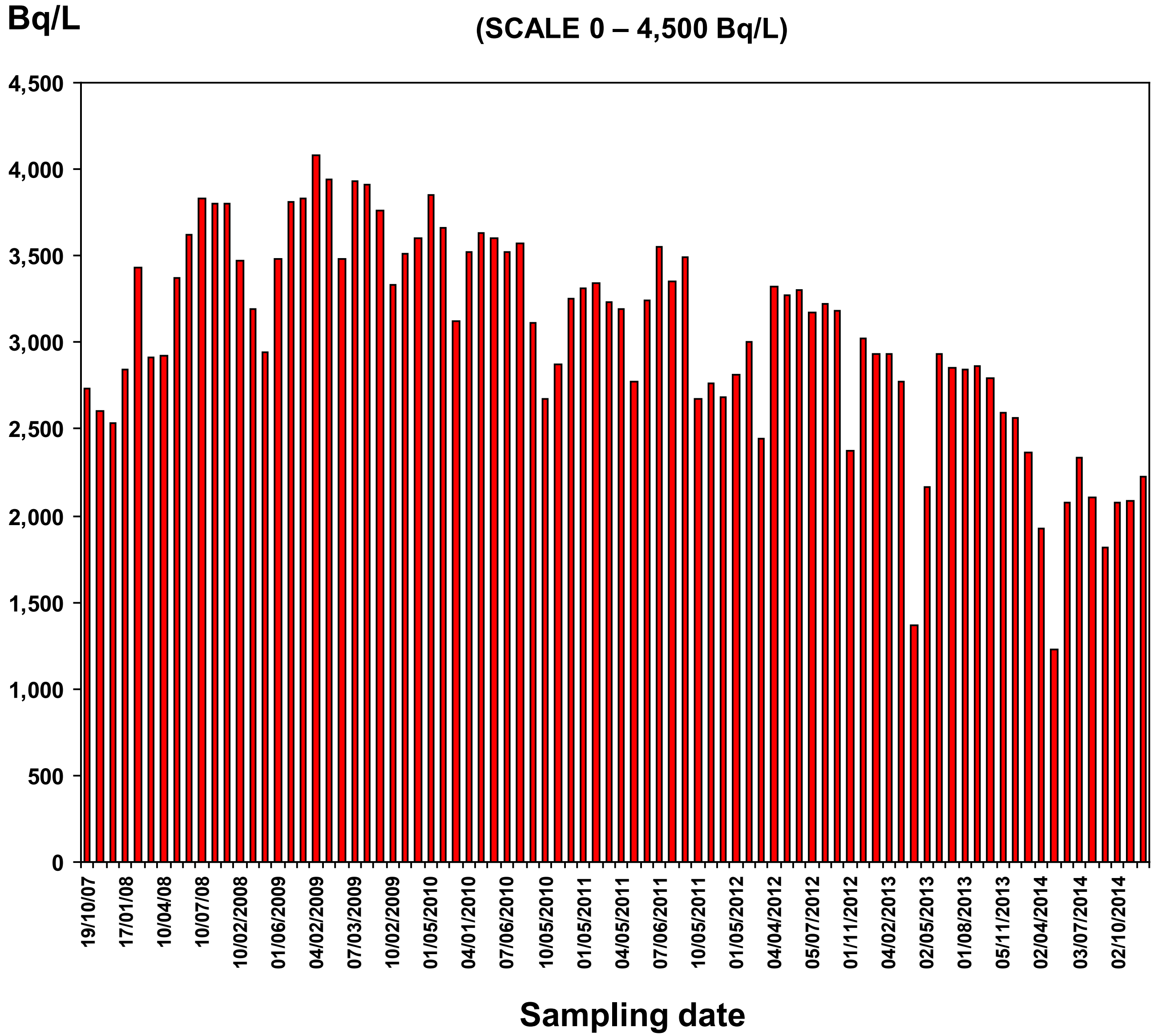
APPENDIX K

MONITORING RESULTS
MW07-25



APPENDIX K

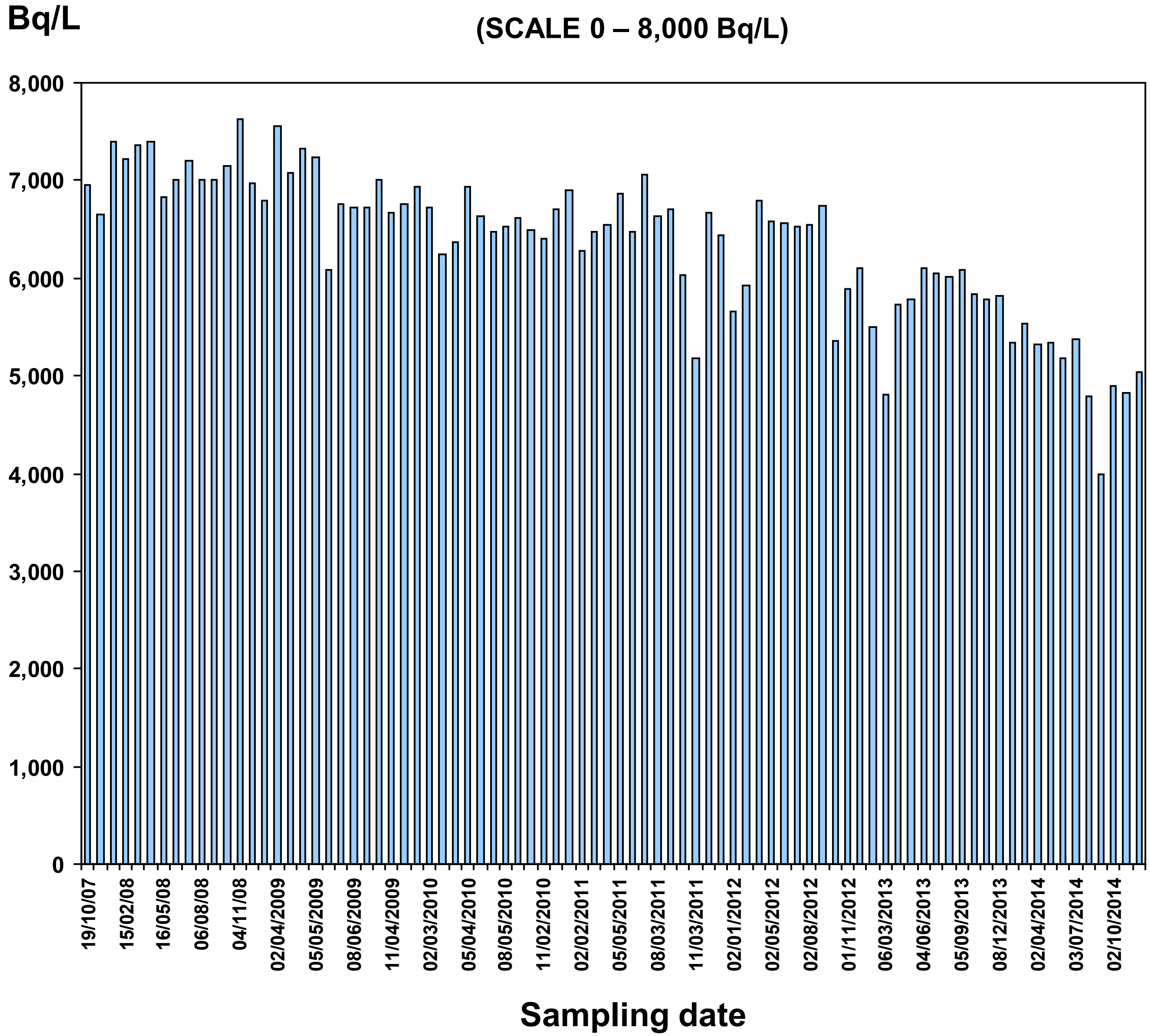
MONITORING RESULTS
MW07-26



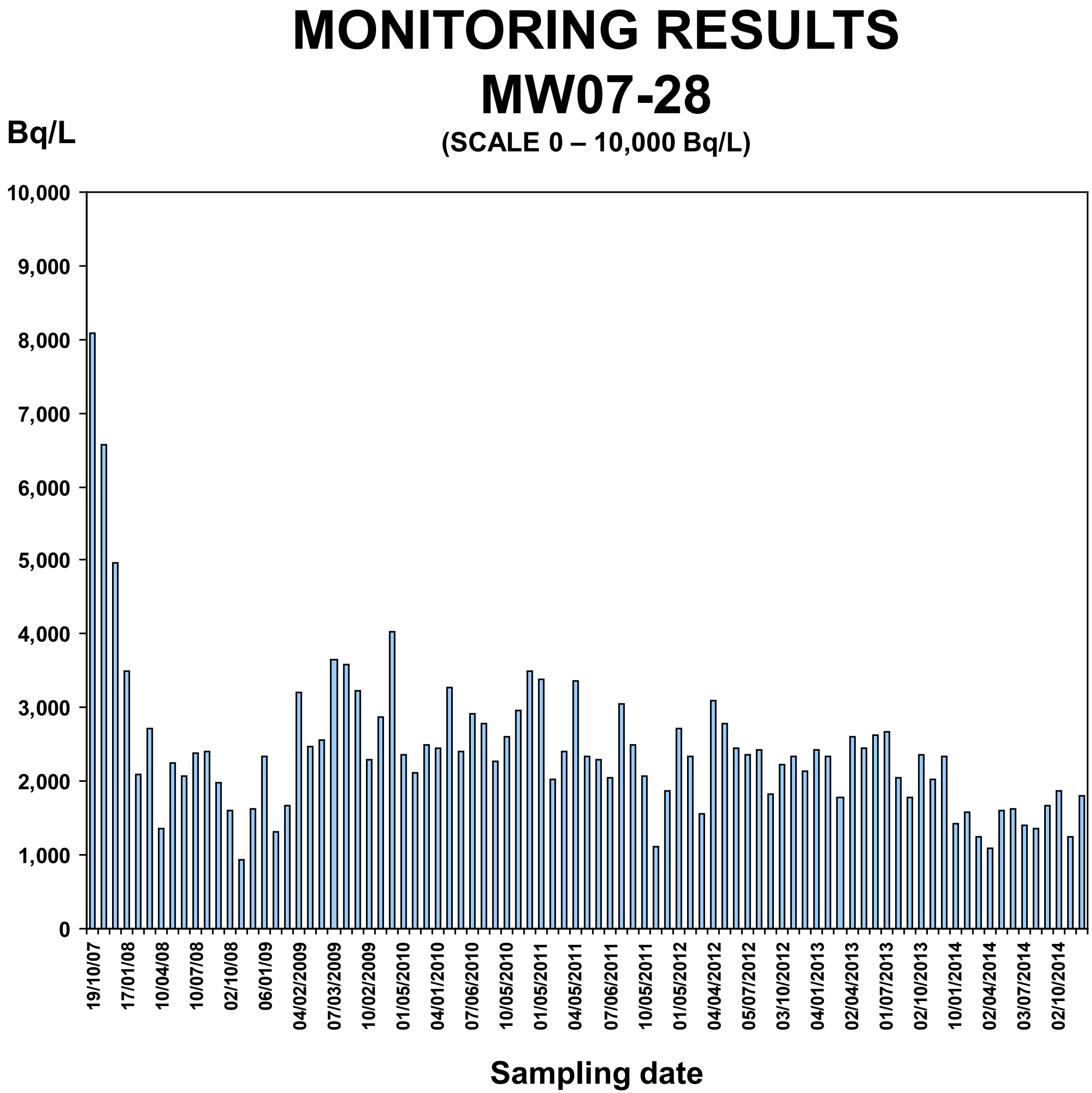
APPENDIX K

MONITORING RESULTS
MW07-27

(SCALE 0 – 8,000 Bq/L)

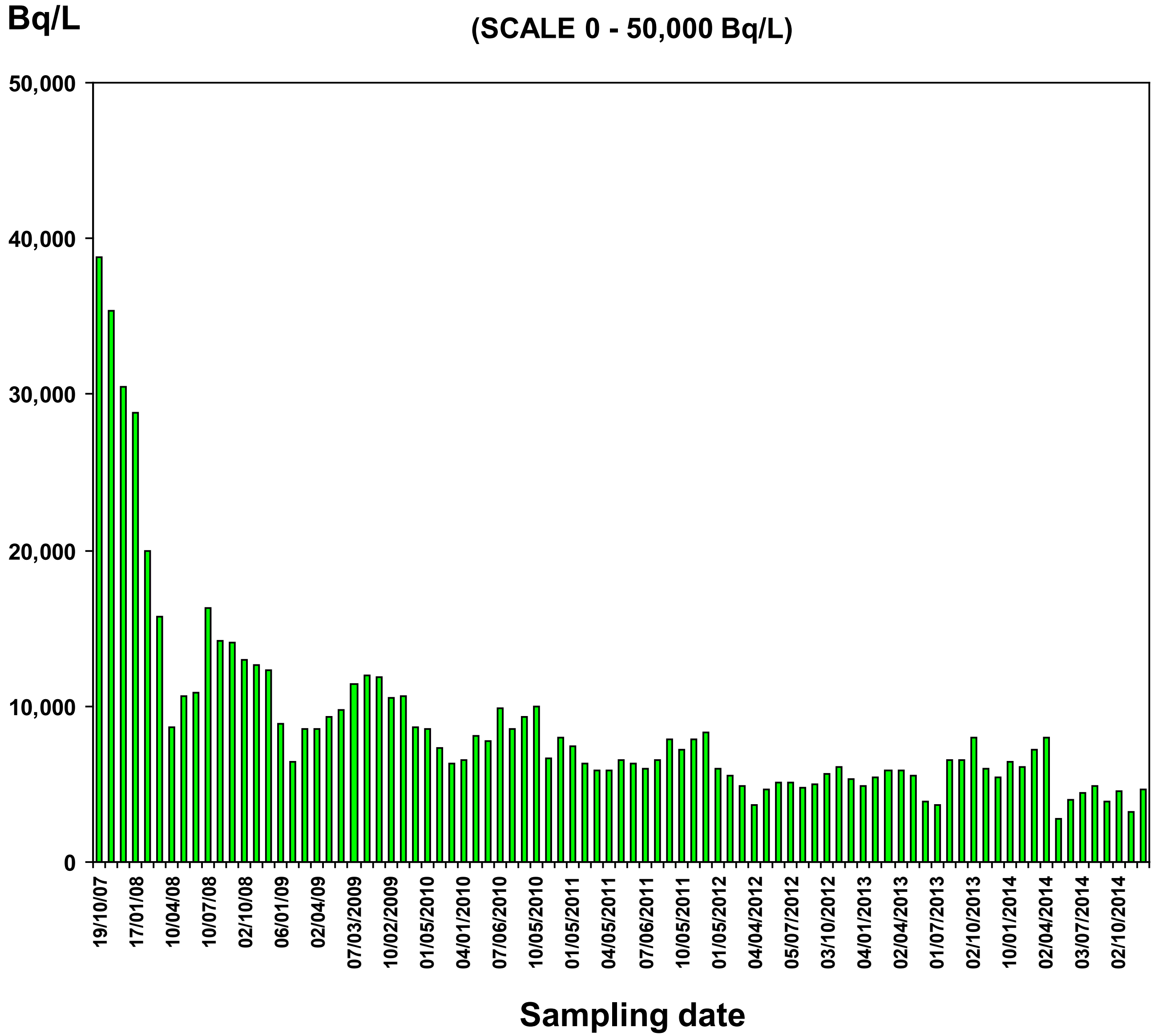


APPENDIX K


MONITORING RESULTS
MW07-28
Bq/L
(SCALE 0 – 10,000 Bq/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
19/10/07
17/01/08
10/04/08
10/07/08
02/10/08
06/01/09
04/02/2009
07/03/2009
10/02/2009
01/05/2010
04/01/2010
07/06/2010
10/05/2010
01/05/2011
04/05/2011
07/06/2011
10/05/2011
01/05/2012
04/04/2012
05/07/2012
03/10/2012
04/01/2013
02/04/2013
01/07/2013
02/10/2013
10/01/2014
02/04/2014
03/07/2014
02/10/2014
Sampling date

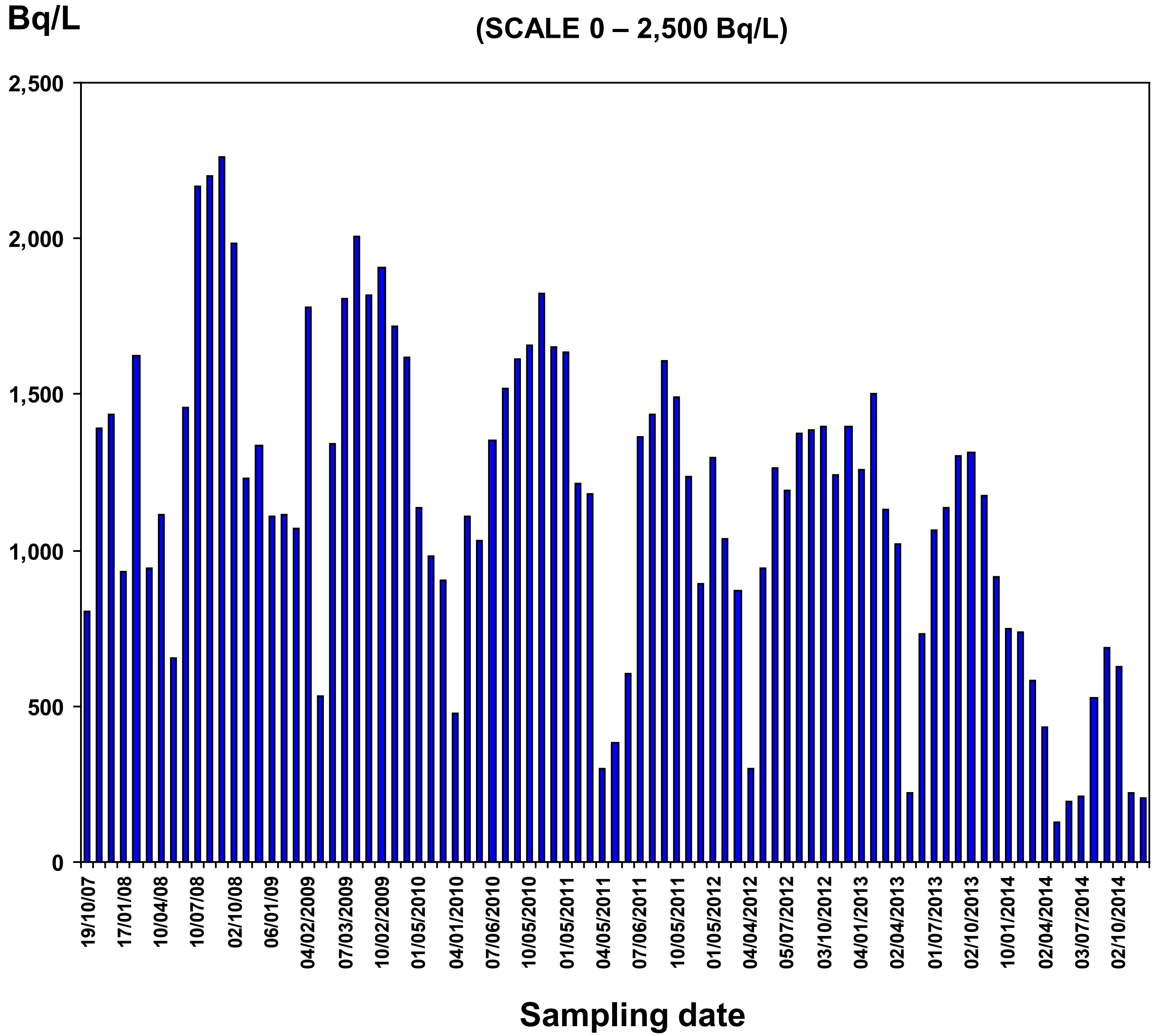
MONITORING RESULTS
MW07-29

(SCALE 0 - 50,000 Bq/L)



APPENDIX K

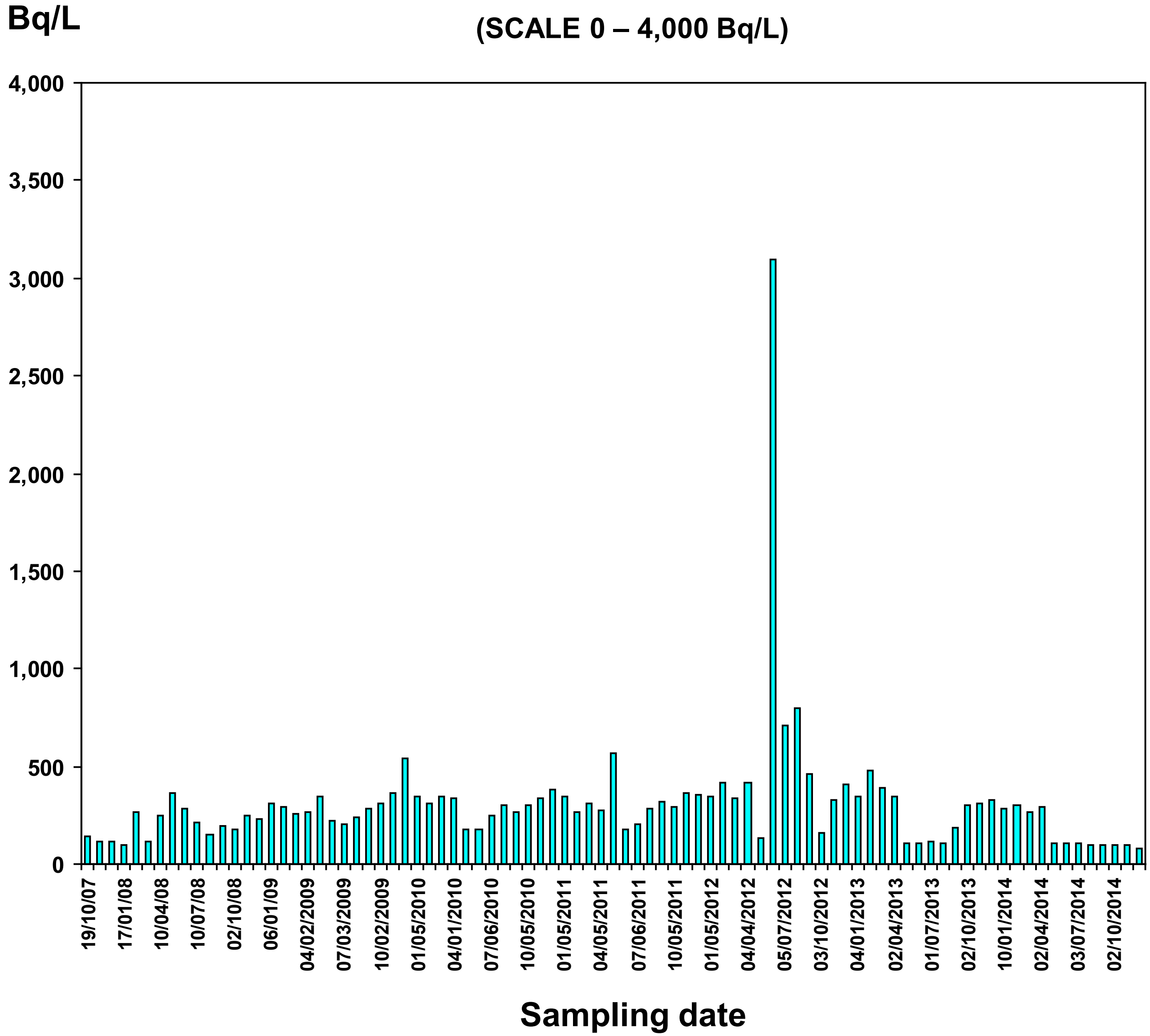
MONITORING RESULTS
MW07-31



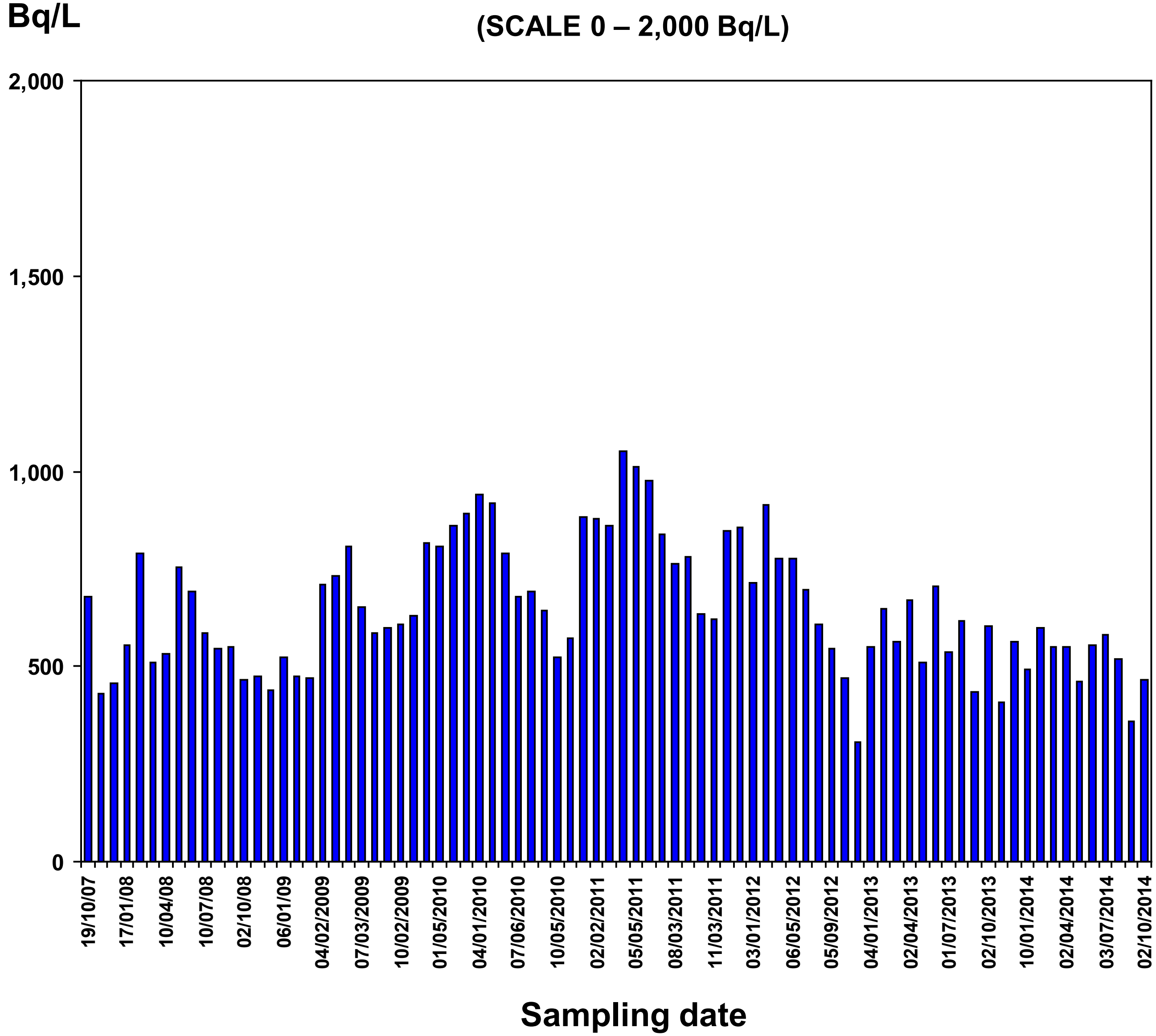
APPENDIX K

MONITORING RESULTS
MW07-32

(SCALE 0 – 4,000 Bq/L)



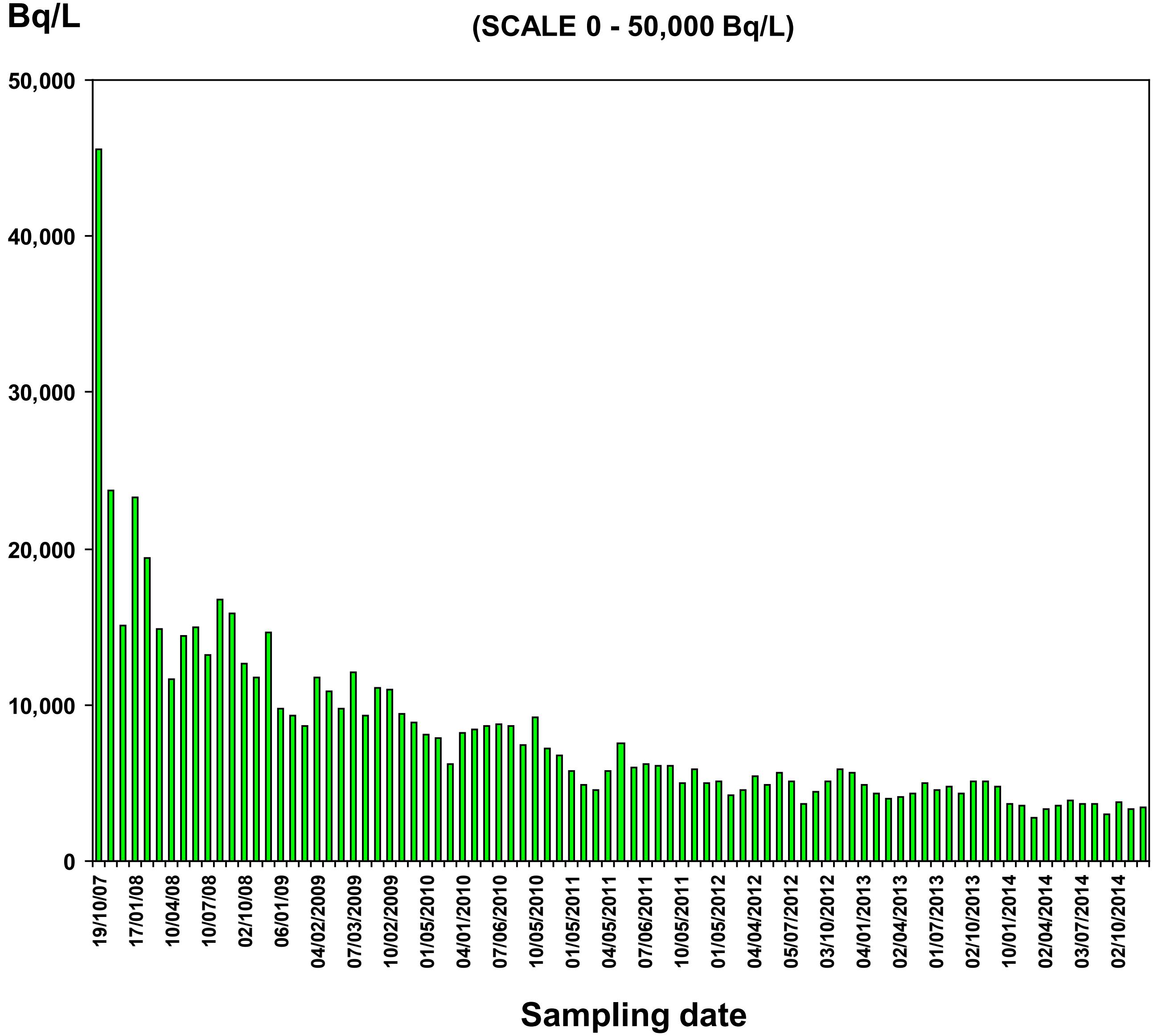
MONITORING RESULTS
MW07-33



APPENDIX K

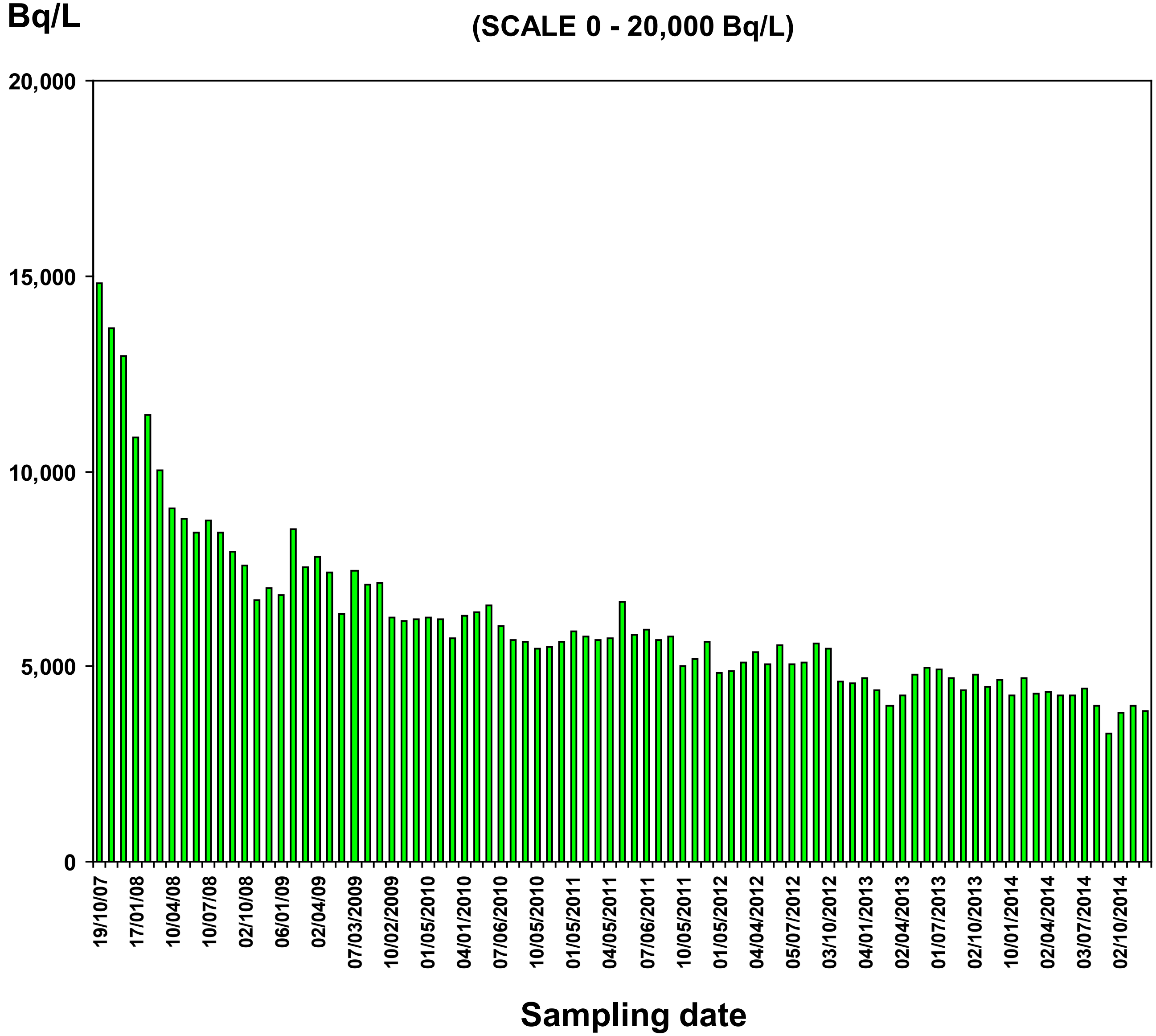
MONITORING RESULTS
MW07-34

(SCALE 0 - 50,000 Bq/L)



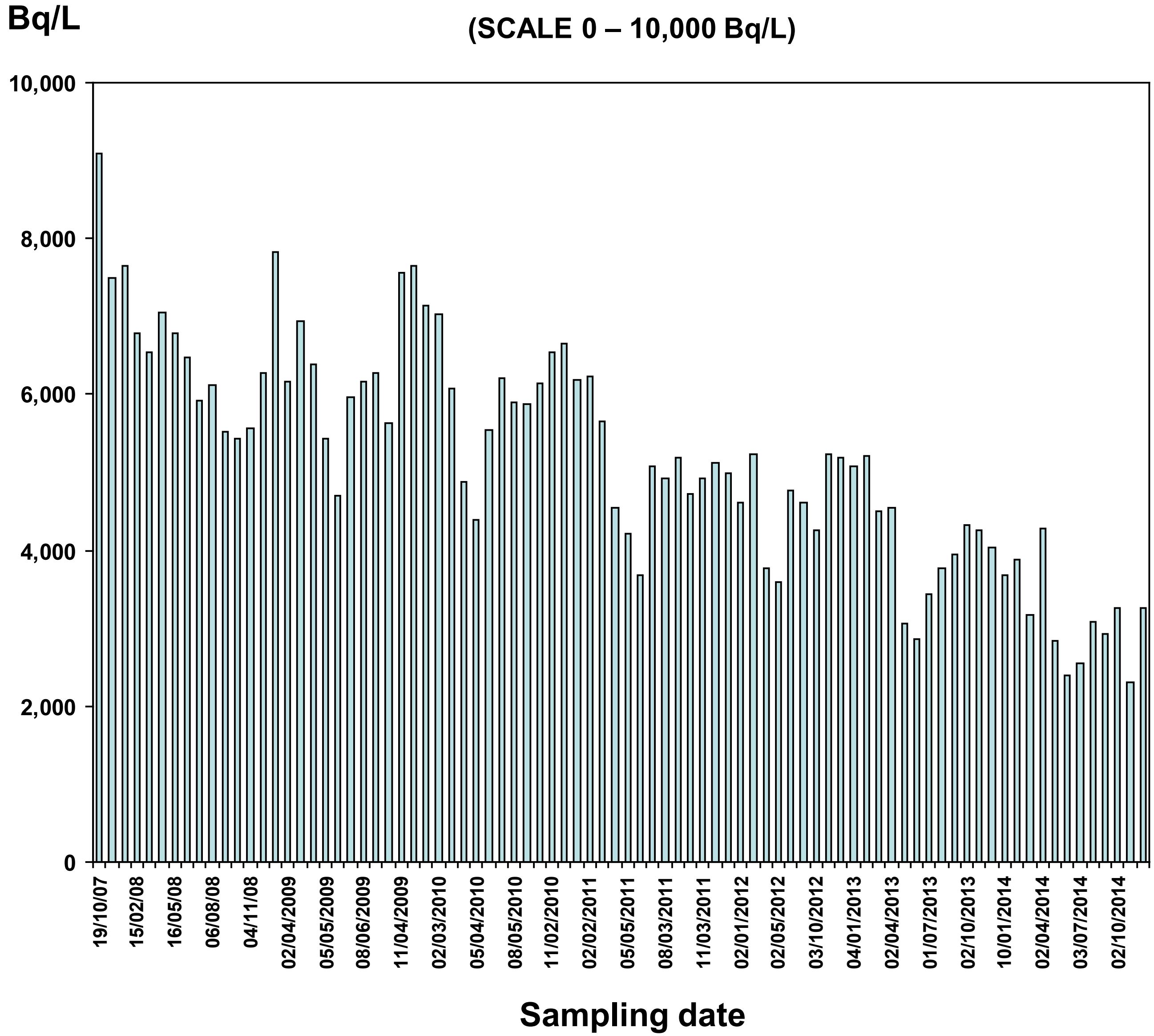
APPENDIX K

MONITORING RESULTS
MW07-35



MONITORING RESULTS
MW07-36

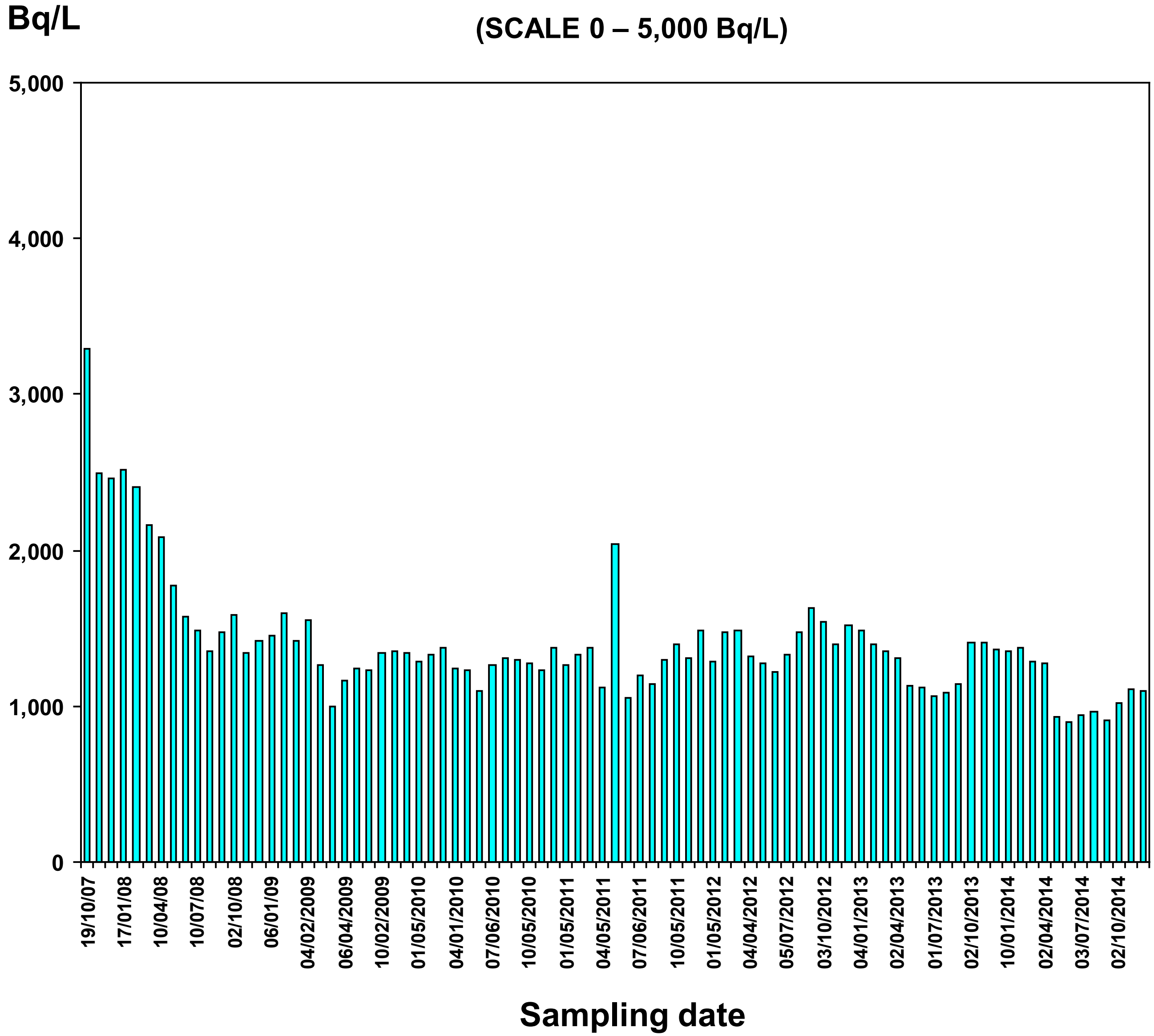
(SCALE 0 – 10,000 Bq/L)



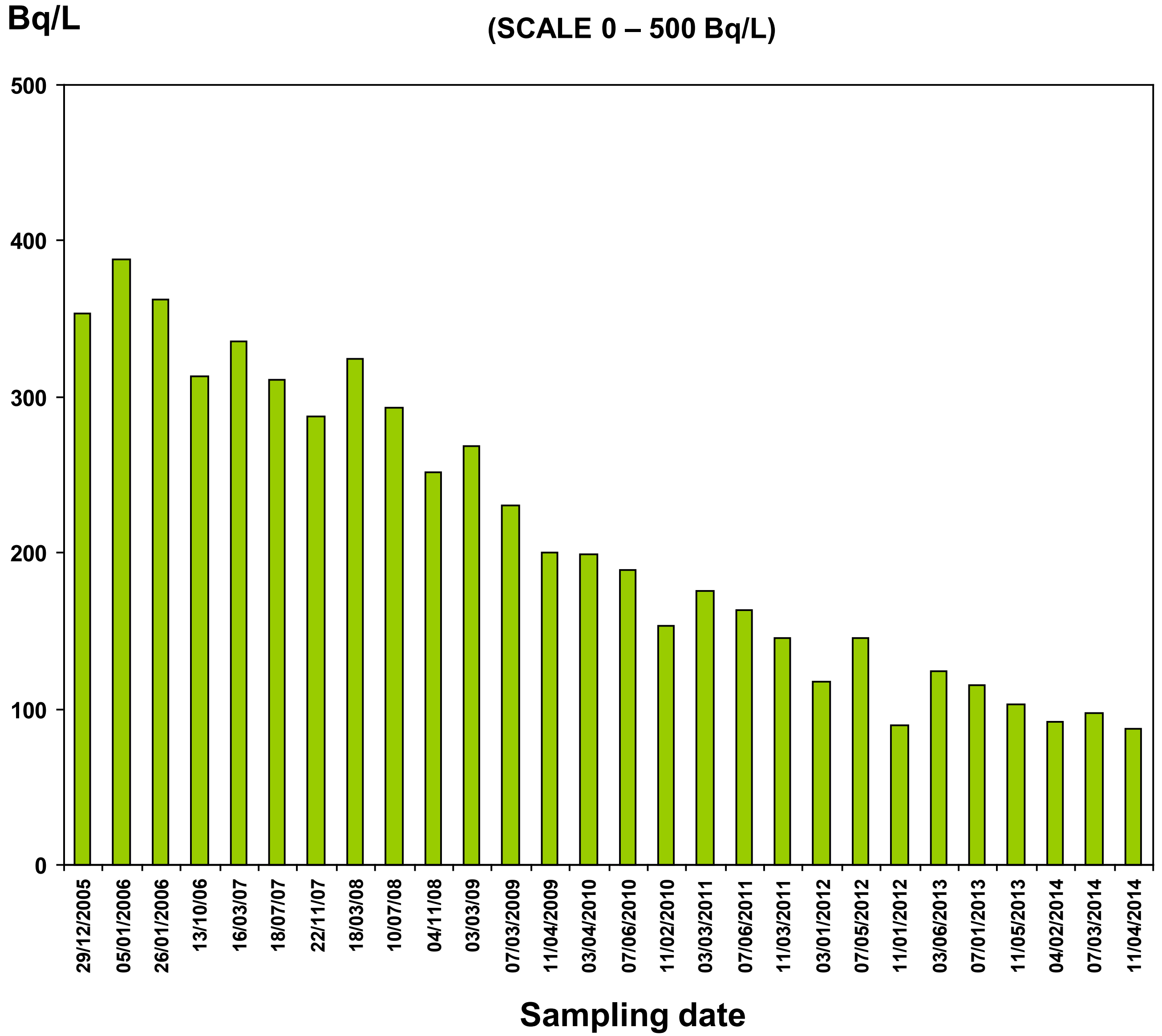
APPENDIX K

MONITORING RESULTS
MW07-37

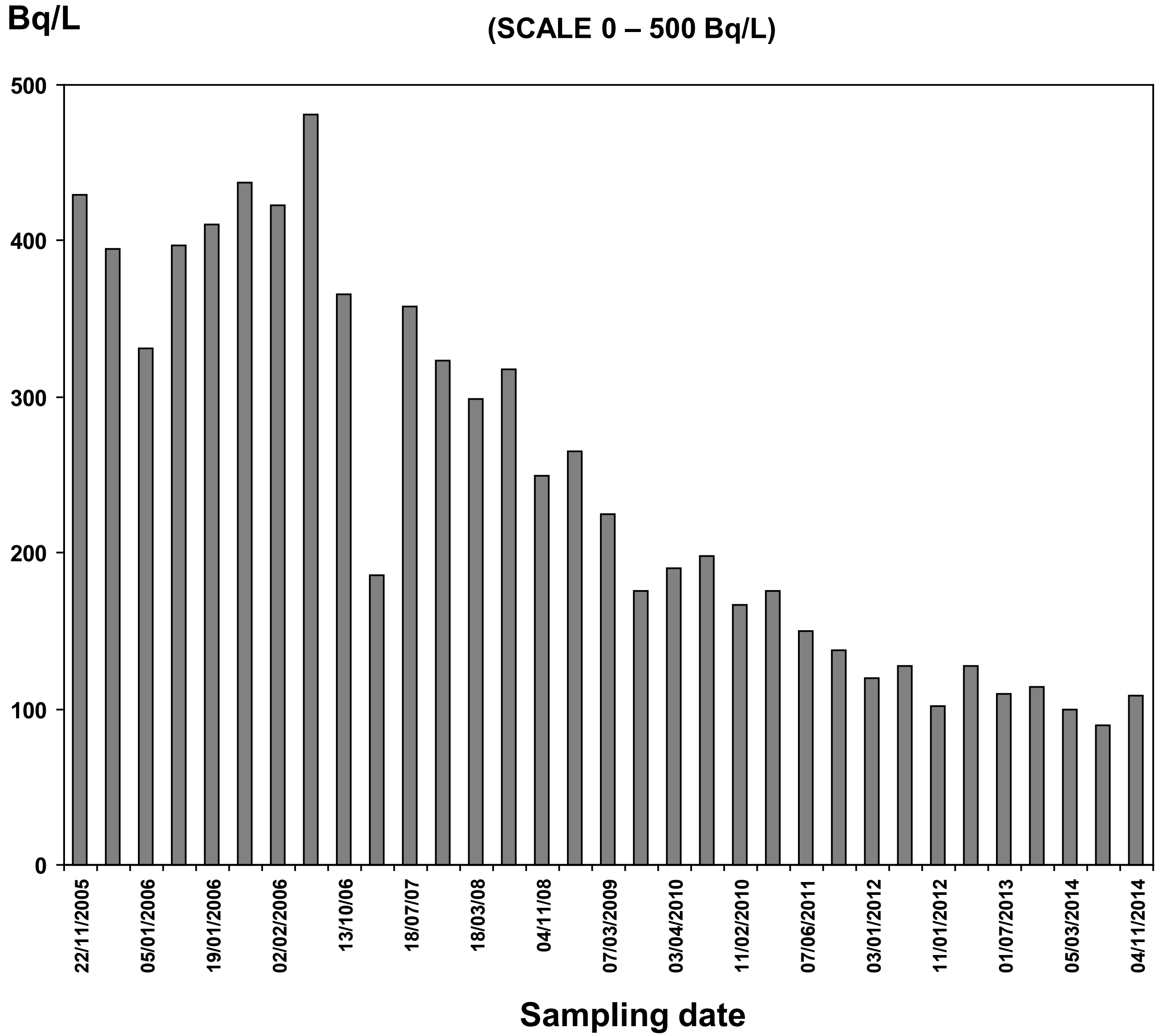
(SCALE 0 – 5,000 Bq/L)



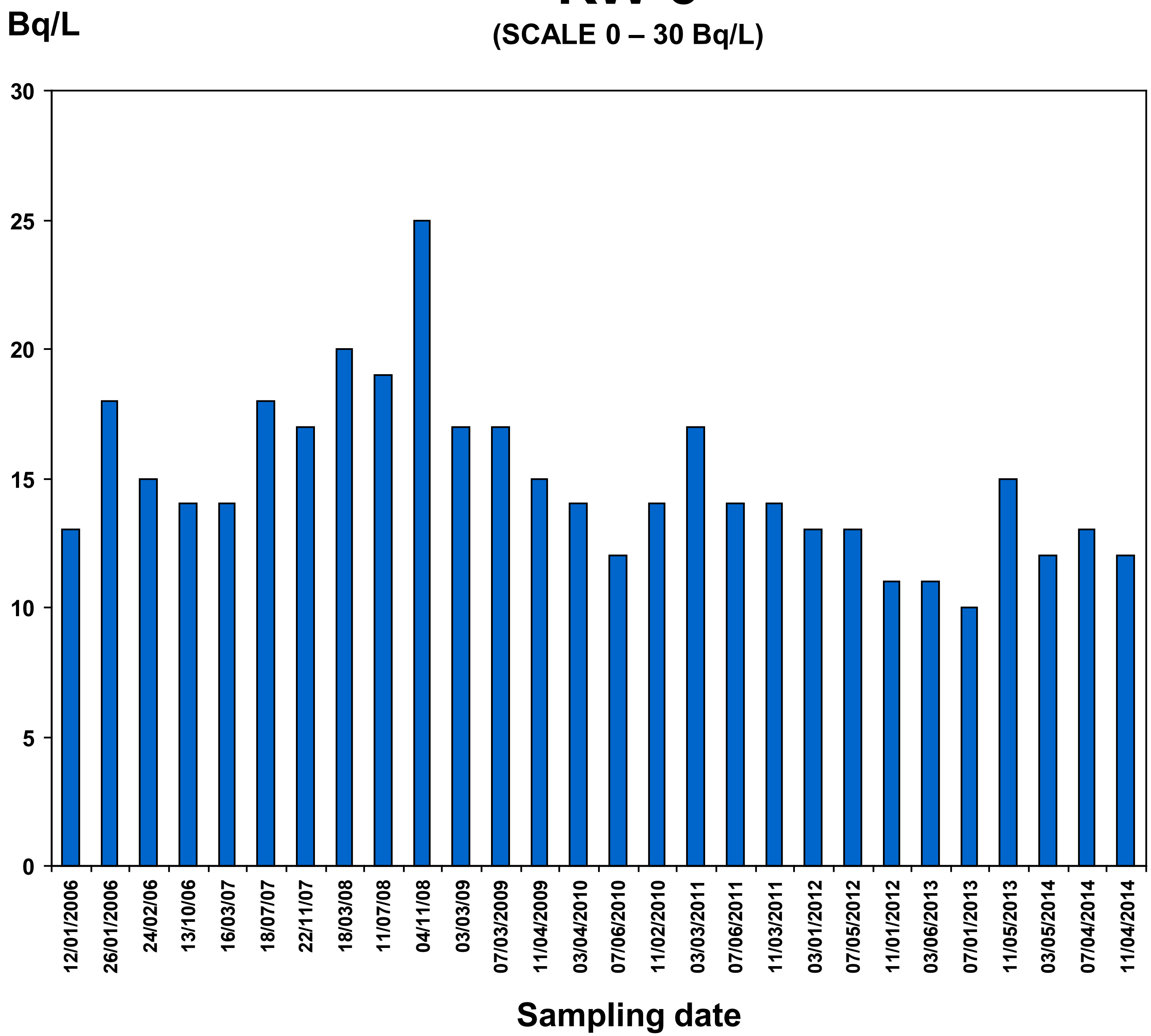
MONITORING RESULTS
RW-2
(SCALE 0 – 500 Bq/L)



MONITORING RESULTS
RW-3
(SCALE 0 – 500 Bq/L)



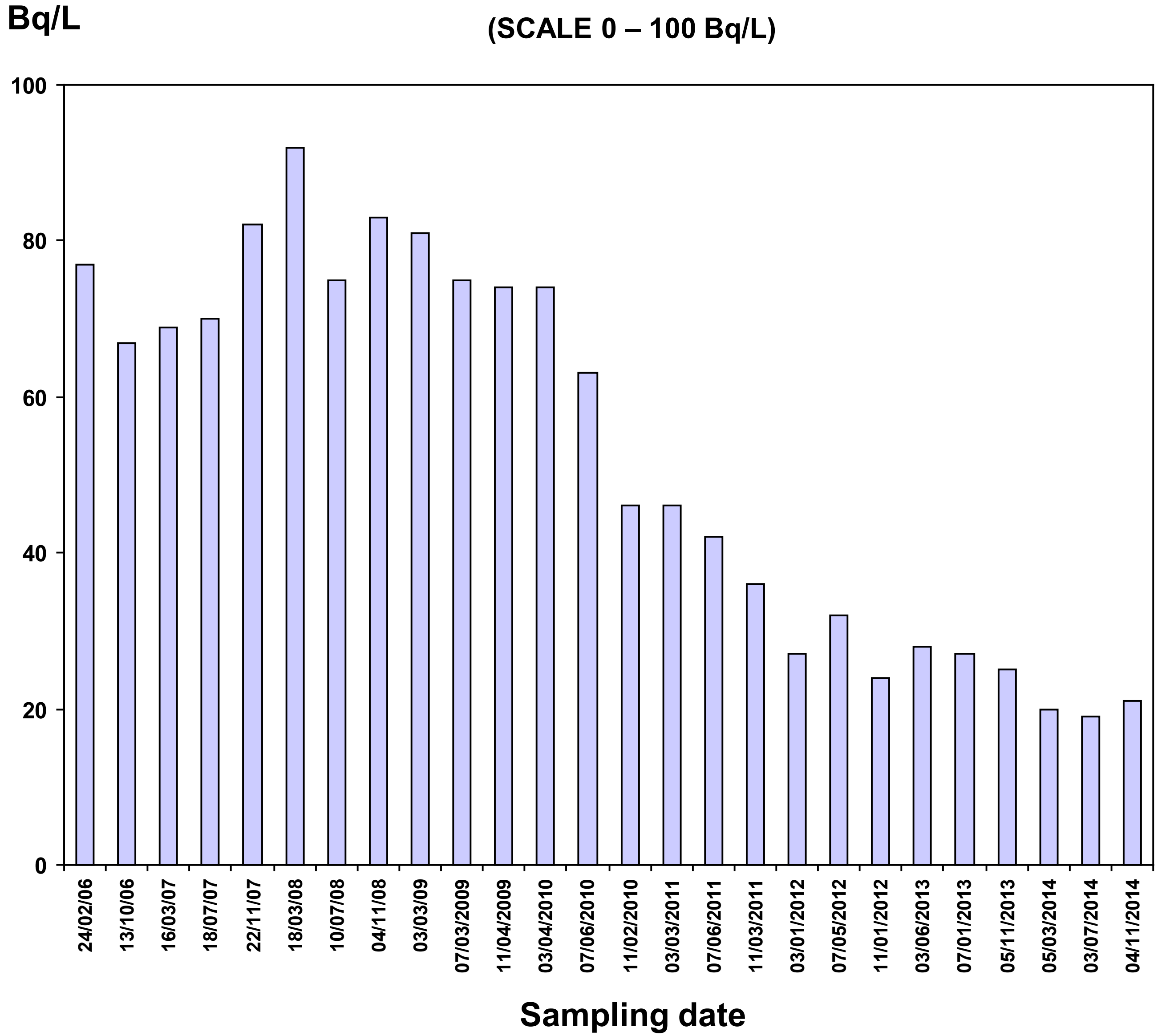
MONITORING RESULTS
RW-5
(SCALE 0 – 30 Bq/L)



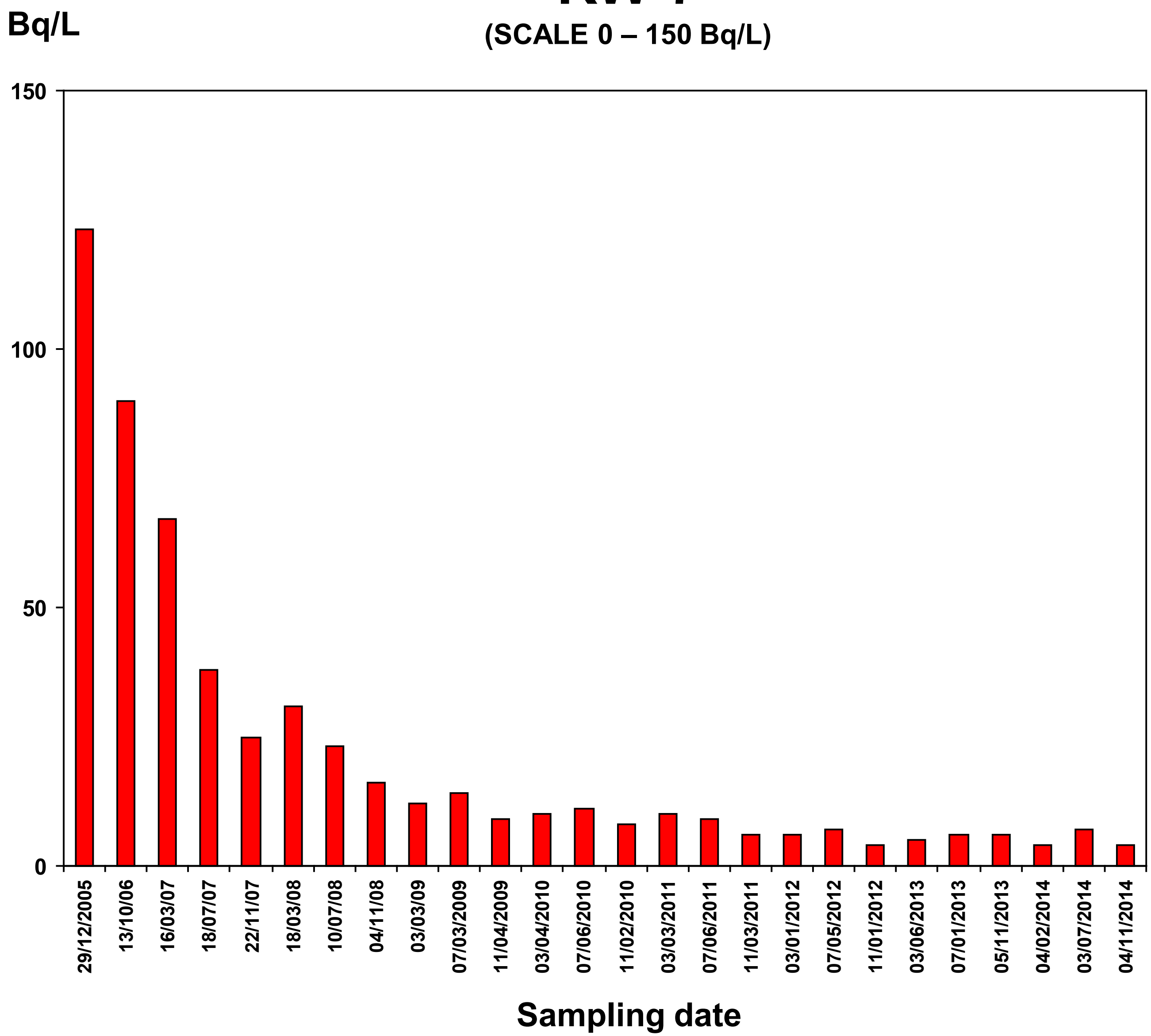
APPENDIX K

MONITORING RESULTS
RW-6

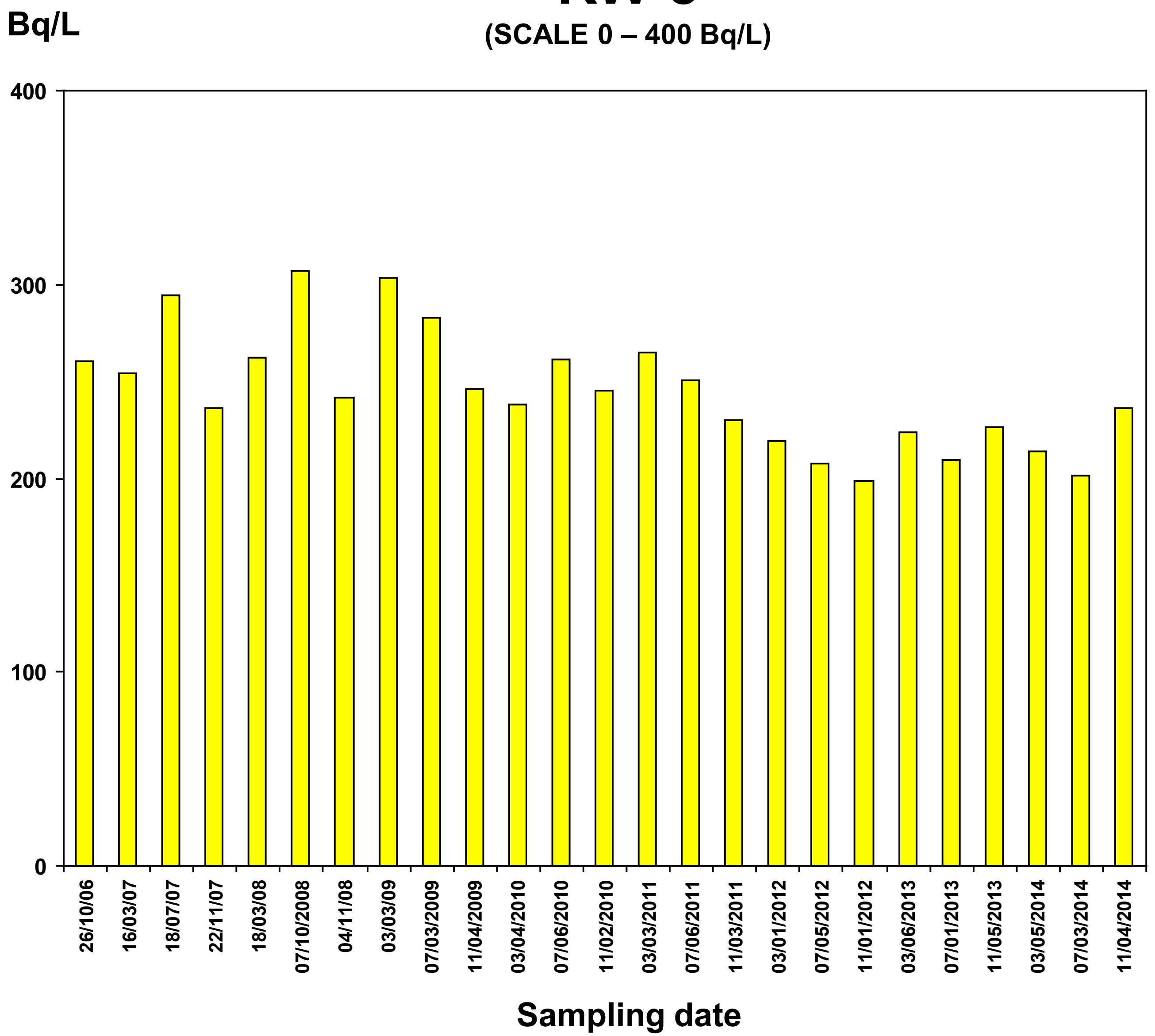
(SCALE 0 – 100 Bq/L)



MONITORING RESULTS
RW-7
(SCALE 0 – 150 Bq/L)

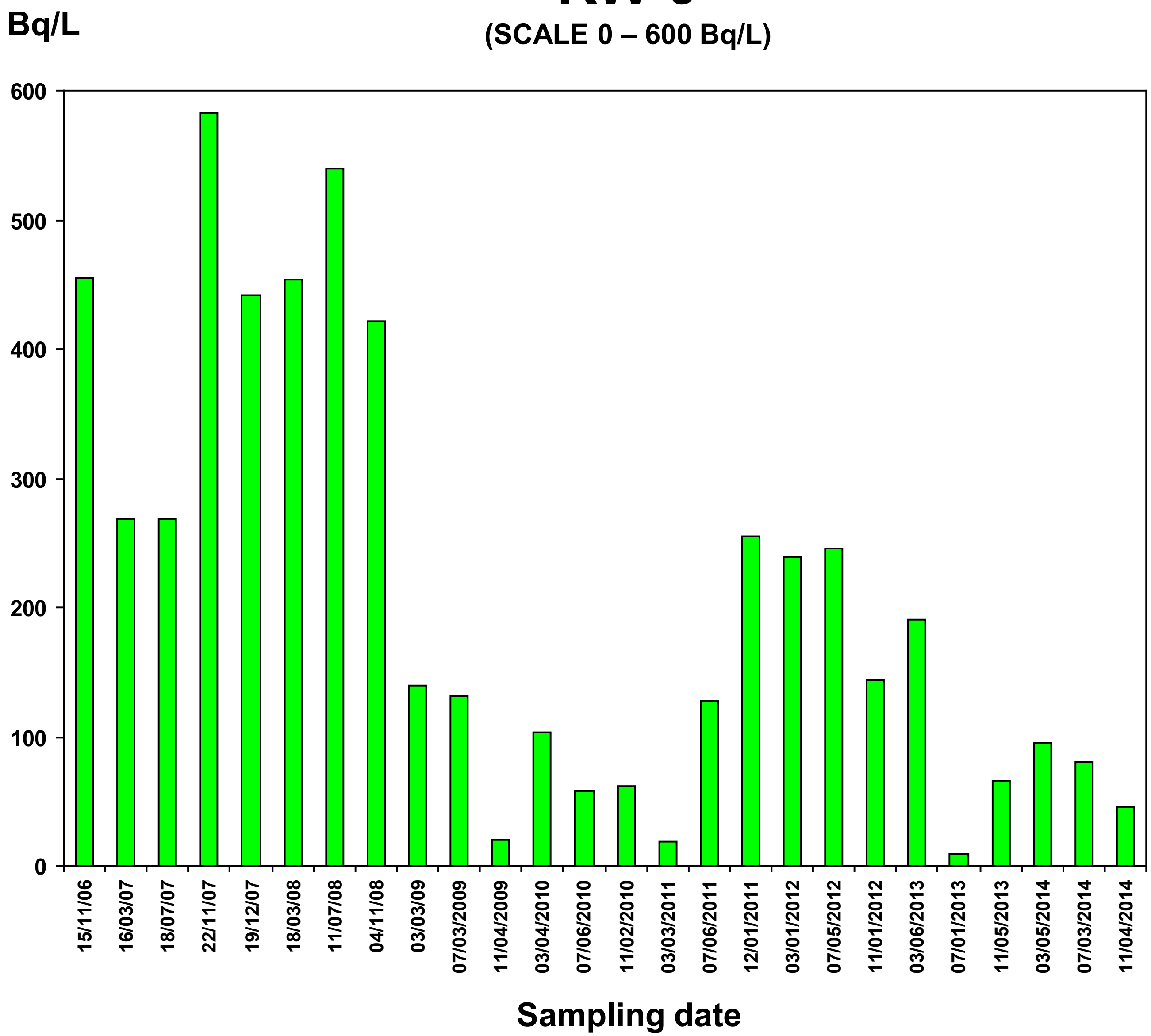


MONITORING RESULTS
RW-8



APPENDIX K

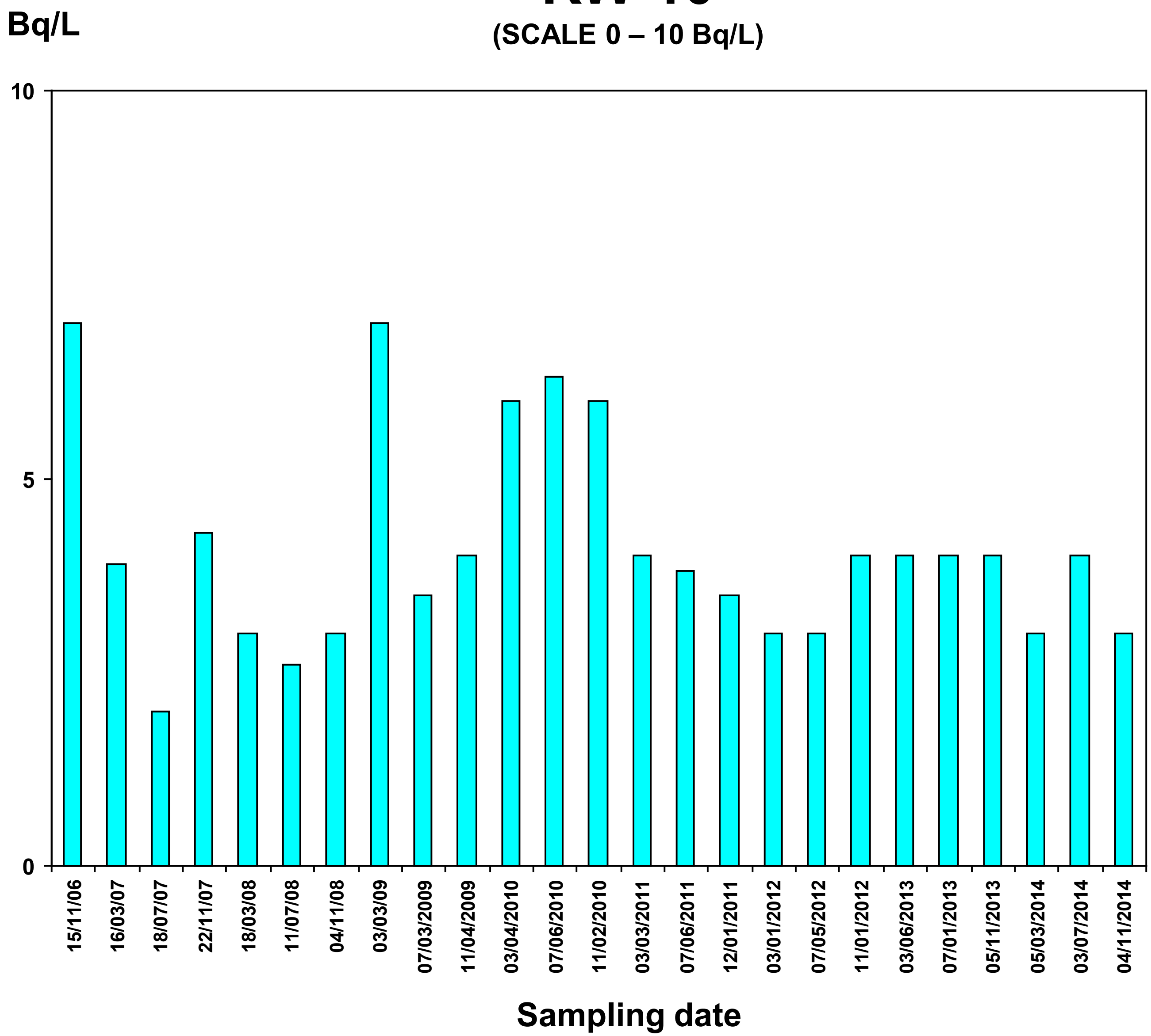
MONITORING RESULTS
RW-9
(SCALE 0 – 600 Bq/L)



APPENDIX K

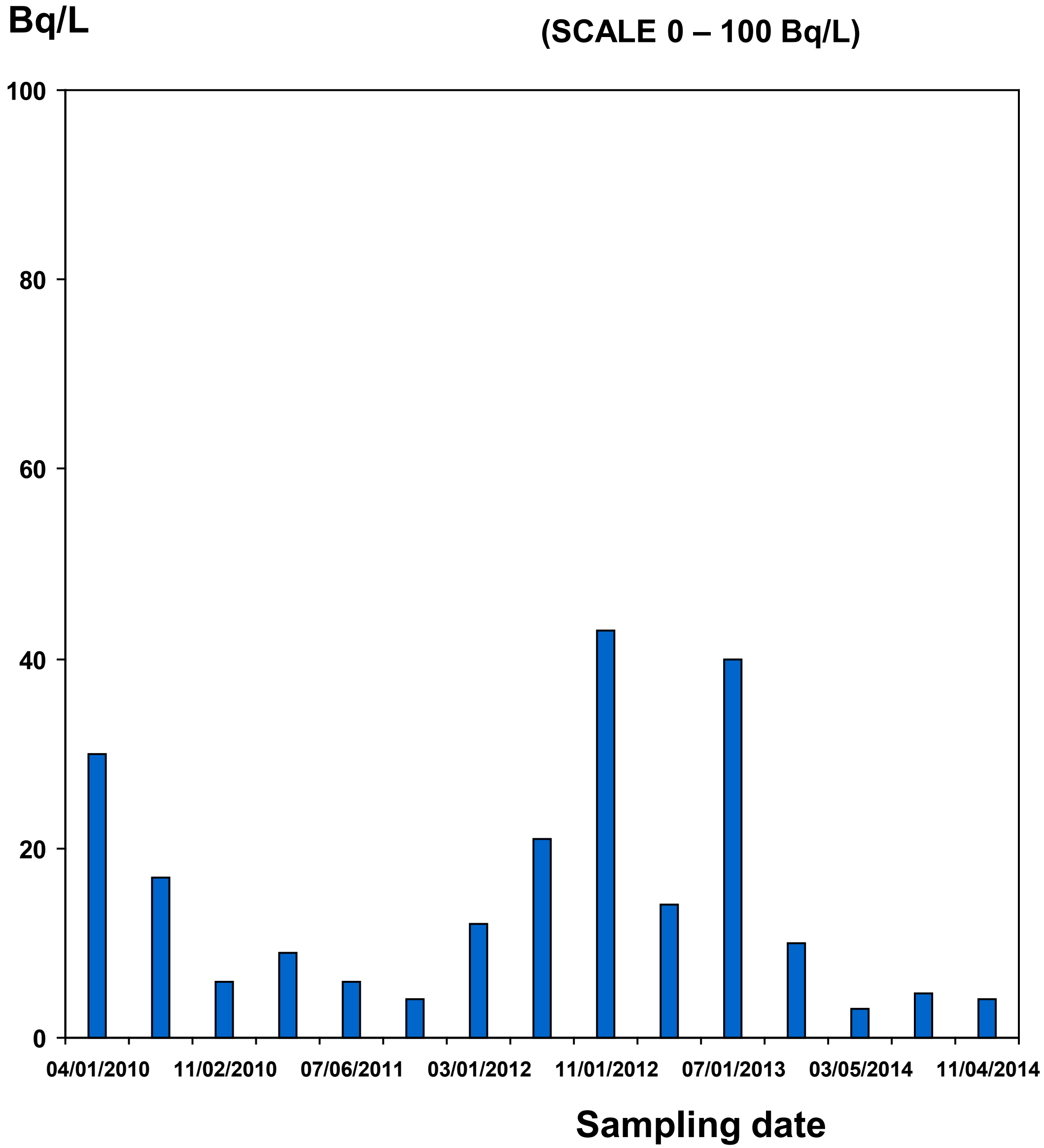
MONITORING RESULTS
RW-10

(SCALE 0 – 10 Bq/L)



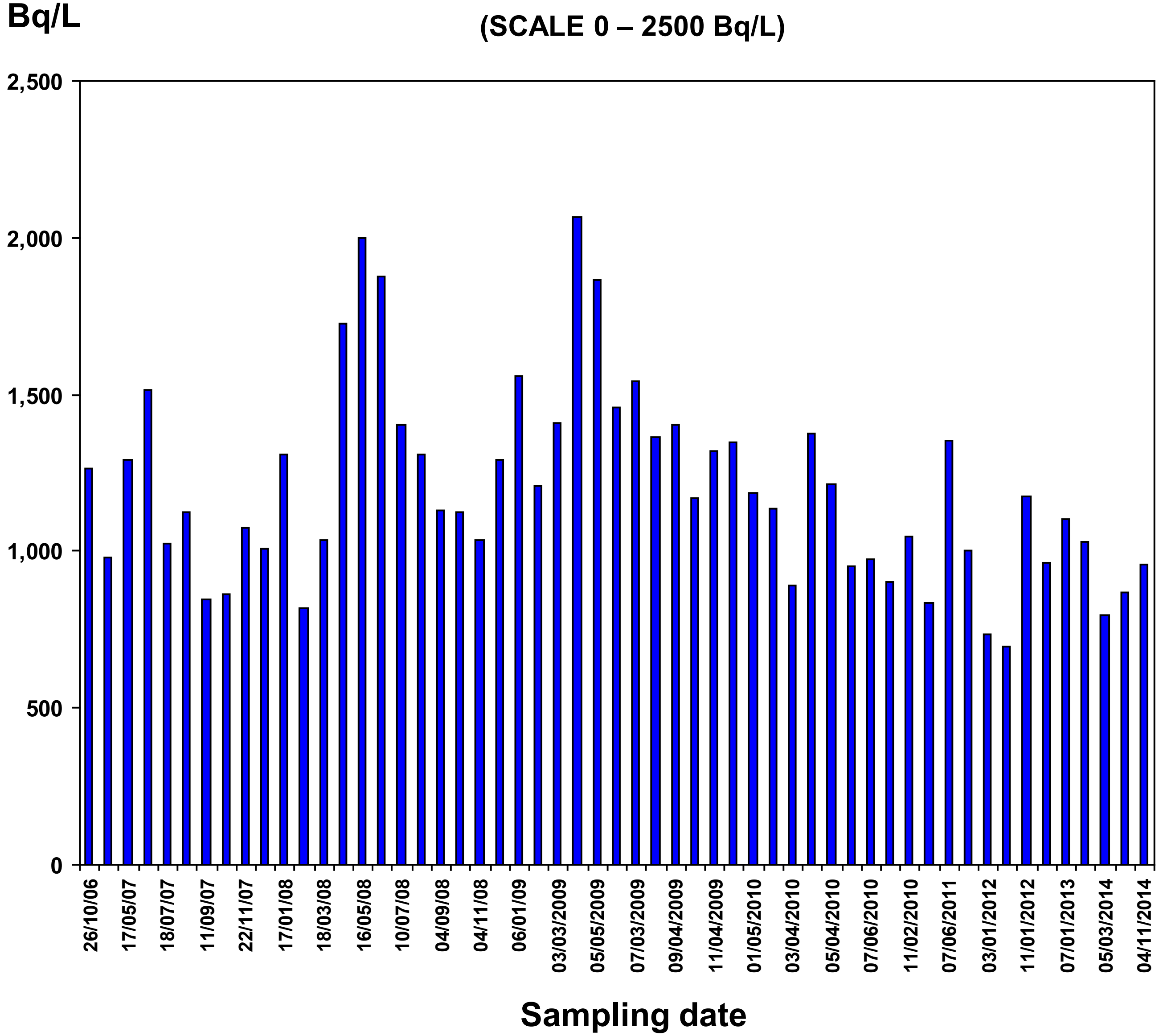
APPENDIX K

MONITORING RESULTS
RW-12



APPENDIX K

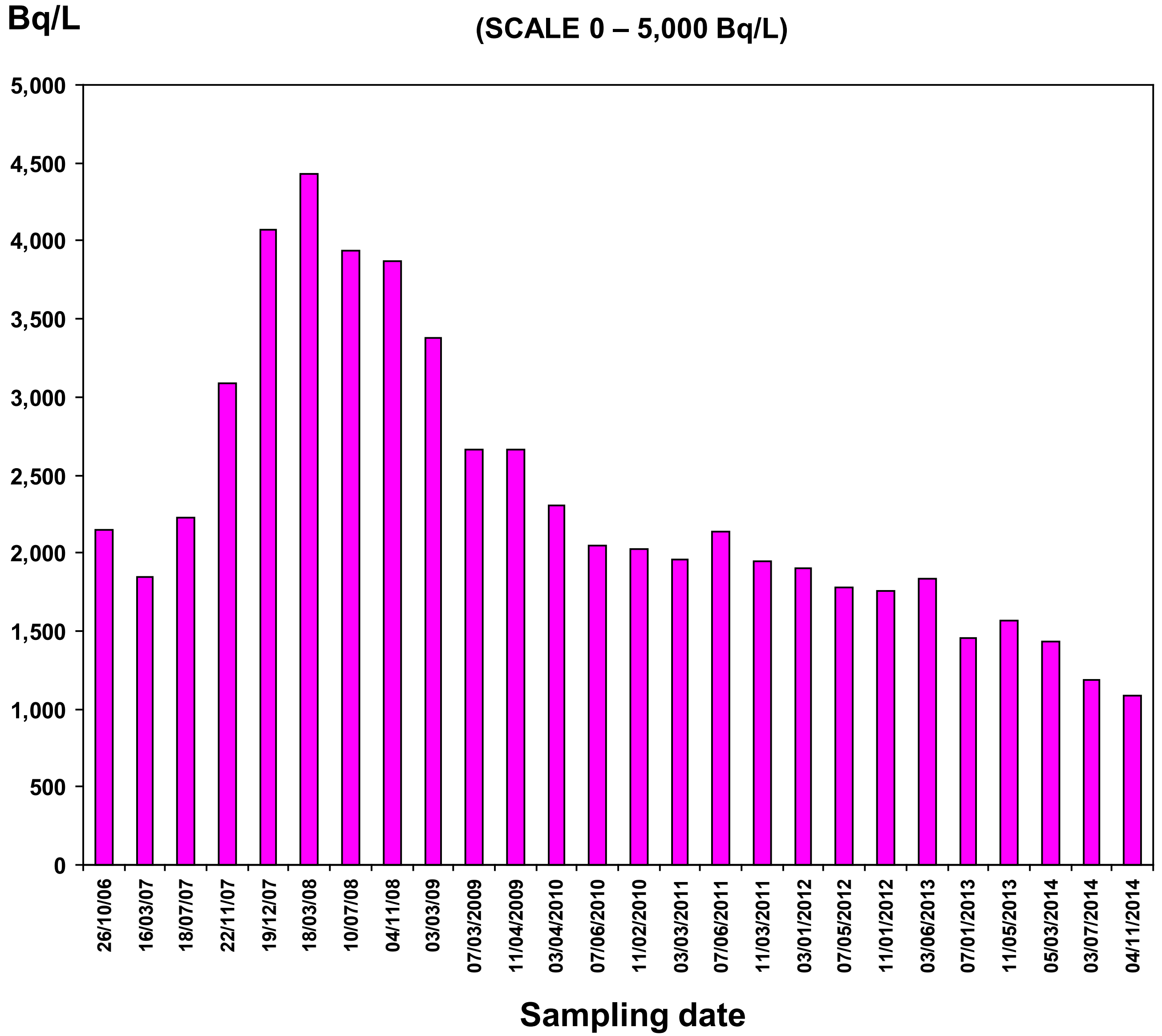
MONITORING RESULTS
B-1
(SCALE 0 – 2500 Bq/L)



APPENDIX K

MONITORING RESULTS
B-2

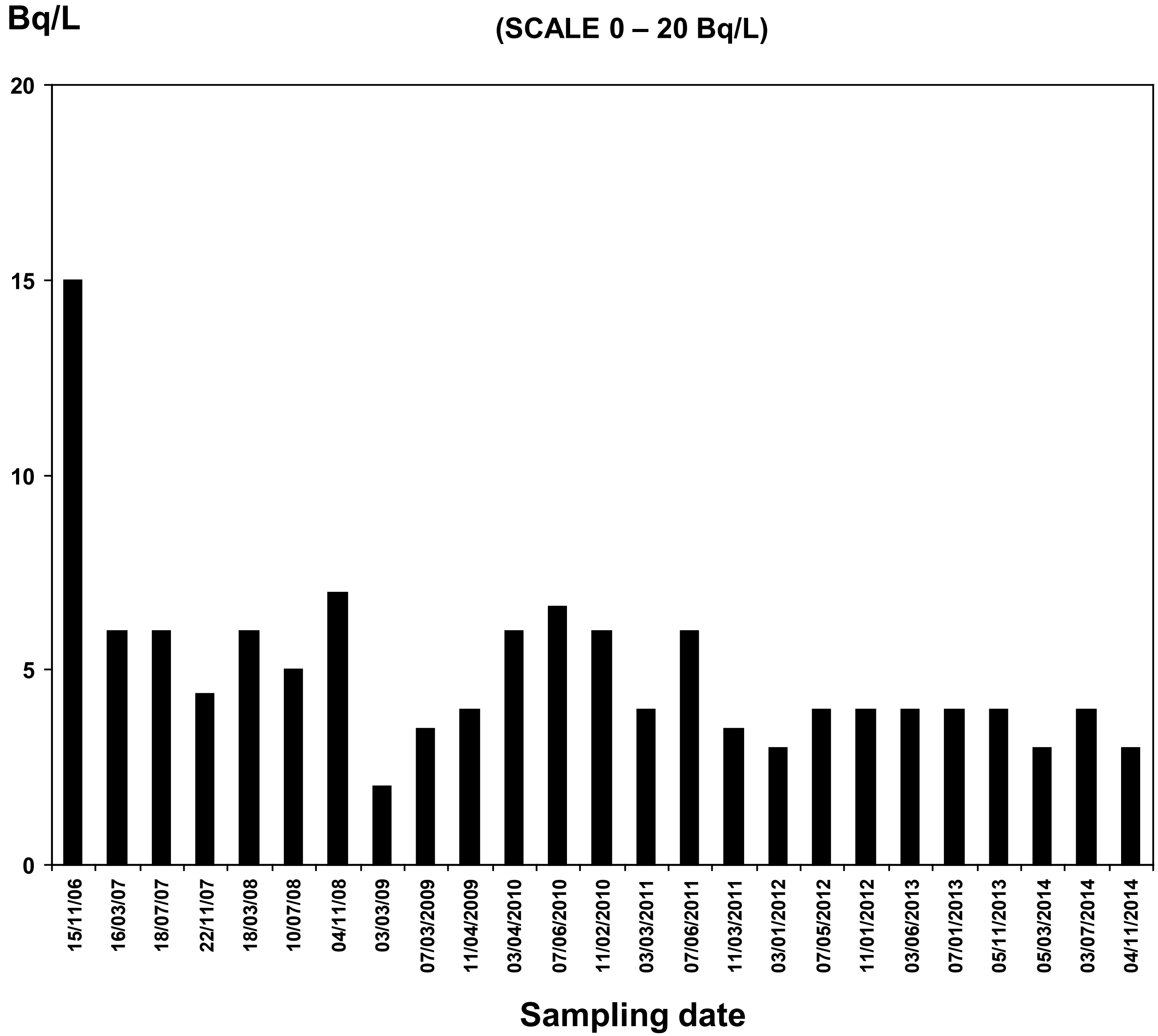
(SCALE 0 – 5,000 Bq/L)



APPENDIX K

MONITORING RESULTS
B-3

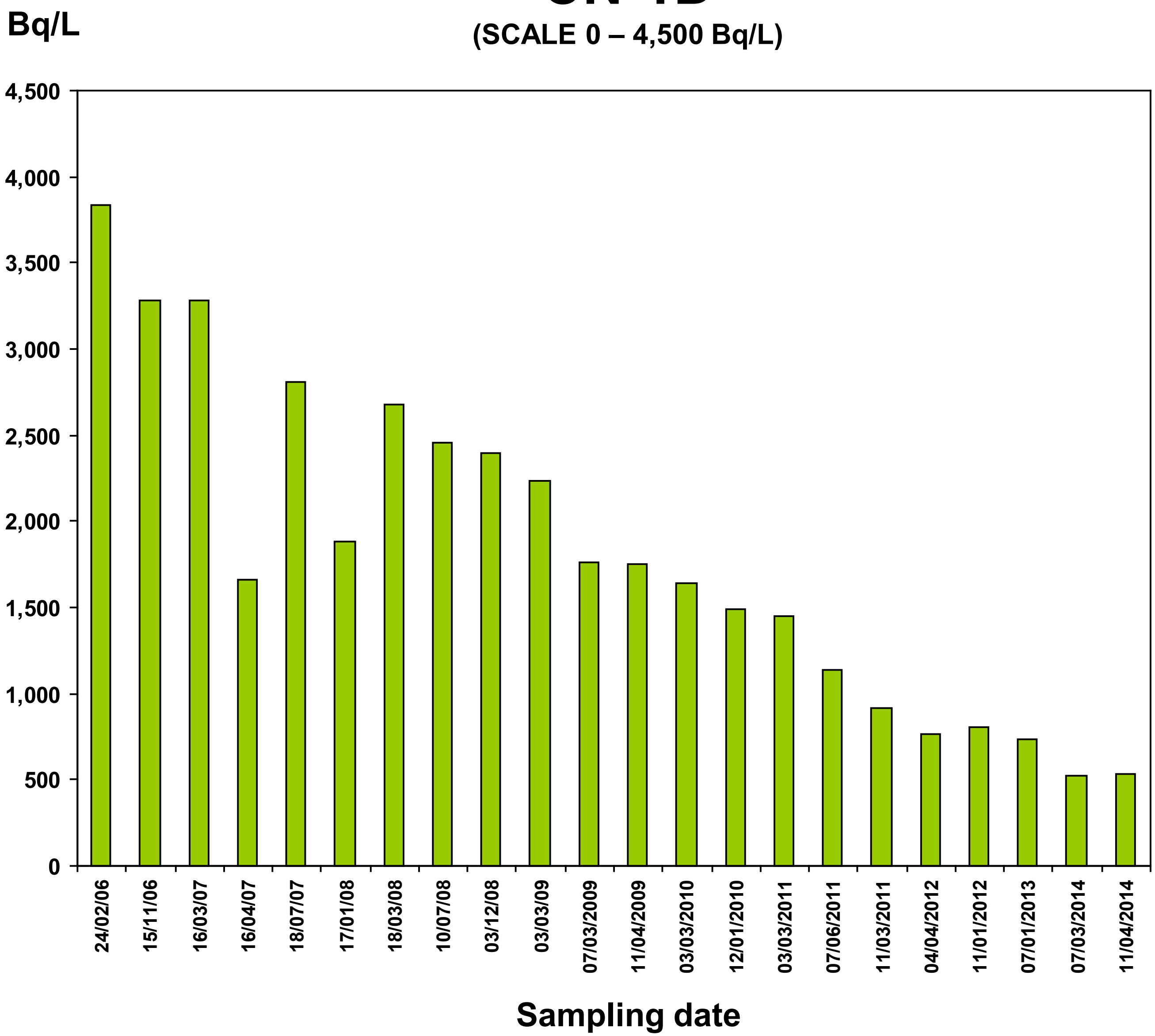
(SCALE 0 – 20 Bq/L)



APPENDIX K

MONITORING RESULTS
CN-1D

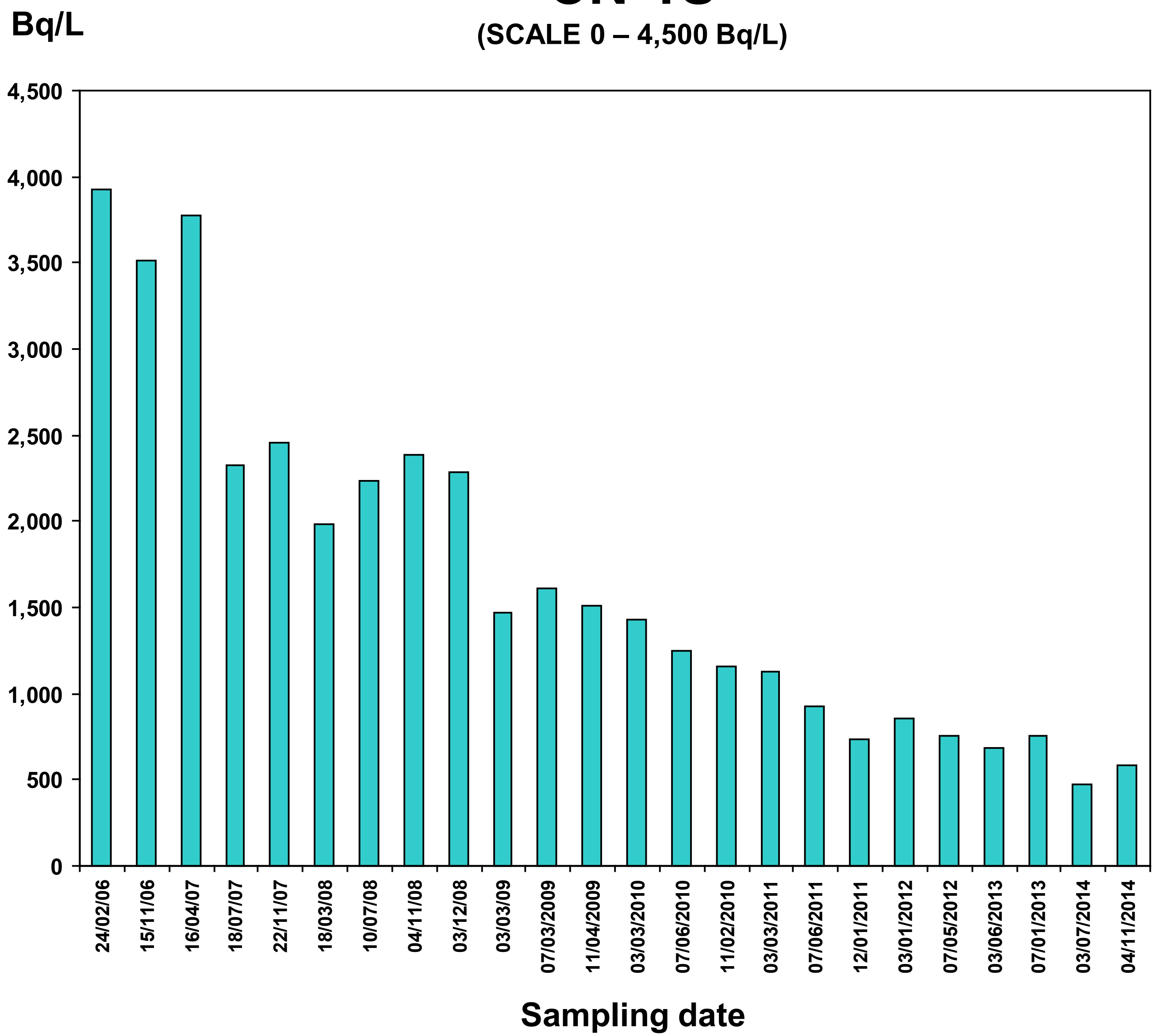
(SCALE 0 – 4,500 Bq/L)



APPENDIX K

MONITORING RESULTS
CN-1S

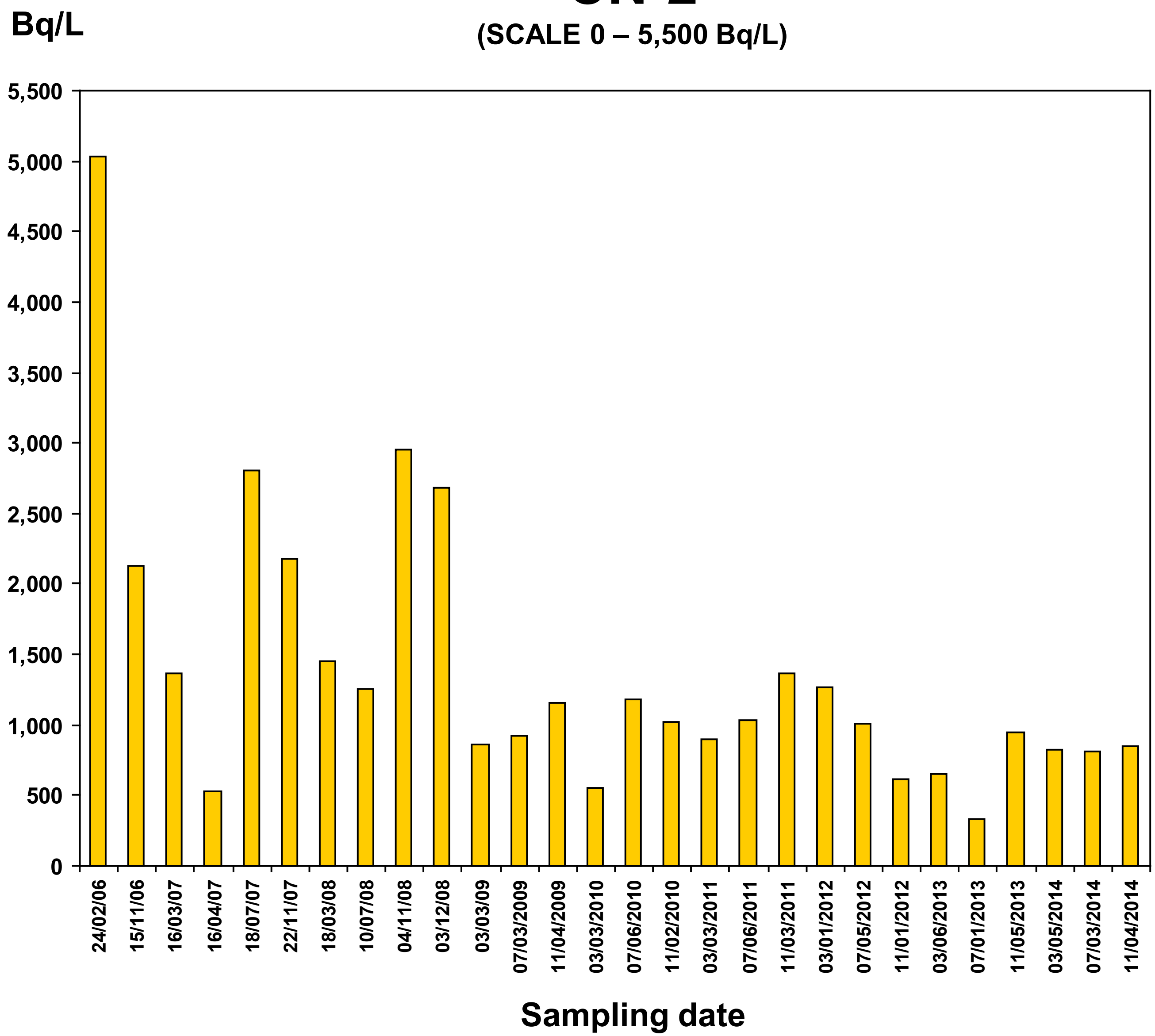
(SCALE 0 – 4,500 Bq/L)



APPENDIX K

MONITORING RESULTS
CN-2

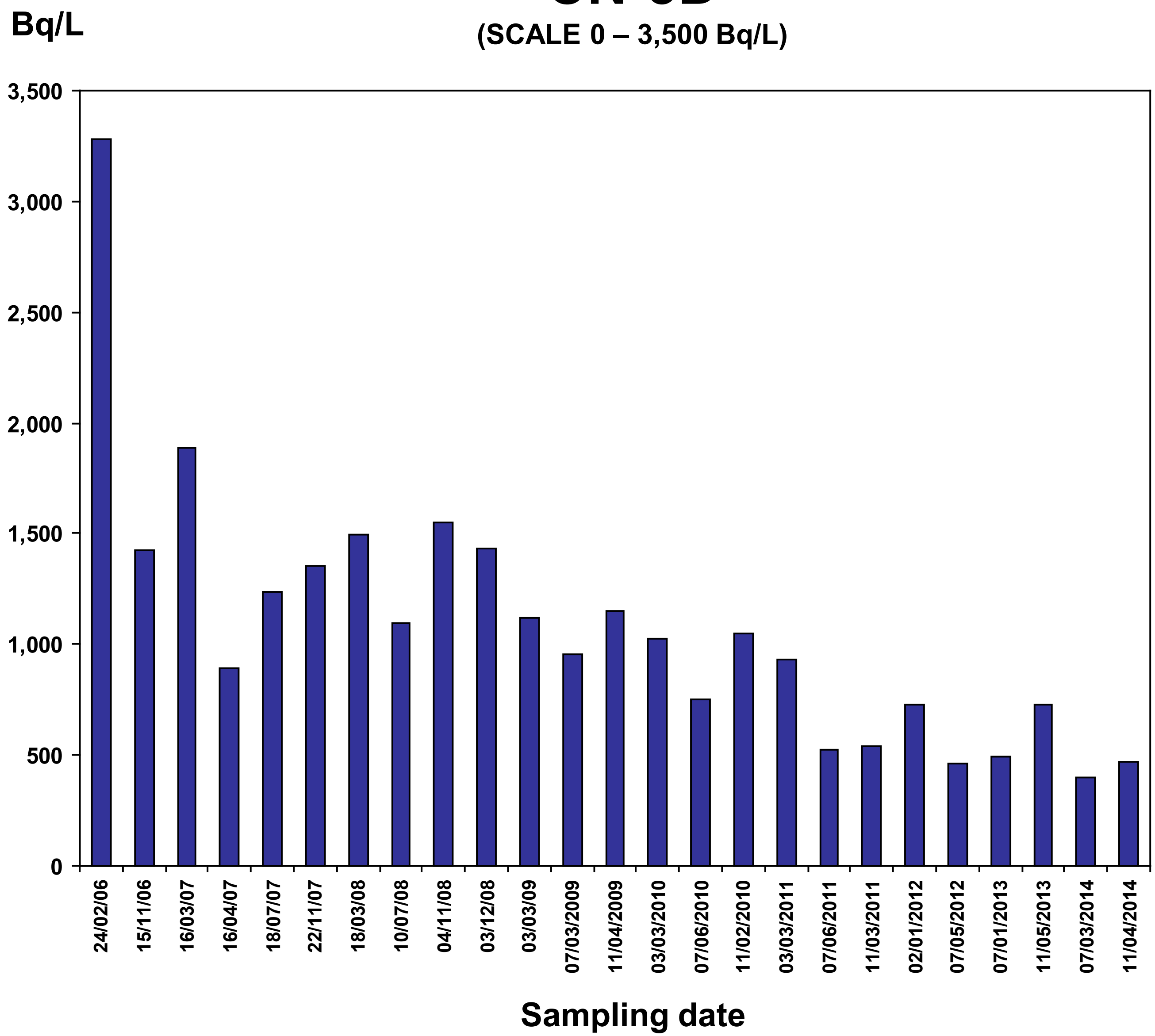
(SCALE 0 – 5,500 Bq/L)



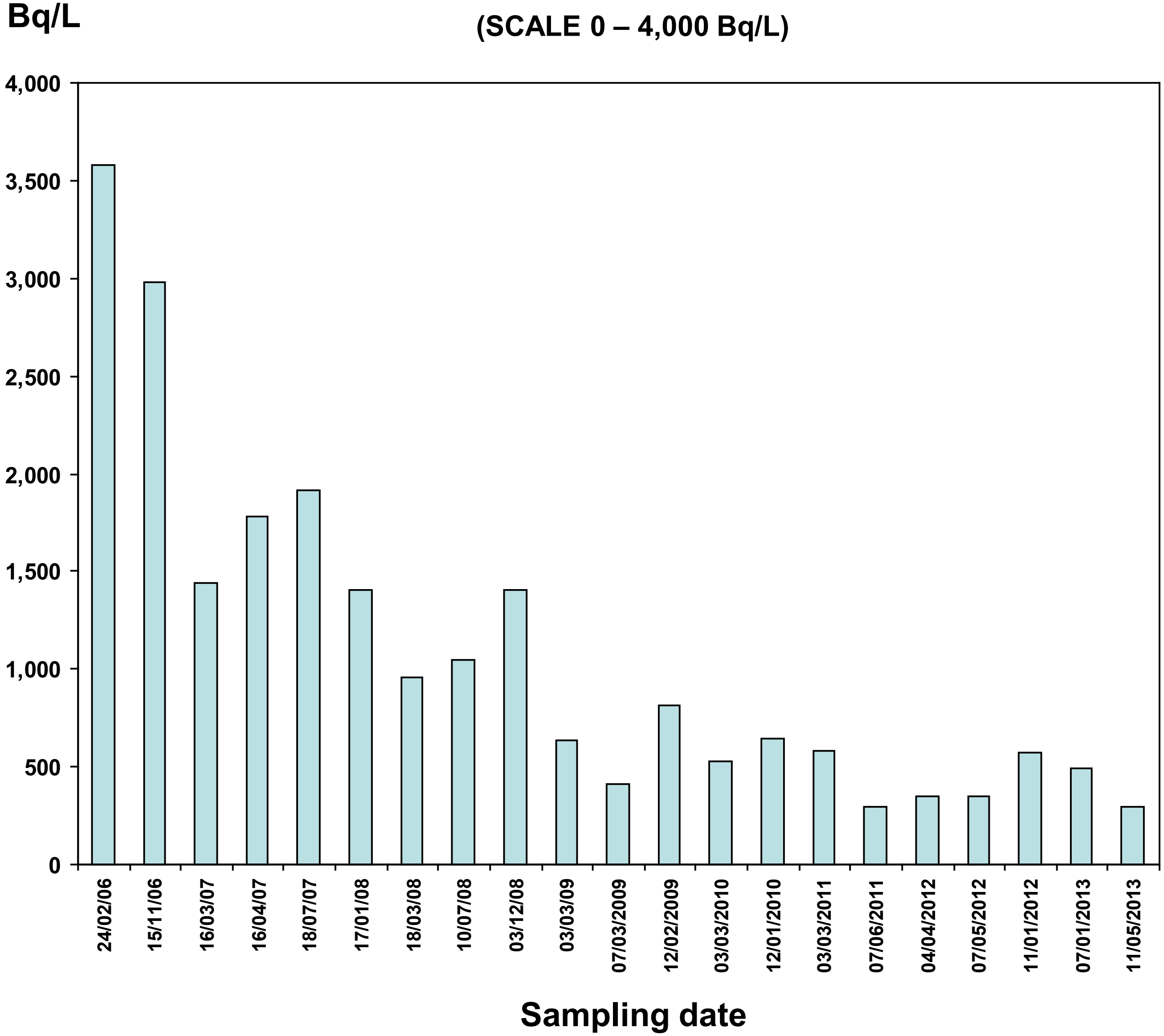
APPENDIX K

MONITORING RESULTS
CN-3D

(SCALE 0 – 3,500 Bq/L)



MONITORING RESULTS
CN-3S



APPENDIX K

APPENDIX L

Runoff Monitoring Results for 2014

DOWNSPOUTS							
DATE	TIME	DS-1	DS-2	DS-3	DS-4	DS-5	DS-6
31-Mar-14	1:30 PM	No Sample	470	100	No Sample	100	No Sample
17-Apr-14	2:00 PM	No sample	880	170	560	420	410
9-May-14	7:45 AM	100	100	190	100	460	1,690
11-Jun-14	11:00 AM	No sample	100	100	100	100	100
12-Aug-14	9:00 AM	100	100	100	100	100	100
24-Nov-14	3:00 PM	No sample	100	100	100	360	870
Average		**100**	**292**	**127**	**192**	**257**	**634**
Average all results		**267**					

Values are all in Bq/L
Lower limit of detection = 100 Bq/L

APPENDIX M

Precipitation Monitoring Results for 2014

PRECIPITATION SAMPLERS								
	1P	4P	8P	11P	15P	18P	22P	25P
	Bq/L							
January 9 - February 4, 2014	138	92	27	6	7	23	56	88
February 4 - March 4, 2014	8	134	24	15	18	35	150	28
March 4 - April 2, 2014	9	200	29	42	14	89	54	30
April 2 - May 1, 2014	5	27	67	16	29	43	9	20
May 1 - June 4, 2014	20	100	No Sample	54	15	33	14	39
June 4 - July 3, 2014	8	29	16	8	7	5	5	7
July 3 - August 6, 2014	16	19	10	8	5	8	10	122
August 6 - September 3, 2014	13	42	277	5	5	7	7	12
September 3 - October 2, 2014	27	48	21	18	9	9	9	10
October 2 - November 4, 2014	10	31	42	39	5	27	12	103
November 4 - December 3, 201	206	62	11	5	5	27	62	138
December 3, 2014 - January 9,	10	16	64	5	26	260	179	14
Average	**39**	**67**	**53**	**18**	**12**	**47**	**47**	**51**
Average all results	**42**							

APPENDIX N

Compilation of Water Level Measurements for 2014

Date	Monitoring Wells (Values in m)														
	MW06-1	MW06-2	MW06-3	MW06-8	MW06-9	MW06-10	MW07-11	MW07-12	MW07-13	MW07-15	MW07-16	MW07-17	MW07-18	MW07-19	MW07-20
Easting	335449	335478	335363	335464	335401	335408	335478	335465	335448	335403	335393	335392	335387	335378	335296
Northing	5074615	5074578	5074535	5074590	5074605	5074506	5074576	5074588	5074616	5074605	5074599	5074599	5074595	5074587	5074616
TOP Elevation (m)	130.99	130.03	133.09	130.30	131.15	131.32	130.06	130.41	130.92	130.84	130.98	131.08	131.23	131.61	130.70
GS Elevation (m)	130.17	129.24	132.32	129.58	129.86	130.24	129.15	129.58	130.03	129.93	130.16	130.16	130.37	130.79	129.85
Well Diameter (m)	0.051	0.051	0.051	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.051	0.032	0.032	0.032
Well Depth (m)	5.165	5.330	6.130	6.700	5.930	7.770	7.215	7.450	6.615	7.230	7.050	14.610	7.250	7.400	7.820
Stick-up (m)	0.820	0.788	0.767	0.720	1.290	1.077	0.905	0.835	0.893	0.910	0.822	0.915	0.868	0.815	0.850
08-Jan-14	125.99	126.56	127.03	124.82	125.82	125.46	124.99	124.76	125.23	124.98	125.12	121.22	125.23	131.61	123.45
04-Feb-14	126.69	126.95	127.02	124.99	125.87	125.47	125.13	124.92	124.31	125.11	125.04	121.01	125.25	125.32	122.90
03-Mar-14	127.01	126.67	127.03	124.76	125.40	126.08	124.90	124.71	124.31	124.87	124.85	120.69	124.89	125.01	123.35
01-Apr-14	128.52	127.66	128.38	125.87	126.43	126.69	125.93	125.87	126.12	126.66	126.55	120.86	126.52	126.66	124.91
30-Apr-14	129.01	128.05	130.18	127.81	129.55	129.38	127.84	127.90	128.13	129.35	129.30	124.81	129.42	129.41	127.22
03-Jun-14	128.73	127.70	129.20	127.50	129.21	128.64	127.52	127.42	127.26	128.69	128.61	123.98	128.63	128.66	126.57
02-Jul-14	128.59	127.62	129.02	127.24	128.83	128.31	127.35	127.22	127.22	128.21	128.26	123.79	128.07	128.35	126.32
05-Aug-14	128.37	127.38	127.76	126.50	127.94	127.15	126.59	126.46	126.63	127.29	127.37	122.35	127.17	127.13	125.38
02-Sep-14	128.48	127.45	127.67	126.55	128.16	127.22	126.59	126.52	126.71	127.31	127.28	121.98	127.20	127.10	125.47
01-Oct-14	128.34	127.42	127.69	126.45	128.12	127.30	126.65	126.54	126.60	127.31	127.10	122.07	127.05	127.10	125.56
03-Nov-14	128.59	127.84	128.77	127.02	128.55	127.92	127.12	127.01	127.06	127.94	127.87	122.22	127.79	127.85	125.82
02-Dec-14	128.44	127.93	128.77	126.97	128.34	127.78	126.98	126.80	126.77	127.71	127.61	122.97	127.70	127.54	125.95

Date	MW07-21	MW07-22	MW07-23	MW07-24	MW07-25	MW07-26	MW07-27	MW07-28	MW07-29	MW07-31	MW07-32	MW07-33	MW07-34	MW07-35	MW07-36	MW07-37
Easting	335522	335472	335492	335519	335466	335357	335354	335352	335384	335471	335517	335465	335393	335354	335338	335468
Northing	5074584	5074584	5074560	5074530	5074498	5074567	5074611	5074612	5074592	5074583	5074530	5074497	5074591	5074613	5074629	5074589
TOP Elevation (m)	129.51	130.25	130.04	129.03	129.85	132.42	132.89	132.71	131.09	130.16	128.86	129.88	131.12	132.89	133.10	130.06
GS Elevation (m)	128.78	129.05	129.29	128.22	129.03	131.85	132.02	132.04	130.57	129.38	128.23	129.26	130.71	132.16	132.31	129.47
Well Diameter (m)	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032
Well Depth (m)	7.580	7.465	5.905	6.525	6.750	7.310	8.330	14.400	13.000	13.240	13.090	14.230	9.110	9.390	9.330	8.590
Stick-up (m)	0.730	1.200	0.750	0.810	0.820	0.570	0.870	0.670	0.520	0.780	0.630	0.620	0.410	0.730	0.790	0.590
08-Jan-14	123.25	124.74	126.19	125.78	126.55	125.79	124.88	121.18	121.20	120.50	120.49	120.48	124.72	124.61	124.29	124.90
04-Feb-14	123.34	124.87	126.21	125.43	126.60	125.76	124.88	120.98	121.01	120.38	120.44	120.35	124.72	124.60	124.27	125.04
03-Mar-14	122.98	124.65	125.91	125.36	126.34	125.46	124.64	120.63	120.65	120.22	120.21	120.24	124.42	124.34	124.04	124.83
01-Apr-14	125.17	125.75	126.92	126.10	127.16	127.52	125.59	120.78	120.82	120.54	120.48	120.53	125.74	125.15	124.71	125.93
30-Apr-14	126.61	127.87	128.27	127.13	128.25	130.20	129.66	124.60	124.58	125.13	125.16	125.14	128.81	129.19	128.35	128.04
03-Jun-14	128.01	127.42	127.89	126.98	127.78	129.14	128.68	123.95	123.94	123.47	123.44	123.41	127.97	128.25	127.38	127.56
02-Jul-14	127.81	127.26	127.71	126.73	127.63	128.69	128.05	123.66	123.67	123.32	123.33	123.30	127.38	127.72	126.80	127.41
05-Aug-14	128.00	127.47	127.17	126.27	127.11	127.09	126.72	122.39	122.35	121.37	121.35	121.32	127.33	126.29	125.30	126.63
02-Sep-14	127.96	126.48	127.24	126.34	127.15	127.05	126.72	122.19	122.18	120.88	120.84	120.85	126.39	126.25	125.30	126.66
01-Oct-14	128.00	126.48	127.43	126.53	127.26	127.24	126.77	122.22	122.21	120.72	120.73	120.75	126.41	126.24	125.24	126.63
03-Nov-14	128.01	127.01	127.68	126.85	N/A	128.34	127.50	123.20	123.13	122.99	122.99	N/A	126.96	127.02	125.97	127.18
02-Dec-14	128.01	126.81	127.53	126.71	N/A	128.37	127.34	122.94	122.93	122.56	122.56	N/A	126.90	126.85	125.75	126.99

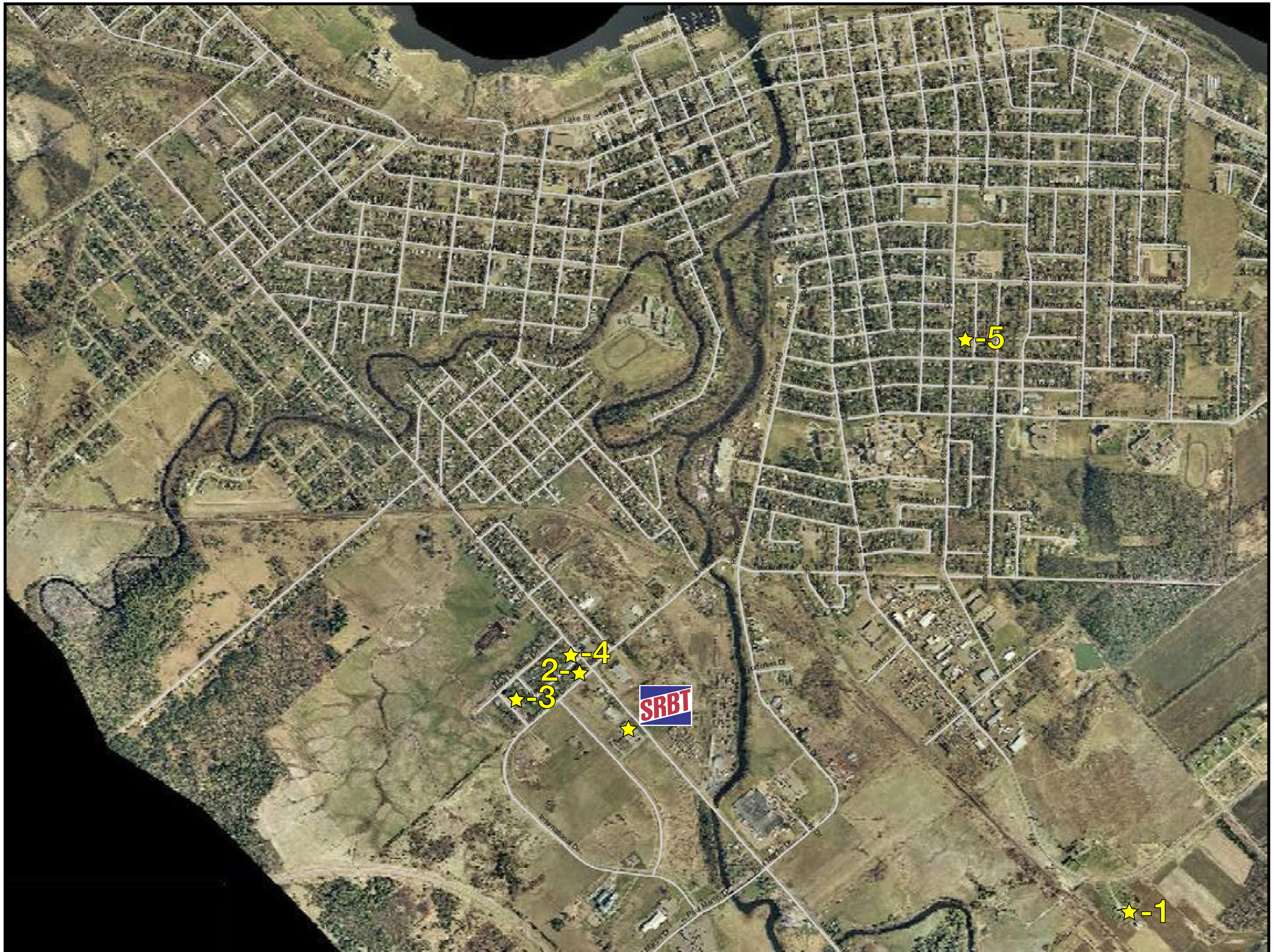
APPENDIX O

Produce Monitoring Results for 2014

DESCRIPTION	DISTANCEE FROM STACKS	RHUBBARB	TOMATO	GREEN PEPPER	PLUM	POTATO	ZUCCHINI	ONION	CARROT	APPLE	AVG
406 BOUNDARY RD	400									**100**	**100**
413 SWEEZEY CRT	400			**209**					**122**	**217**	**183**
408 BOUNDARY RD	400	**402**	**92**		**154**			**59**			**177**
366 CHAMBERLAIN	2,000	**25**	**9**			**7**				**13**	**13.5**
										AVG	**118**

DESCRIPTION	DISTANCE FROM STACKS	RHUBBARB	TOMATO	SWISS CHARD	CUCUMBER	POTATO	ZUCCHINI	ONION	CARROT	APPLE	AVG
LOCAL MARKET	1,750		**48**		**15**		**289**	**123**	**410**		**177**
										AVG	**177**

SRB PRODUCE SAMPLING - 2014



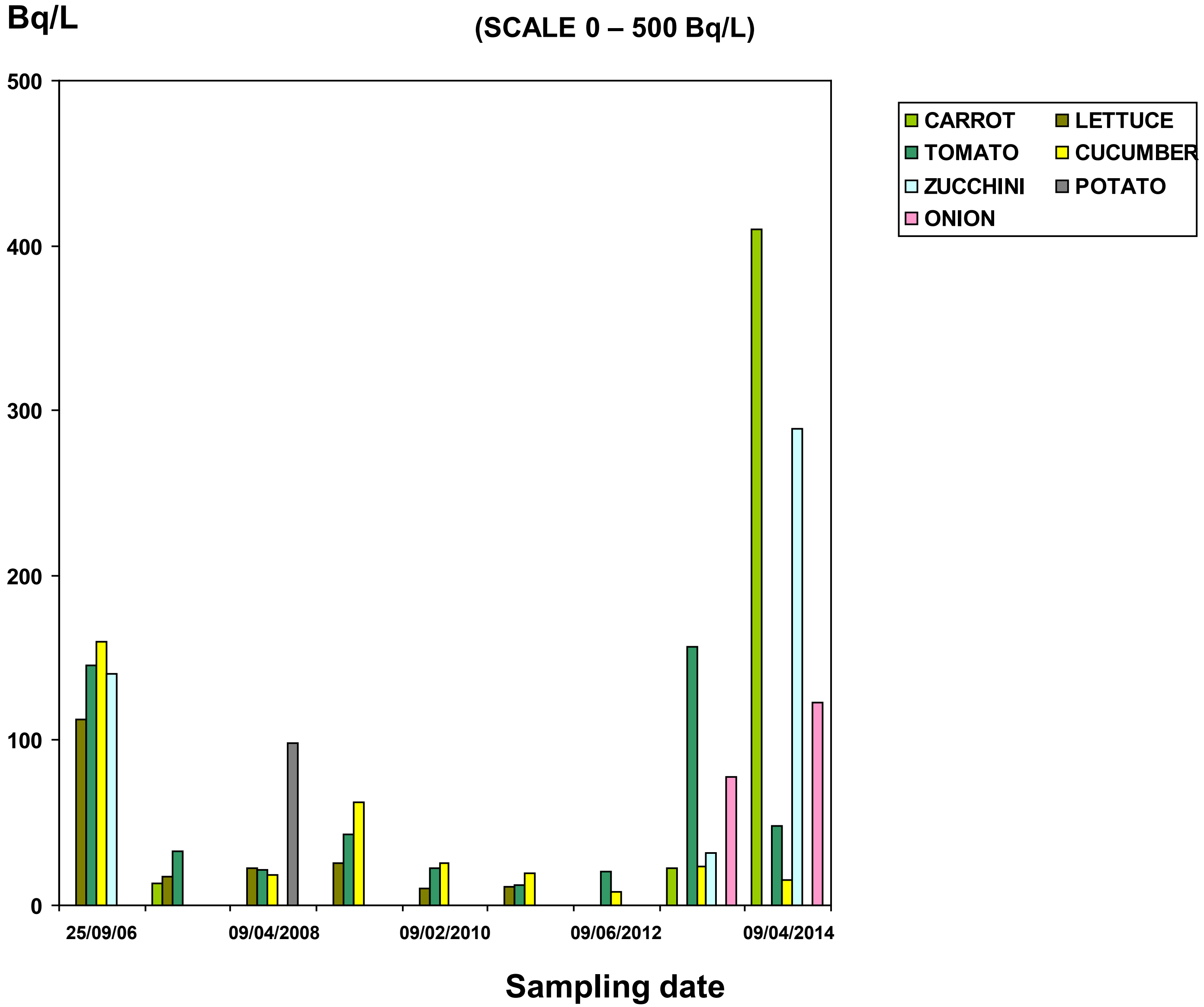
Rev. 11/ 03/2014

Sample Locations

1- Local Market ~ 1.75 KM
2- 406 Boundary Rd. ~ 0.35 KM
3- 413 Sweezey Crt. ~ 0.4 KM
4- 408 Boundary Rd. ~ 0.35 KM
5- 366 Chaimberlain St. ~ 1.65 KM

PRODUCE MONITORING RESULTS
BOUDENS GARDENS

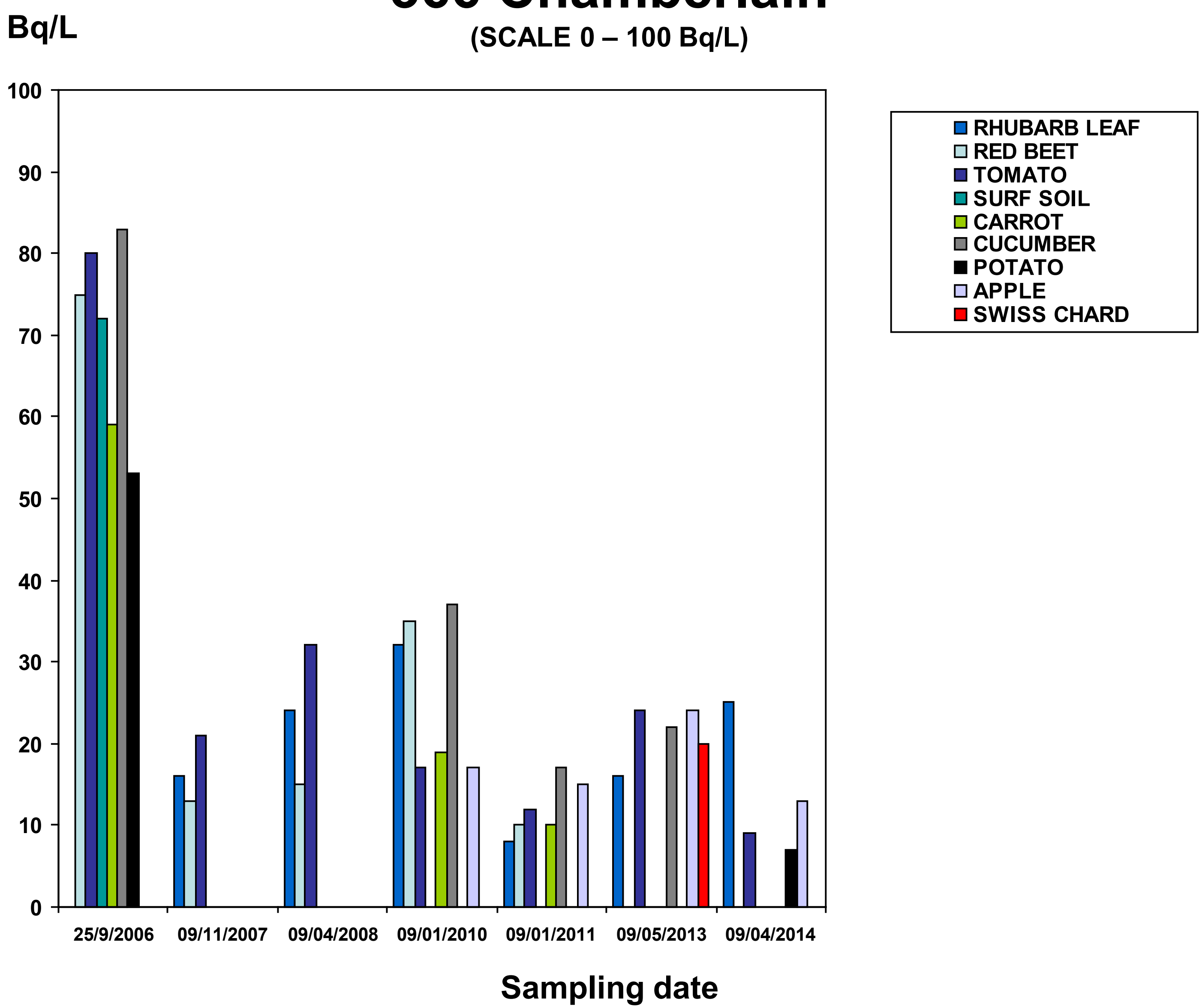
(SCALE 0 – 500 Bq/L)



APPENDIX O

PRODUCE MONITORING RESULTS
366 Chamberlain

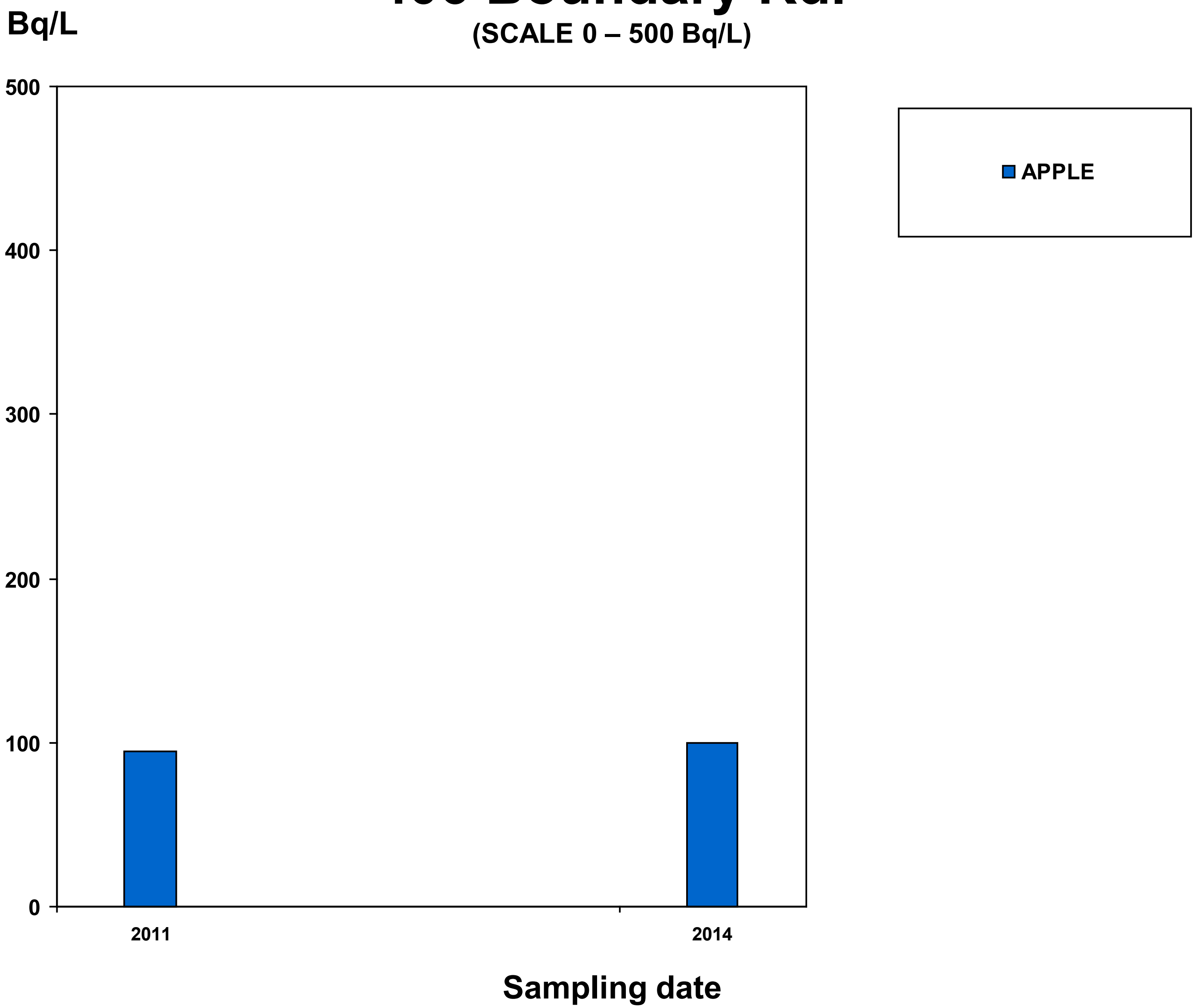
(SCALE 0 – 100 Bq/L)



APPENDIX O

PRODUCE MONITORING RESULTS
406 Boundary Rd.

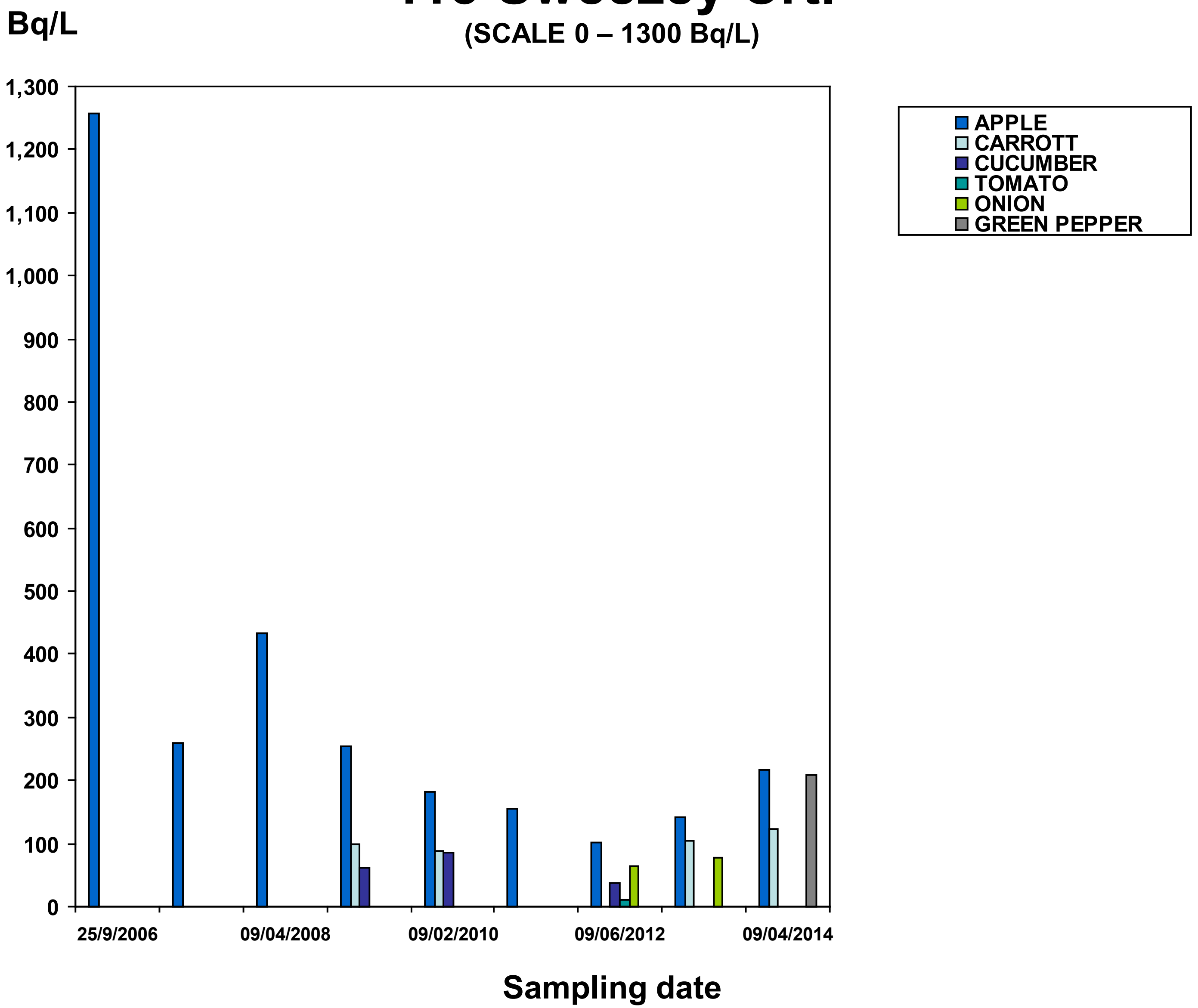
(SCALE 0 – 500 Bq/L)



APPENDIX O

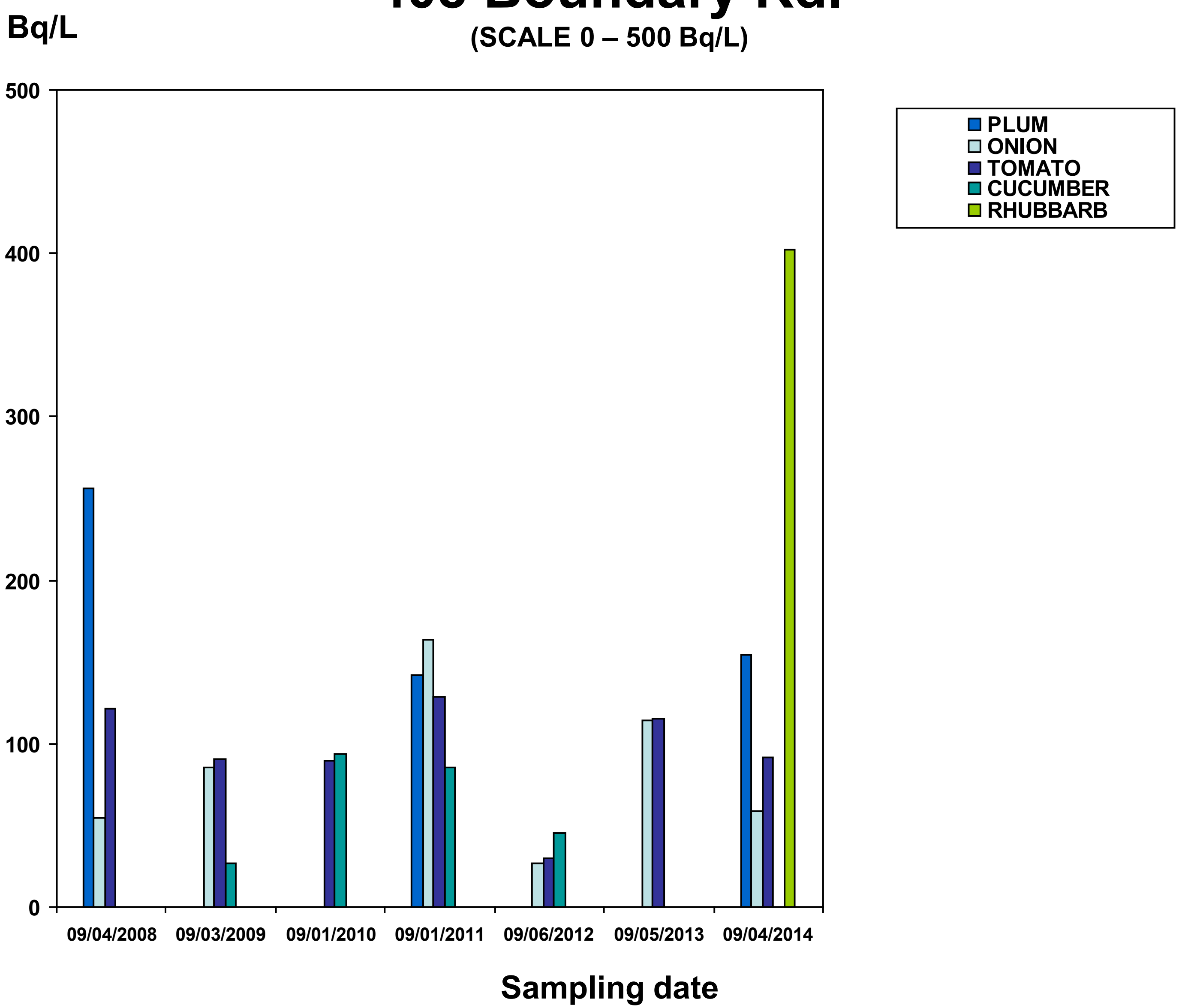
PRODUCE MONITORING RESULTS
413 Sweezey Crt.

(SCALE 0 – 1300 Bq/L)



APPENDIX O

PRODUCE MONITORING RESULTS
408 Boundary Rd.
(SCALE 0 – 500 Bq/L)

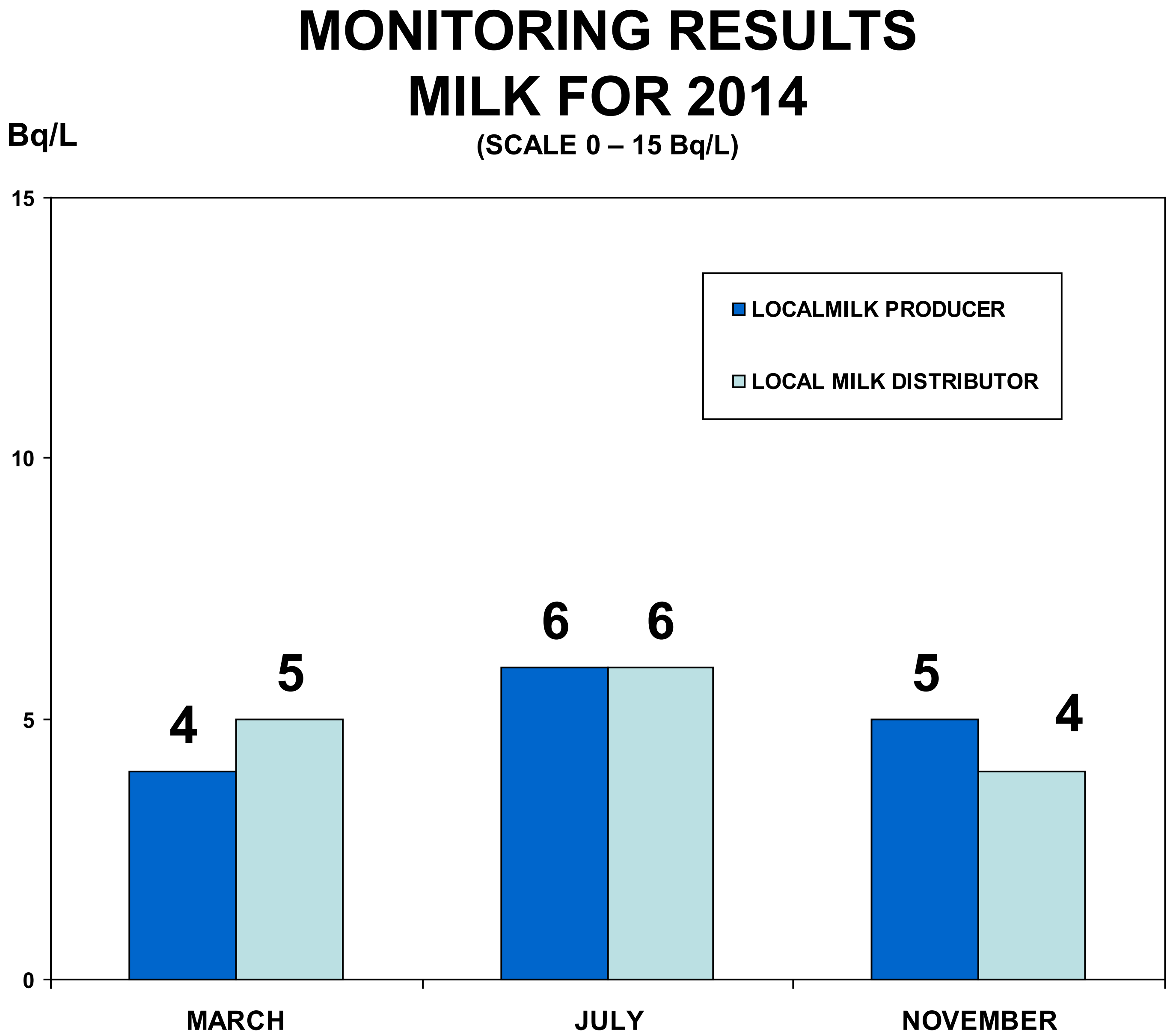


APPENDIX O

APPENDIX P

Milk Monitoring Results for 2014

DESCRIPTION	March	July	November	AVG
LOCAL PRODUCER	4	6	5	5
LOCAL DISTRIBUTOR	5	6	4	5
			AVG	5

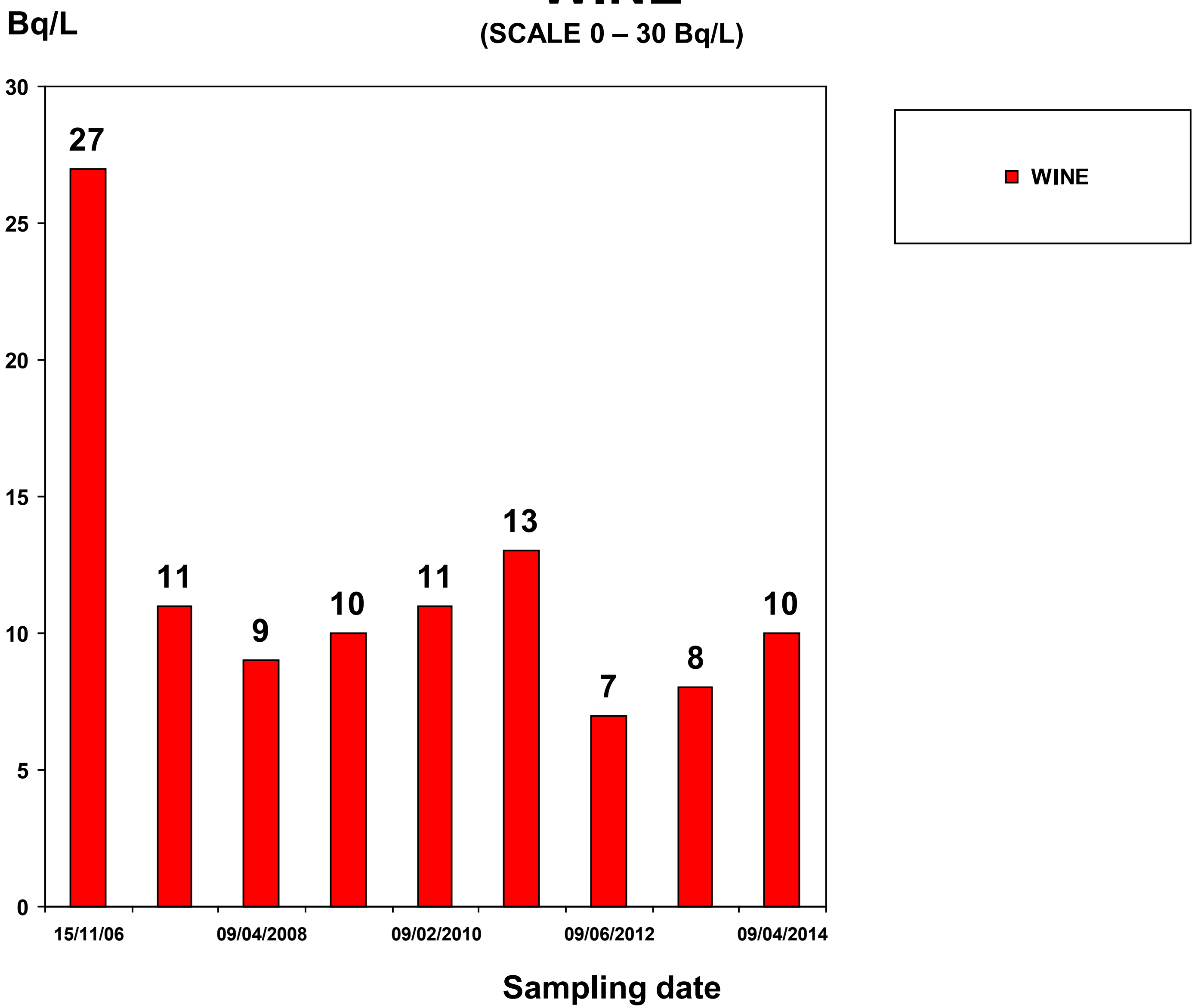

MONITORING RESULTS
MILK FOR 2014
(SCALE 0 – 15 Bq/L)
Bq/L
15
10
5
0
LOCALMILK PRODUCER
LOCAL MILK DISTRIBUTOR
4
5
6
6
5
4
MARCH
JULY
NOVEMBER

APPENDIX P

APPENDIX Q

Wine Monitoring Results for 2014

MONITORING RESULTS
WINE



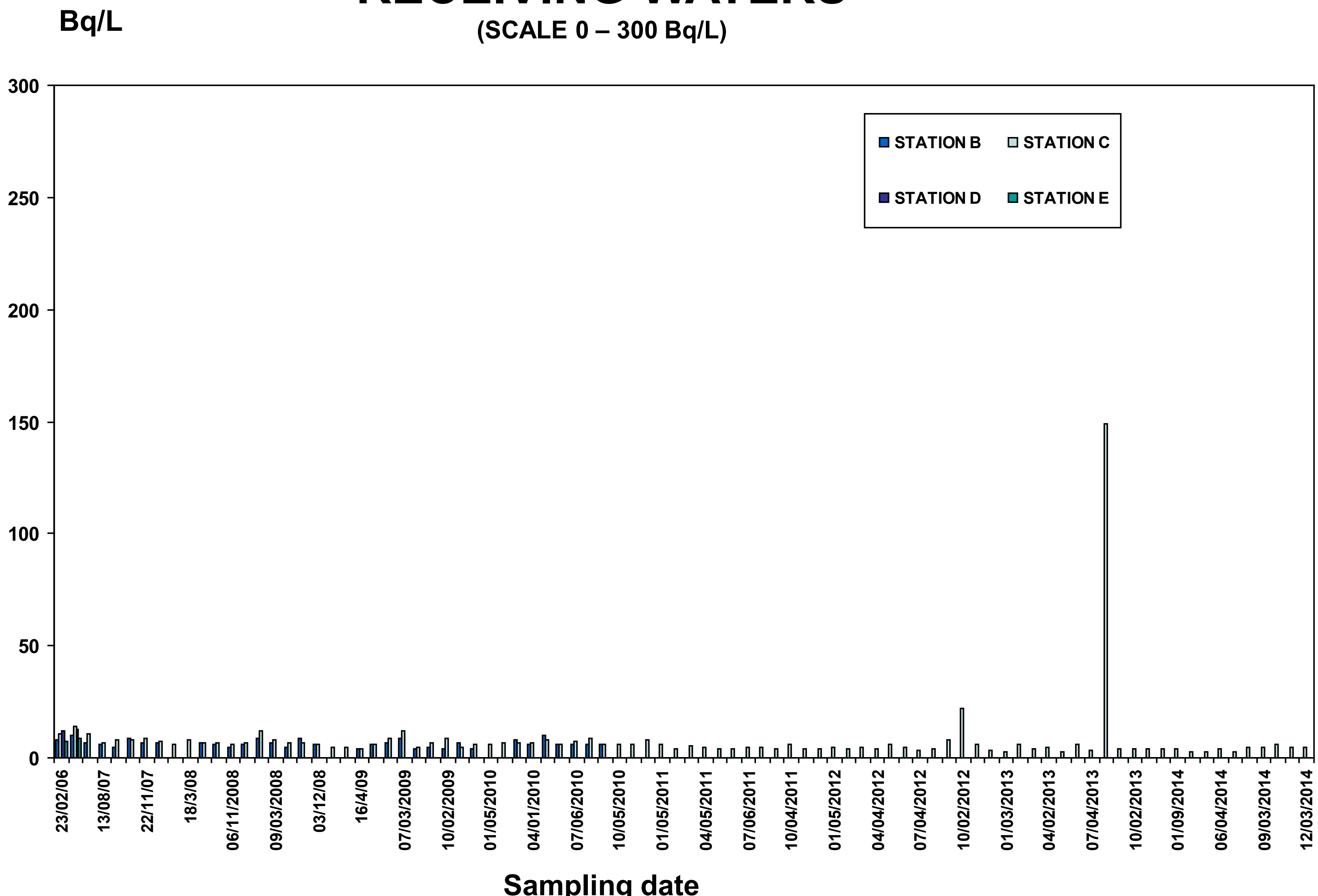
APPENDIX Q

APPENDIX R

Receiving Waters Monitoring Results for 2014

MONITORING RESULTS
RECEIVING WATERS

(SCALE 0 – 300 Bq/L)



APPENDIX R

APPENDIX S

Weather Data for 2014

	WEATHER MONITORING DATA 2014									
	Pressure, mbar()	Counts, # ()	Wind Speed, m/s()	Gust Speed, m/s()	Wind Direction, ø()	Temp, °C()	RH, %()	DewPt, °C()	Wind sector (nesw)	Total rain (mm)
Jan-14	994.49	126	3.06	4.38	179.86	-10.23	77.48	-13.51	SSE	25.2
Feb-14	998.97	36	3.03	4.39	163.35	-10.63	70.07	-15.21	SSE	7.2
Mar-14	998.78	63	3.3	4.8	146.1	-5.36	66.6	-10.93	SE	12.6
Apr-14	998.09	469	3.34	4.94	145.93	4.86	68.9	-1.08	SE	93.8
May-14	997.89	327	2.63	4.01	193.05	14.28	67.14	7.45	SSW	65.4
Jun-14	997.38	675	2.31	3.58	209.92	19.1	71.34	13.14	SSW	135
Jul-14	996.69	609	2.09	3.33	251.26	18.84	75.42	14.01	WSW	121.8
Aug-14	997.63	417	2.26	3.43	232.01	18.25	81.17	14.64	SW	83.4
Sep-14	1001.59	371	2.21	3.42	185.84	13.75	82.62	10.63	SSW	74.2
Oct-14	995.26	477	2.79	4.28	164.52	8.38	82.8	5.47	SSE	95.4
Nov-14	996.57	123	2.95	4.69	212.65	-1.17	79.57	-4.33	SW	24.6
Dec-14	1001.49	178	2.74	4.17	209.51	-7.37	82	-10	SSW	35.6
YEARLY AVERAGE	997.90	322.58	2.73	4.12	191.17	5.23	75.43	0.86	SSW	64.52

APPENDIX T

Shipments Containing Radioactive Material for 2014

SHIPMENTS CONTAINING RADIOACTIVE MATERIAL FOR 2014

Month / 2014	**Number of Shipments**
January	77
February	93
March	95
April	95
May	110
June	79
July	102
August	79
September	102
October	120
November	92
December	78
Total Shipments	***1122***
2014 Monthly Average:	***86.31***

DISTRIBUTION OF SHIPMENTS CONTAINING RADIOACTIVE MATERIAL FOR 2014