BAE SYSTEMS

ORDNANCE SYSTEMS INC.
Radford Army Ammunition Plant
4050 Pepper's Ferry Road
Radford Virginia 24141

February 7, 2017

Leslie Romanchik
Hazardous Waste Program Manager
Virginia Department of Environmental Quality
629 East Main Street
Richmond, Virginia 23219

Subject: RFAAP Open Burning Ground Permit Subpart X Application
Response to Third Notice of Deficiency on Technical Completeness
Radford Army Ammunition Plant, Radford, Virginia
EPA ID#: VA1210020730

Dear Ms. Romanchik:

BAE Systems, Ordnance Systems, Inc. (BAE) and the Radford Army Ammunition Plant (RFAAP) are in receipt of your January 12, 2017, correspondence regarding the technical completeness of our Resource Conservation and Recovery Act (RCRA) Subpart X renewal application for our open burning ground (OBG). This letter requested a formal response to the notice of deficiencies (NODs) on or before February 13, 2017.

Attachment 1 to this letter provides RFAAP's formal response to each of the NODs. For each NOD provided by DEQ, we have summarized our conversations to date, made additional comments where appropriate, and summarized the action items resulting from the NOD. DEQ's comments are provided in *italic* type and RFAAP's response is provided in standard type. To allow tracking of those items deemed satisfied and not satisfied and to facilitate review of this response, we have added checkboxes in the response letter. Those items deemed satisfied in DEQ's January 12, 2017, letter have been marked as such.

Attachment 2 to this letter provides modified sections of the OBG permit application. These sections have been revised in response to the NODs provided in DEQ's letter. The following revised sections are included:

- Attachment II.C, Soil Monitoring Plan
- Attachment II.F, Contingency Plan
- Attachment II.I, 100-Year Flood Plain Standard
- Module IV, Detection Monitoring
- Module V, Groundwater Compliance Monitoring
- Module VII, Regulated Corrective Action

After you have reviewed each of the responses provided herein, please contact us to schedule a conference call for any remaining issues. To schedule this conference call or address any initial questions or concerns, please contact me directly at (540) 639-7005or via e-mail at bill.hendon@baesystems.com.

Sincerely,

Bill Hendon, PG, CPG
Safety, Health, & Environmental Manager
BAE Systems, Ordnance Systems Inc.

Enclosure:

17-0900-023
J. Hawks

Attachment 1: Written Responses to Noted Deficiencies
Attachment 2: Revised Application Sections

c: A. Scott, R. McAvoy, S. Iyer, M. Livaniou, H. Keceli, K. Kochan, VDEQ-CO
C. McGoldrick, EPA Region III (3LC50)
B. Lohman, VDEQ-BRRO

Coordination: J. McKenna
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bc: J. McKenna, Army Staff
A. Patton, BAE Staff
J. Hawks, BAE Staff
M. Gehring, Coterie Environmental
J. Frazier, Draper Aden Associates
M. Lawless, Draper Aden Associates
Environmental File – 17-0900-023

Concerning the following:

RFAAP Open Burning Ground Permit Application NOD Response
Radford Army Ammunition Plant, Radford, Virginia
EPA ID#: VA1210020730

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

SIGNATURE: _____

PRINTED NAME: Alicia M. Masson
TITLE: LTC, CM
Commanding

SIGNATURE: _____

PRINTED NAME: William M. Barnett
TITLE: General Manager
BAE Systems

BAE Systems, Ordnance Systems Inc. is contracted by the Army to operate the facilities RCRA permits, which includes the permit to open burn propellant waste. This letter serves as a formal response to Notice of Deficiencies (NODs) received on the open burning ground permit application.

Attachment 1
Written Responses to Noted Deficiencies

Section 1 of the Notice of Deficiency Addressing the Technical Completeness of the Part A and Part B Permit Applications for the Renewal of the Subpart X Open Burning and Open Detonation Permit, Overall Technical Deficiencies of the Permit Application

General Comments on RAAP OBG Application:

Satisfied

☐ 1. *Page and section numbers are incorrect across multiple sections. Please reformat the application so that page and section numbers are sequential for easier reference while reviewing.*

RFAAP acknowledges discrepancies in the numbering of section pages throughout the application. We will correct these discrepancies as revisions are made to each section.

DEQ will review the revised section numbering when submitted by RAAP. If corrected this will satisfy the comment made.

No response was provided with this submission. However an informal response was submitted which shows renumbering of sections that satisfies the comment made.

☒ 2. *Attachment II.C has had the word "contamination" changed to "impacted or impact to soil". Please provide a justification for this language change. [DEQ will review the revised language in Attachment II.C when submitted by RAAP. If corrected according to the comment made this will satisfy the comment made.] (Additional comment provided in brackets included in DEQ letter dated August 15, 2016.)*

RFAAP will modify Attachment II.C as requested, reverting to the original word of "contamination" in each instance that it was changed to "impacted" or "impact to soil."

DEQ will review the revised language in Attachment II.C when submitted by RAAP. If corrected according to the comment made this will satisfy the comment made.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP modified Attachment II.C as requested, reverting to the original word of "contamination" in each instance that it was changed to "impacted" or "impact to soil." Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

Specific Comments for the RAAP Application:

Satisfied

☒ 1. ***Attachment II.A: Figures II.A-2, II.A-4 and II.A.5 –*** *Figures II.A-2, II.A-4 and II.A-5 are not at a scale of no more than 200 feet per inch as specified in 40 CFR 270.14(b)(19) and checklist item B-2(a). The facility shall resubmit the figures at the required scale.*

As discussed with the explosive waste incinerator (EWI) permit application, it is not possible (nor practical) to provide one map specifying all of the information required by 40 CFR § 270.14(b)(19). Therefore, this information has been provided on multiple maps. The requirement to provide topographic contours at a scale of no more than 200 feet per inch is satisfied with Figure II.A-3.

DEQ agrees with the approach to satisfy the regulatory requirement RAAP has made and the comment is now satisfied.

Satisfied

☐ 2. ***Attachment II.I: Section II.I.1(ii), Page II.I-1 –*** *The language of Section II.I.1(ii) has been revised to state that no adverse effects to human health or the environment will occur for soils around the OBG in the event of a washout. While Section II.I.4 does describe the procedures to be followed after a washout in the Soil Monitoring Plan (SMP) there is no reference made to this section in Section II.I.1(ii) and simply a blanket statement regarding an assumption of no impact to soils after a washout which cannot be predicted by the facility, only verified by sampling and analysis of the soils after a washout. The language shall be revised to make reference to the requirements of Section II.I.4 or the SMP itself which will be used to verify if an impact to soils has occurred through approved sampling and analysis.*

RFAAP will revise Section II.I.1(ii) to make reference to the requirements of Section II.I.4 or the SMP itself, as requested.

DEQ will review the revised language in Section II.I.1(ii) when submitted by RAAP. If the revised language correct the deficiency noted in the comment it will satisfy the comment made.

RFAAP provided a draft, modified Attachment II.I for DEQ's review on January 9, 2017. RFAAP has incorporated DEQ's feedback on that draft and is providing a final, revised Attachment II.I with this submittal.

☐ 3. ***Attachment II.I: Section II.I.3, Page II.I-2*** *– Section II.I.3 has been revised to contain the following language:*

"*If diesel has already been applied to the pans or if the waste in the pans is considered a Class 1.1 explosive, supervision will evaluate the risks to human health and the environment and will proceed in a manner that will most effectively mitigate these risks."*

The language shall be revised to provide examples of how the supervisor at the OBG will proceed in these specific instances. The examples may be added to Table II.I-1 and the language may be revised to incorporate the reference to the procedures to be used in the Table.

RFAAP will modify Section III.I.3 to provide examples of how the supervisor at the OBG will proceed if a precipitation event occurs after diesel has been applied to the pans or in the event that a Class 1.1 explosive has been loaded on the pans. RFAAP will clarify that this is a highly unlikely event but will make sure that procedural considerations have been given to its possible occurrence.

DEQ will review the revised language in Section III.I.3 when submitted by RAAP. If acceptable the comment will be satisfied.

RFAAP provided a draft, modified Attachment II.I for DEQ's review on January 9, 2017. RFAAP has incorporated DEQ's feedback on that draft and is providing a final, revised Attachment II.I with this submittal.

☒ 4. ***Attachment II.B, Section II.B.2f, Page II.B-8*** *– Section II.B.2f contains the following revision:*

"The Group 20 wastes do not ~~It doe~~ ~~not~~ include any listed wastes nor does it ~~exceed any of the limitations on specific constituents set forth in Module III of this permit~~ carry any RCRA codes not authorized by this Permit."

Please provide an explanation as to why the language was modified to describe Group 20 wastes as now being potentially able to include constituents in an amount which will violate the throughput limits on constituents being treated at the OBG. If no satisfactory explanation can be provided to the DEQ the current language in Section II.B.2f will be retained in the condition.

Satisfied

The concentration limits specified in Module III apply on an individual burn basis, not an individual waste group basis. For example, a waste group may have a barium concentration higher than the Module III limit. But, if the total concentration of barium in the burn is less than that specified in Module III, the burn may be performed as configured. Therefore, the statement regarding limitation of Group 20 wastes below the limits specified in Module III is inappropriate.

DEQ accepts the explanation provided by RAAP and the comment is now satisfied.

☒ 5. ***Attachment II.B, Table 2 –*** *Table 2, which presented a breakdown of the propellant constituent weight percents for each waste group, has been removed from the Waste Analysis Plan. The permittee shall revise Section II.B to include Table 2.*

Table 2 in Attachment II.B provided a significant level of detail on each waste group that is irrelevant to regulation of that waste group under RCRA. There is no requirement under 40 CFR § 264.13 to provide this level of specification of the waste streams; RCRA only requires that information be obtained that is necessary to store, treat, and dispose of the waste. Examples of this for the OBG would include determination of the waste code and determination of pollutants for which specific permit limits are provided. Furthermore, this analysis need only be maintained in the operating record; it is not required in the waste analysis plan pursuant to 40 CFR § 264.13(b). Therefore, RFAAP does not feel it appropriate to reinstate the table as requested.

In response to DEQ's concern for adequately documenting the expected characterization of each waste stream, RFAAP will develop and maintain onsite a profile of each waste group. Pursuant to Section II.B.5a of Attachment II.B, this profile will identify the hazardous constituents and characteristics necessary for proper designation and management of the waste stream. The profile will also include concentrations of all 40 CFR 261 Appendix VIII (adopted by reference in 9 VAC 20 60 261) constituents in that waste. Every waste profile will be reviewed at least annually in order to confirm that it still accurately represents the waste stream. A waste stream will be re-profiled whenever the Permittees have reason to believe that the process or operation generating the hazardous waste has changed.

DEQ accepts the explanation provided by RAAP and the comment is now satisfied.

☒ 6. ***Attachment II.B, Tables 3-7 –*** *Tables 3-7 of Attachment II.B have been removed as they have been replaced by VELAP approved SOPs. Please provide copies of the VELAP certifications and SOPs for these analytical methods for review by DEQ. The certifications and SOPs will not be included in the final permit documents but do need to be reviewed to ensure the methods will satisfy the regulatory requirements for waste analysis.*

RFAAP will provide copies of the VELAP certifications and SOPs as requested.

DEQ will review the submitted VELAP and SOP documents when submitted to determine if they satisfy the comment

RFAAP submitted the requested documentation on August 30, 2016.

DEQ has reviewed the submitted VELAP and SOP document and the comment is now satisfied.

Satisfied

☒ 7. ***Attachment II.B, Section II.B.5a, Page II.B-13 –*** *Section II.B.5a does not include several metals, and the associated analytical method, from the previous Table 3. The permittee shall revise Section II.B.5a to include the following metals: Antimony, Thallium, Cadmium, Nickel, Silver, Beryllium, Barium, Selenium, Mercury and Arsenic. Please revise the section to include these metals and their associated analytical method.*

The metals specified in Section II.B.5a, Analysis for Compliance, are those metals on which individual concentration limits are established in Module III. The other metals specified in DEQ's comment are only determined for waste profiling analysis. Pursuant to 40 CFR 261, these determinations may be made via either process knowledge or waste analysis. Therefore, analysis for each of the metals specified by DEQ is not necessary. The bulleted list of metals provided in Section II.B.5a, Analysis for Compliance, are determined monthly via waste analysis using the methods specified below the bullet list.

DEQ accepts the explanation provided but cautions RAAP that the list of metals with established concentration limits in Module III may change depending on the results of the risk assessment and that the list in Section II.B.5a will then need to be updated based on the rationale provided by RAAP.

RFAAP understands that limitations in the Permit may change as a result of the risk assessment and further understands that these changes may require that additional analyses be incorporated to the monthly analytical scheme.

DEQ concurs with RAAP's statement and the comment is now satisfied.

☒ 8. ***Attachment II.B, Section II.B.5a, Page II.B-13 –*** *Please explain the rationale by only reporting Chloride and Perchlorate testing as chloride equivalents instead of reporting them as distinct compounds.*

The waste contains two types of chlorine - inorganic chlorine and organic chlorine as perchlorate. RFAAP has to comply with a concentration limit for total chlorine at the burning ground. Total chlorine (inorganic plus organic) is typically determined by placing a waste in a bomb calorimeter and converting all organic chlorine to chloride prior to performing the chloride analysis via ICP. Given the nature of RFAAP's wastes, placing a waste sample in a bomb calorimeter is not recommended. Therefore, RFAAP has developed an alternative method to determine total chlorine and comply with the concentration limit presented in our Permit. RFAAP determines inorganic chlorine and perchlorate. The perchlorate measurement is then converted to chloride equivalents to allow comparison with the total concentration limit provided in the Permit. This method of analysis and compliance has been consistent over the life of the Permit.

DEQ accepts the explanation provided by RAAP and the comment is now satisfied.

☐ 9. ***Attachment II.B, Section II.B.4a, Page II.B-10 –*** *Section II.B.4a regarding waste sampling has been changed to remove the requirement to attach the date the sample was taken from the sampling procedure and instead simply lists the month. This procedure is not adequate to ensure best QA/QC practices as the absence of a date will not allow the permittee to identify the waste which may be out of compliance with the operating limitations in Module III. The language shall be revised to incorporate the labeling of sampling containers with the full date the sample was taken.*

RFAAP accumulates waste material in satellite accumulation areas and then stores this material on a temporary basis in less than 90 day storage areas. At the time the waste is sent to the area for destruction, it could have been in storage, either via satellite accumulation or temporary storage for over three months. Generally, a sample collection date is assigned to satisfy

Satisfied

laboratory holding times. However, as the material is sitting in storage for an extended period of time, any sample date that is assigned to a sample provides an arbitrary representation of the "age" of that sample and is meaningless in determination and evaluation of sample holding time. Furthermore, the sample that is analyzed is reflective of a series of samples collected over the month to form the sample composite, not a single sample collected on a single date. Therefore, RFAAP assigns a sample month to the sample to reflect the month in which the composite sample was collected and allow tracking of the waste that went into each sample. Assigning a date to this composite is not appropriate.

Please explain how the dating of the waste samples is not appropriate to ensure compliance that the permitted waste groups, with constituents in the ratios dictated by the operating conditions, given there have been violations of the constituent limits for the waste groups treated at the open burning grounds. DEQ requests a more detailed rationale from RAAP and if found unacceptable the previous language will be retained in the permit.

RFAAP does apply dates to the waste samples. Our original objection to DEQ's request was that the date should specify the exact date (e.g., 9/10/2016) on which the sample was taken. Instead of providing an exact date, RFAAP specifies the month that the composite sample was created (e.g., 9/2016). Should an issue arise with the results of that sample, burn records and internal waste manifest records are then used to determine the specific waste tubs that would have been included in that sampling event.

The rationale provided does not satisfy the comment made. The preferences of the facility have been noted but they do not satisfy the requirements necessary to demonstrate compliance if/when a violation of the permit conditions occurs. Additionally from the language RAAP provided in the response it appears as though the current permit condition may have been violated as the current permit requires the date, as in date/month/year, to be written on the sample container and not just the month and year. The language specifying the date the sample was taken be affixed on the sample container will be retained.

DEQ misunderstood the information relayed in our previous response. Each waste sample that is submitted to the laboratory is labeled with the date on which the sample was taken or created, including the day, month, and year on which it was created. However, the results from the sample analysis are used on a per month basis. For example, waste samples are composited typically on the 20th of the month. The sample card that accompanies the samples indicates the date in terms of mm/dd/yy. However, our objection to the permit language surrounds the misleading nature of this date. Per our waste analysis plan, samples of the wastes are collected throughout the month for each waste group. At the end of the sampling period, the operator then takes these sample grabs and combines them to form one sample composite for the month. The date does not indicate the date on which the waste was generated or process, but rather reflects the date on which the composite sample waste formed. We request that DEQ further clarify the "violation" that is of concern with this practice. We also request that a conference call be arranged after DEQ's review of this response to discuss this issue and ensure its quick resolution.

Satisfied

☒ 10. ***Attachment II.C, Section II.C.1, Page II.C-1 –*** *Section II.C.1 has been revised to remove the reference to the floodplain standard which requires the removal of hazardous waste from the unit prior to a flood and a comment has been made by RAAP that this citation is incorrect. The DEQ reminds RAAP that the additional language provided in the revised application is applicable to Subpart X units* ***in addition to*** *the requirements in the previous citation of 40 CFR 264.18(b)(1)(i). The language from 40 CFR 264.18(b)(1)(i) shall be restored in a revised submittal of Attachment II.C.*

RFAAP will revise Section II.C.1 as requested.

DEQ will review the revised language in Section II.C.1 when submitted to determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reverted the referenced text to that contained in the current Permit. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the restored language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ 11. ***Attachment II.C, Section II.C.1, Page II.C-1 –*** *The language of Section II.C.1 has been revised to the following:*

"The analysis of soil samples and subsequent provisions for remediation will, in effect, serve as the way in which the Virginia Department of Environmental Quality (VDEQ) assures that no adverse effects on human health or the environment will result if washout of the area occurs."

This revised language is incorrect as RAAP is the permittee, not DEQ, and is responsible for demonstrating that impacted soils have been removed and remediated according to the plan, which will demonstrate compliance with the floodplain protection standards in event of a washout. The language shall be revised to the previous version or an alternate version which reflects the comment made which will be evaluated for adequacy upon submittal.

RFAAP will revise the language in Section II.C.1 as requested.

DEQ will review the revised language in Section II.C.1 when submitted to determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reverted the referenced text to that contained in the current Permit. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the restored language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ 12. ***Attachment II.C, Section II.C.3.1, Page II.C-3 -*** *The language of Section II.C.3.1 has been revised to allow for one grab sample instead of the previous two and the combination of NB1 and NB2 into one sampling location. Please either provide a reference to a permit modification which has been approved by the DEQ to allow for this reduced sampling or revise the language to reflect two grab samples will be collected at the two locations NB-1 and NB-2.*

RFAAP proposed to combine the two sampling locations based on historical data from the many years of soil sampling at the site. RFAAP will prepare a separate submittal that

formalizes the request for combining the two site and provides justification necessary to substantiate this request.

DEQ will review the request for combining the two sampling locations, with the proper justification, when submitted to determine if the comment is satisfied.

RFAAP submitted the requested documentation to DEQ on September 8, 2016. RFAAP is awaiting DEQ review of the request and the data provided to substantiate it.

DEQ has reviewed the submission made on 9/8/2016 and does not concur with RAAP regarding the sampling sites. As these sites are chosen at random within the defined area to ensure contamination is not impacting the soil from the operating unit DEQ does not feel like it is appropriate to reduce the sampling locations. The language currently in the permit will remain unmodified.

RFAAP has revised the document to be consistent with the language currently in the permit. A final, revised Attachment II.C is included with this submittal.

☒ *13.* ***Attachment II.C, Section II.C.3.2, Page II.C-4 –*** *Section II.C.3.2 has been revised to remove reference to the Risk Assessment performed upon the initial permit action. While this is not incorrect as a new risk assessment will be performed as part of the permitting process the permittee is reminded that a reference to the new risk assessment will be included in this section and that the COPCs listed in Table II.C-1 may be revised to reflect COPCs identified in the new risk assessment.*

RFAAP has no objection to incorporating a reference to the new risk assessment once it is completed.

DEQ will review the revised language in Section II.C.3.2 when submitted after the risk assessment has been completed to determine if the comment is satisfied.

No modifications are required to the version of Attachment II.C included with the permit renewal application at this time. RFAAP understands that a reference to the new risk assessment will be inserted into this section once the risk assessment is completed.

As stated in the previous response DEQ will review the revised language once the risk assessment protocol has been finalized and the risk assessment report is submitted.

RFAAP added general language to Section II.C.3.2 to reference risk assessment. This general reference will be updated if necessary after completion of the risk assessment.

☒ *14.* ***Attachment II.C, Section II.C.3.2, Page II.C-5 –*** *See Comment 12 regarding reduced grab samples and locations for applicable revised language in Section II.C.3.2.*

As stated in response to Comment 12 above, RFAAP proposed to combine the two sampling locations based on historical data from the many years of soil sampling at the site. RFAAP will prepare a separate submittal that formalizes the request for combining the two site and provides justification necessary to substantiate this request.

DEQ will review the request for combining the two sampling locations, with the proper justification, when submitted to determine if the comment is satisfied.

RFAAP submitted the requested documentation to DEQ on September 8, 2016. RFAAP is awaiting DEQ review of the request and the data provided to substantiate it.

Satisfied

DEQ has reviewed the submission made on 9/8/2016 and does not concur with RAAP regarding the sampling sites. As these sites are chosen at random within the defined area to ensure contamination is not impacting the soil from the operating unit DEQ does not feel like it is appropriate to reduce the sampling locations. The language currently in the permit will remain unmodified.

RFAAP has revised the document to be consistent with the language currently in the permit. A final, revised Attachment II.C is included with this submittal.

☒ 15. ***Attachment II.C, Section II.C.3.2, Page II.C-6 –*** *The language of Section II.C.3.2 has been revised as follows:*

> *"~~Radford AAP~~RFAAP will list each constituent detected above the MDL~~.in soil~~."*

As MDL's can vary by laboratory and analytical procedure, which may not reflect the current achievable MDL for a chemical compound, RAAP will either provide a reference to the permit modification which allows for only constituents reported above the MDL to be reported or will revise the language to the previously permitted version which dictates that all constituents identified in soil sampling will be reported to DEQ.

The change proposed on Page II.C-6 of Section II.C.3.2 of Attachment II.C was consistent with permit modifications made in 2008 and 2011. The change was made at that time with the intent of clarifying the definition of the word "detected".

DEQ accepts the explanation provided by RAAP and the comment is now satisfied.

☒ 16. ***Attachment II.C, Section II.C.3.2, Page II.C-6 –*** *The language of Section II.C.3.2 has been revised to the following:*

> *Because 4-nNitrophenol has no Region III RSL value., Radford AAPRFAAP will analyze for this compound, and if detected above the Reporting LimitRL, a site specific risk evaluation will be conducted. The risk evaluation will entail comparingthe result will be compared to ecological screening level for 4-nitrophenol in soil the result to alisted in the June 23, 2000 USEPA memorandum Entitled Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders."*

Please provide the reference to the DEQ approved modification to the current permit which allows for this significantly less stringent screening to be performed in lieu of a site specific risk assessment to be conducted. If no reference can be provided the permittee shall revise the language to the previously approved language which requires the risk assessment.

The referenced language was not substantially changed from that provided in the prior version of the permit language. The revision provided above was simply made to clarify what was previously a confusing paragraph. Based on conversations with DEQ on March 30, 2016, the language is acceptable as proposed. No additional changes are required.

DEQ concurs with the explanation provided by RAAP and the comment is now satisfied.

Satisfied

☒ 17. ***Attachment II.C, Section II.C.3.2, Pages II.C-6 and II.C-7 –*** *The language of Section II.C.3.2 has been revised to remove the following paragraph and the permittee has added the additional justification language which has been requested to not be included in the final permit:*

~~"If ten or more non-carcinogenic COPCs are detected during a single sampling event, the concentrations will be compared to 1/10 of the RBC of those constituents. This comparison is a qualitative evaluation and will have no bearing on the risk evaluation of the site, and will not trigger corrective actions or interim measures at the site.~~

Justification
Permit requirements for open burning ground soil sampling, data analysis and response actions are very conservatively set in the existing facility permit and do not reflect several site-specific conditions and realities including the following:

- *The permit requirements for soil sampling, data evaluation and response actions for the Open Burning Ground OBG assume unprotected site worker exposure to the site soils at EPA and VDEQ default levels of exposure. The reality is that the facility is an active operation and not a closed hazardous waste management unit. As such the facility is accessible by authorized personnel only. Authorized personnel are typically site workers who work very limited hours a day on select days a week and not on a regular 40 hour work week schedule. Furthermore, the facility policies and procedures mandate specific personnel exposure limitations (e.g., no eating or drinking in active areas) and require the use of appropriate personal protection equipment that makes routine direct human exposure to site soils practically minimal. The site workers are therefore unlikely to ingest any site soils or have any direct dermal contact, and their removal from the area during pan initiation provide minimal exposure from inhalation. Therefore the very need for an active soil sampling and response actions* ***from the perspective of site worker protection*** *is unnecessary.*
- *Considering the minimal levels of risks to site workers from exposure to site soils,comparison of site soil data to 1/10th action level for non-carcinogens is excessive and unnecessary and provides an unnecessary level of conservatism in the protection of human health and the environment. Furthermore, such comparisons and consequent additional screening and risk assessment of soil data have only one essentially end response action possible, i.e., removal of soil samples. Such action is already required under the permit when any COPC concentration exceeds the actual Action Level.*

~~We therefore~~ RFAAP concludes that the removal of the referenced paragraph from the Permit is well justified and no replacement is necessary. Please remove the above noted justification section if VDEQ concurs."

DEQ does not concur with the removal of the language which requires a site specific risk assessment or the justification RAAP has provided. The fact that the OBG is a currently operating unit, which means the potential for contamination to impact soils and worker health is ongoing, is the very reason why RAAP is required to provide a site specific risk assessment for industrial workers health to ensure the workers are protected at the currently detected levels of contamination in the soils.

Additionally given that the operating conditions in the submitted permit detail that ejected material from the pans will be picked up off the ground and retreated directly refutes RAAP's claim that there is no potential for dermal contact between workers and impacted soils.
The permittee shall revise the section language to include the struck paragraph or DEQ will add in the language while finalizing the draft permit.

During a meeting between the parties on March 31, 2016, several ideas concerning modification

of the referenced language were presented. DEQ agreed to evaluate the proposed alternatives and return with a modified request concerning this NOD.

DEQ has reviewed the proposal and drafted alternate language for the condition which addresses RAAP's concerns. The language was sent to RAAP via electronic transmission on May 6, 2016 and no comments have been received by DEQ on the proposed language. Please submit comment on the proposed language with the next response to this comment.

RFAAP reviewed and concurs with the proposal provided in DEQ's May 6, 2016, e-mail. RFAAP provided a draft submittal on June 24, 2016, that reflected the language specified above. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ concurs with striking the language on Page II.C-9 regarding the non-carcinogenic COPCs being detected triggering a quantitative evaluation as agreed upon during the 5/31/2016 meeting. However, RAAP has included the language DEQ suggested be struck from the permit on Page II.C-19 regarding the in-situ/ex-situ remediation strategy demonstration. As these remediation strategies are normally employed on closed units where contamination is not being continually added to the surrounding area RAAP shall remove this language from the permit application as this remedial approach is not appropriate for an operating unit and will only cause unnecessary delays in removal of identified soil contamination.

RFAAP has revised the document, removing the language regarding the in-situ/ex-situ remediation strategy as requested. A final, revised Attachment II.C is included with this submittal.

☒ *18.* ***Attachment II.C, Section II.C.4.1, Page II.C-8 –*** *See Comment 12 regarding revision of NB-1 and NB-2 into one sampling site. Language shall be revised to reflect two distinct sampling locations.*

As stated in response to Comment 12 above, RFAAP proposed to combine the two sampling locations based on historical data from the many years of soil sampling at the site. RFAAP will prepare a separate submittal that formalizes the request for combining the two site and provides justification necessary to substantiate this request.

DEQ will review the request for combining the two sampling locations, with the proper justification, when submitted to determine if the comment is satisfied.

RFAAP submitted the requested documentation to DEQ on September 8, 2016. RFAAP is awaiting DEQ review of the request and the data provided to substantiate it.

DEQ has reviewed the submission made on 9/8/2016 and does not concur with RAAP regarding the sampling sites. As these sites are chosen at random within the defined area to ensure contamination is not impacting the soil from the operating unit DEQ does not feel like it is appropriate to reduce the sampling locations. The language currently in the permit will remain unmodified.

RFAAP has revised the document to be consistent with the language currently in the permit. A final, revised Attachment II.C is included with this submittal.

Satisfied

☒ 19. ***Attachment II.C, Section II.C.4.2, Pages II.C-8 and II.C-9 –*** *The language of Section II.C.4.2 has been revised to remove the following paragraph:*

> *"The contract laboratory will keep a logbook to document the processing steps that are applied to the sample. All sample preparation techniques and instrumental methods must be identified in this logbook. The results of the analysis of all quality control samples should be identified specific to each batch of groundwater samples analyzed. The logbook should also include the time, date, and name of person (and company affiliation if subcontracted) who performed each processing step."*

RAAP has noted in comment RFAAP19 that this condition is covered under the laboratory's VELAP accreditation. Please provide a revised Attachment II.C which includes the current accreditation documents which contains this language for incorporation into the permit.

RFAAP will reinstate the struck language. However, we request that DEQ recognize that these are minimum requirements and individual laboratory VELAP/QA/QC programs will direct the procedures employed. Clarifying language will be added in this regard.

DEQ accepts the rational provided by RAAP to satisfy the comment but reminds RAAP that responsibility to ensure contract laboratories are operating at or above the minimum standards in this condition ultimately falls on the facility relying on the laboratory data to ensure compliance with the permit conditions.

RFAAP understands this compliance burden. RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reverted the referenced language to that provided in the current Permit. For clarity and to incorporate the current laboratory accreditation requirements, RFAAP also added a reference to the individual laboratory's VELAP-approved QA/QC programs. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ 20. ***Attachment II.C, Section II.C.4.3, Page II.C-9 –*** *The sampling device referenced in Section II.C.4.3 has been changed from a tulip bulb sampler to a trowel. Please provide a technical justification for this revision.*

The referenced change was made to be consistent with more modern sampling techniques. Based on conversations with DEQ on March 30, 2016, the language is acceptable as proposed. However, for clarification and consistency with the ASTM standard, the sampling device will be changed to reference "a stainless steel sampling device able to collect an undisturbed soil sample."

DEQ accepts the explanation provided by RAAP and the comment is now satisfied.

Satisfied

☒ 21. ***Attachment II.C, Section II.C.4.3, Page II.C-9 –*** *The language has been revised to remove the words "at each burn pad" from the description of the measurement of the sampling locations. The language shall be revised to incorporate these words as it may seem like RAAP is not required to sample at each burn pad otherwise.*

RFAAP will revise and reinstate "at each burn pad" in Section II.C.4.3 where requested.

DEQ will review the revised language of Section II.C.4.3 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP revised the referenced text to include the language "at each burn pad" in Section II.C.4.3 where requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ 22. ***Attachment II.C, Section II.C.4.4, Page II.C-10 –*** *The reference to SW-846 test methods has been removed. The language shall be revised to reflect the inclusion of SW-846 methods and VELAP approved methods for testing.*

RFAAP will make the requested revision to Section II.C.4.4.

DEQ will review the revised language of Section II.C.4.4 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reverted the text to that contained within the current Permit, adding a reference to VELAP accreditation as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ 23. ***Attachment II.C, Section II.C.4.5, Pages II.C-11 through 13 –*** *The submitted Section II.C.4.5 has been revised to be significantly less stringent in regards to sample COC requirements and analysis reports to be sent and maintained at RAAP for review by inspectors to ensure compliance with the COC requirements of this permit. While RAAP has indicated in Comment RFAAP21 that the revisions were included to reflect the groundwater SAP that does not allow the COC requirements for the SMP to become less restrictive than already permitted. The language shall be revised as follows or the permittee may submit a revision which incorporates all of the current and proposed requirements:*

> *"The soil monitoring program incorporates a COC program to track the custody of the samples from time of collection, to shipment to and receipt at the laboratory. The monitoring of sample possession from field sampling to laboratory analysis is important in the event that unexpected laboratory lab results occur and the documentation of sample possession can be evaluated. This documentation contains several records and logs that assist in the quality control of the program.*

Sample labels are used to prevent misidentification of samples. The labels are completed and affixed to the sample containers prior to field sampling. COC control for all samples will consist of the following:

Satisfied

1. *Labels will be placed on individual sample containers while sampling containing the following information:*
   - *Sample identification number*
   - *Name of sampler (initials)*
   - *Date and time of sample collection*
   - *Sampling location*
   - *Constituents to be analyzed.*

Additionally, sample custody seals affixed over each shipping cooler should be used when a common carrier transports the sample shipment to the laboratory. These seals ensure that the samples have not been disturbed during transportation. The sample custodian sample identification name and date will be included on the custody sample seal.

2. *A custody seal should be placed on the shipping container or on the individual sample bottles. Custody seals provide prevention or easy detection of sample tampering. The custody seal should bear the signature of the collector and the date signed. The custody seal can be placed on the front and back of a cooler, around the opening of a polyethylene overpack bag or on the lid of each sample container.*

3. *No sample should be brought back to the laboratory for preservation. It is recommended that two polyethylene overpack bags be used in shipping.The first will contain the sample bottles, the second the ice needed to keep history of the samples should be maintained as a QC measure. Upon receipt of the shipment, the laboratory should record the temperature on the COC. The method holding time is defined by the analytical method and listed in Table II.C-3. Holding time refers to the period from sample collection to sample extraction and/or analysis.*

4. *A COC record should be completed and should accompany every sample shipment. The COC record should contain enough copies so that each person possessing the shipment receives his/her own and should be designed to allow the Permittee to reconstruct how and under what circumstances a sample was collected, including any problems encountered. An example of a COC form that includes the necessary information is included as Attachment II.C-A.*

5. *Samples will be packaged and labeled for shipment in compliance with current U.S. Department of Transportation regulations. All samples will be shipped priority/overnight via commercial carrier or hand delivered to the laboratory.*

6. *Samples will arrive at the laboratory via the overnight delivery service or hand delivery. Upon delivery to the laboratory, the ice chests will be checked for intact custody seals and the samples will be unpacked and the information on the accompanying COC records will be examined. If the samples shipped match those described on the COC form, the laboratory sample coordinator will sign the form and assume responsibility for the samples. If problems are found with the sample shipment, the laboratory sample custodian will sign the form and record the problems in the "remarks" section.*

7. *Any missing samples, missing sample tags, broken sample bottles, or unpreserved samples will be noted on the COC record. If there are problems with individual samples, the sample custodian will inform the laboratory coordinator of such problems. The laboratory custodian will then contact the Permittee to determine a viable solution to the problem.*

8. *All information relevant to the sample will be secured at the end of each business day. All samples will be stored in a designated sample storage refrigerator, access to which will be limited to laboratory employees.*

The completed form COC is returned to RFAAP included with the certificate of analyses (i.e., laboratory report package), for each Unit. An example chain-of-custody form is included in Appendix II.C-A. The sample possession is established from time of collection to the time of analysis. This record The COC

Satisfied

contains the following information:

- *Sample identification and location*
- *Signature of sampler*
- *Date and time of sampling*
- *Sample type*
- *Identification*
- *Number of containers*
- *Required analysis*
- *Signatures of person(s) involved in possession*
- *Times and dates of possession*
- *Method of transportation*
- *Tracking number from transporter*
- *Statement for packing on ice*
- *Temperature during shipment (min & max)*
- *Internal temperature of shipping cooler (or sample containers) upon arrival at Laboratory*

A sample analysis request sheet can further clarify the samples for each requested constituent. This additional check sheet will be utilized when necessary (i.e., beginning of a new contract with a new laboratory). This sheet sent along with the samples will contain the following information:

- *Name of person receiving samples*
- *Laboratory sample number*
- *Date of sample receipt*
- *Analysis to be performed*
- *Internal temperature during shipping."*

During a meeting between the parties on March 30, 2016, RFAAP explained that the COC requirements may vary depending on the laboratory performing the analysis. However, RFAAP agreed that general COC requirements can be specified that would be required at a minimum for all projects. Therefore, RFAAP will revise the referenced language to incorporate the minimum COC requirements for any sampling event and to reference laboratory VELAP QA/QC programs for further specification of requirements.

DEQ will review the revised language of Section II.C.4.5 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP revised the text as described above. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ *24.* ***Attachment II.C, Section II.C.6.2, Pages II.C-15 and II.C-16 –*** *As noted in Comment 19 please provide the QA/QC documentation required by the VELAP accreditation which is replacing the equivalent language in this section for inclusion into the permit language as an appendix to be referenced in Section II.C.6.2.*

Including specific QA/QC documentation from a specific contract laboratory in the Permit restricts RFAAP to use to that contract laboratory for all future analyses. Given that each

Satisfied

VELAP accredited laboratory is required to have a QA/QC plan and that plan is reviewed, approved and deemed adequate for regulatory analysis by DCLS, there should be no need to include the documentation in the Permit. Simply making reference that QA/QC should be performed according to the VELAP-approved QA/QC program for each laboratory should be sufficient.

DEQ has reviewed RAAP's rationale and requests that language stating the QA/QC plans for each VELAP accredited laboratory be maintained at the facility for review by DEQ inspectors be added to Section II.C.6.2.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In making the changes provided in the draft submittal, RFAAP worked with DCLS to provide proposed language for this section that would specify the requirements to the level necessary and allow room for laboratory VELAP programs to function as intended. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is mostly satisfied. RAAP shall modify the language to the following to completely satisfy the comment:

> *"The analytical laboratory must develop, implement and maintain a quality system program to generate data of known and documented quality based on national performance standards adopted under the National Environmental Laboratory Accreditation Program (NELAP). Analytical laboratories producing compliance data must be ~~VELAP~~ accredited under 1VAC30-46, also called the Virginia Environmental Laboratory Accreditation Program (VELAP). VELAP accreditation under 1VAC30-46 incorporates TNI (Qualify this acronym) standards and its quality system requirements."*

RFAAP has revised the document as requested above. A final, revised Attachment II.C is included with this submittal.

☒ 25. ***Attachment II.C, Section II.C.7.2.2, Page II.C-18 –*** *Section II.C.7.2.2 has been revised to change the word shall into the word should. The language shall be revised back to include the word shall and remove the word should as should is not a legally enforceable term for a permit condition.*

RFAAP will revise Section II.C.7.2.2 as requested.

DEQ will review the revised language of Section II.C.7.2.2 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reverted the language in Section II.C.7.2.2 to that contained in the current Permit as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

Satisfied

☒ 26. ***Attachment II.C, Section II.C.7.2.3, Page II.C-18 –*** *The language of Section II.C.7.2.3 has been revised to significantly modify the procedures to be used to identify data outliers. As data outliers may not just indicate improper sampling and analysis procedures and may indicate a spike in contaminated soil not previously identified this language shall be revised to the previous language included in the Permittee's current permit.*

RFAAP will reinstate struck language as requested.

DEQ will review the revised language of Section II.C.7.2.3 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reinstated the struck language as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ 27. ***Attachment II.C, Section II.C.7.2.1, Page II.C-19 –*** *Section II.C.7.2.1 contains language referencing the changes in Section II.C.7.2.3 regarding treatment of outliers. As this language has been found to be deficient by the DEQ the language of Section II.C.7.2.1 shall be revised to the previous language contained in the Permittee's current permit.*

RFAAP will reinstate the previous language as requested.

DEQ will review the revised language of Section II.C.7.2.1 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reinstated the struck language as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ 28. ***Attachment II.C, Section II.C.7.3.6, Page II.C-19 –*** *Section II.C.7.3.6 has revised the word possible into practical. The language shall be revised to include the word possible as practical is not a synonym of possible and verification sampling is not to be restricted to when it shall be convenient for the permittee to conduct it.*

RFAAP will revise Section II.C.7.3.6 as requested.

DEQ will review the revised language of Section II.C.7.3.6 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reverted the language to that provided in the current Permit as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

Satisfied

☒ 29. ***Attachment II.C, Section II.C.7.8, Page II.C-17 –*** *Section II.C.7.8 has been revised to change the deadline to submit a modification request to DEQ from 90 days to "the duration specified by VDEQ". Please note that this duration was previously specified in the permit language and is 90 days. The language of the condition shall be revised to reflect the 90 day deadline requirement*

RFAAP will reinstate the 90 day requirement in Section II.C.7.8.

DEQ will review the revised language of Section II.C.7.8 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reinstated the 90-day requirement as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☐ 30. ***Attachment II.C, Table C.II-1 -*** *There are multiple constituents which have been removed from Table C.II-1. Please provide a reference for the permit modification which has been approved by DEQ to remove these constituents or submit a revised table which includes the struck constituents.*

Attachment II.C.3.3 of the permit allows opportunity to modify the sample locations and/or constituent list. Most of the constituents proposed for removal have not been detected at or above the RL since 2005. RFAAP will provide a separate submittal that summarizes the historical data for each removed pollutant and justifies the basis for removal.

DEQ will review the separate submittal and make a determination on whether the proposed changes are appropriate based on the justification and supporting sampling data.

RFAAP provided the requested documentation in a separate submittal on September 8, 2016. Please note that if RFAAP's requests for removal of constituents from Table C.II-1 is granted, RFAAP requests that DEQ consider removal of a subset of these same constituents from Module VII, Attachment VII.C, Corrective Action Program - Annual Groundwater Monitoring List, as these analytes have not been detected in groundwater samples in over a decade. Furthermore, similar to pyrene, if these constituents are no longer COCs in soil, inclusion of them in the groundwater monitoring program would no longer be appropriate.

DEQ does not concur with RAAP's request to remove the constituents from soil monitoring. As these COC's were identified in the risk assessment and the OBG is currently an operating unit the potential for these COC's to be found in the soil exists. However DEQ will reconsider the request if the risk assessment for the renewal permit does not show these constituents to be a COC based on the available data.

RFAAP revised Attachment II.C, Table C.II-1 to reflect those analytes not anticipated to be a COC based on the pending risk assessment. Attachment II.C, Table C.II-1 will be finalized one the final risk assessment is complete. As well, prior to final permit renewal, Attachment II.C, Table C.II-1 will be updated to reflect ALs in place at that time (based on most current Region 3 RSL table).

Satisfied

☒ 31. ***Attachment II.C, Table C.II-2 –*** *The links to the current RSL table used for the TEQ values are not functioning in the footnote of Table C.II-2. Please revise the web addresses to the functional links.*

RFAAP will correct the web addresses for the RSL table in Table C.II-2.

DEQ will review the revised web address in Table C.II-2 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP corrected the web reference as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ 32. ***Module III, Section III.B.2, Pages III-1 through III-3 –*** *While RAAP has commented that because of the Human Health and Ecological Risk Assessment the throughput and maximum constituent concentrations in the waste have been removed, the amount of diesel fuel required for a skid burn has also been removed from the submitted language. If the removal of the amount of diesel fuel to be required per burn is anticipated to be adjusted from the results of the risk assessment the removal may stand as a place holder for a revised throughput limit on diesel per burn. If not then the operating limit must be returned to the permit language.*

Diesel fuel is not a hazardous waste and, therefore, regulation of the amount of diesel fuel burned at the facility is not a matter of RCRA limitation. The diesel fuel emissions from the OBG are accounted for and reported to DEQ's Air Division. Implementation of a diesel fuel limit under the RCRA program is not appropriate.

DEQ accepts the explanation provided by RAAP and the comment is now satisfied.

☒ 33. ***Module III, Section III.D, Page III-5 –*** *The submitted language of Section III.D has removed references to the analytical test methods which will be performed on the ash residue in order to determine if it is hazardous. The language shall be revised to incorporate the analytical methods which will be performed on the ash to make the determination. RAAP may use the site-specific methods which have been approved by VELAP after they have been reviewed by DEQ for technical adequacy.*

As discussed with DEQ during our March 30, 2016, meeting, the only analytical method removed from Section III.D appears to be the reference to SW846 Method 8330. This method is not being used to determine energetic content of the ash residue. The internal reactivity procedure described in the Waste Analysis Plan (and referenced in this section) is being used to determine whether the waste is hazardous for reactivity. Therefore, inclusion of the Method 8330 reference is not appropriate.

DEQ concurs with the explanation provided by RAAP and the comment is now satisfied.

☒ 34. ***Module VII, Pages V.II-1 through V.II-17 –****The submitted groundwater corrective action program does not contain any figures, tables or language which delineates the extent of the contaminant plumes for perchlorate and carbon tetrachloride, identifies the concentrations of the constituents in the plume or delineates the vertical extent of the plume. The section shall be revised to incorporate this information.*

The referenced figures and tables were inadvertently omitted from the permit application. RFAAP will add the information requested.

Satisfied

DEQ will review the figures and tables when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP provided the omitted figures and tables. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Module VII is included with this submittal.

☒ *35.* ***Module IV, Attachment IV.A, Section II.A, Pages IV.A-12 and IV.A-12 –*** *Section II.B of Attachment IV.A has been removed and a comment has been made that the QA/QC procedures are no longer applicable since the methods used are all VELAP certified. Please provide the VELAP approved method documentation which specifies the QA/QC procedures to be followed. These QA/QC procedures will then be incorporated into the permit as an appendix to Attachment IV.A and updated as needed by permit modification if the methods are changed.*

Including specific QA/QC documentation from a specific contract laboratory in the Permit restricts RFAAP to use to that contract laboratory for all future analyses. Given that each VELAP accredited laboratory is required to have a QA/QC plan and that plan is reviewed, approved and deemed adequate for regulatory analysis by DCLS, there should be no need to include the documentation in the Permit. Simply making reference that QA/QC should be performed according to the VELAP-approved QA/QC program for each laboratory should be sufficient.

DEQ has reviewed RAAP's rationale and requests that language stating the QA/QC plans for each VELAP accredited laboratory be maintained at the facility for review by DEQ inspectors be added to Section II.A.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In making the changes provided in the draft submittal, RFAAP worked with DCLS to provide proposed language for this section that would specify the requirements to the level necessary and allow room for laboratory VELAP programs to function as intended. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is mostly satisfied. RAAP shall modify the language to the following to completely satisfy the comment:

> *"The analytical laboratory must develop, implement and maintain a quality system program to generate data of known and documented quality based on national performance standards adopted under the National Environmental Laboratory Accreditation Program (NELAP). Analytical laboratories producing compliance data must be ~~VELAP~~ accredited under 1VAC30-46, also called the Virginia Environmental Laboratory Accreditation Program (VELAP). VELAP accreditation under 1VAC30-46 incorporates TNI (Qualify this acronym) standards and its quality system requirements."*

RFAAP has revised the document as requested. A final, revised Module IV, Attachment IV.A is included with this submittal.

Satisfied

☒ 36. ***Module IV, Attachment IV.A, Section II.A, Page IV.A-12 –*** *The language of the permit has been revised to read as follows:*

"*All analyses must be conducted by a laboratory that is VELAP accredited for the analytical method, matrix and target analyte (where applicable)."*

The words "as applicable" are not consistent with the VELAP certification requirement for facilities using laboratory data to certify compliance with relevant permit conditions. All methods used must be VELAP certified in order to be considered valid analytical results for compliance with a DEQ issued permit condition. The language shall be revised to remove the words "as applicable" from the statement.

RFAAP will remove the phrase "where applicable" from Section II.A of Attachment IV.A.

DEQ will review the revised language of Section II.A when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP removed the "where applicable" phrase as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is not satisfied as the language was not changed to reflect the comment made. RAAP shall modify the language to remove the words "where applicable" in order to satisfy the comment.

RFAAP has revised the document as requested. A final, revised Module IV, Attachment IV.A is included with this submittal.

☒ 37. ***Module IV, Attachment IV.A, Appendix 6, Section B, Page IV.A-24 –*** *The last sentence in section B of Appendix 6 has been revised as follows:*

"Any elimination of an outlier ~~must be approved by the Department.shall~~ be properly documented and its basis for exclusion noted."

Exclusion of data outliers without DEQ approval and simply noting the exclusion is not consistent with standard statistical procedures. The language shall be changed to reflect the original statement included in the permit.

RFAAP will restore the language in Section B of Attachment IV.A, Appendix 6, as requested.

DEQ will review the revised language of Section B of Attachment IV.A, Appendix 6 when submitted by RAAP and determine if the comment is satisfied.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP reverted the language to that contained within the current Permit as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment IV.A is included with this submittal.

Satisfied

☒ 38. ***Module II, Attachment II.H, Section II.H.4m Pages II.H-2 and II.H-3 –*** *Section II.H.4m has been revised to remove the specifications of the fencing which acts as a barrier to control entry into the facility. Please revise the section to include language which references the national security policy which excludes the information from being included in the permit condition.*

RFAAP will add the requested information to Section II.D.1.

DEQ will review the revised language of Section II.D.1 when submitted by RAAP and determine if the comment is satisfied.

RFAAP has added the requested information to Section II.D.4.

DEQ has reviewed the revised language in Section II.D.4 and the comment is now satisfied.

☒ 39. ***Module II, Attachment II.D, Section II.D.1, Page II.D-1 –*** *Section II.D.1 as submitted has removed language referring to the inspection checklists and the checklists themselves. While the checklists are not required to be included in the final permit document they do need to be submitted for review by the DEQ to determine if they are sufficient to demonstrate compliance with the inspection requirements in this permit. Please submit the checklists with the revised application for review by the DEQ.*

RFAAP will provide the requested information as confidential business information with the understanding that the checklists will not be incorporated to the Permit.

DEQ has reviewed the checklists and the comment is now satisfied.

☒ 40. ***Module II, Attachment II.D, Table II.D.1, Page II.D-5 –*** *Table II.D.1 has been revised to remove items of Personal Protective Equipment, Respirators, Air Compressors, Portable Pumps, Facility Barricades, Flashing Red Lights and Facility Signs which are required to be inspected by this permit. Please provide a technical justification as to why these items were removed from the inspection schedule other than the one provided in Comment RFAAP4 as this comment is not a sufficient justification for removal of the items.*

The items that were removed from Table II.D.1 were either not necessary for operation of the OBG or were associated with the incinerator area and simply copied into this Permit as a matter of error. The items remaining in Table II.D.1 reflect those necessary to ensure compliant operation of the OBG.

DEQ accepts the rationale provided by RAAP and the comment is now satisfied.

☐ 41. ***Module II, Attachment II.F, Table II.F-1 -*** *Table II.F-1 does not contain a reference to the specific policy which requires the names, home phone numbers and home addresses of the emergency coordinators to be withheld. Please revise the notation below the table to include a reference to the specific policy documents which does not allow for this information to be included.*

RFAAP will add the requested information to Table II.F-1.

DEQ will review the revised Table II.F-1 when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP provided a draft, modified Attachment II.F for DEQ's review on January 9, 2017. RFAAP has incorporated DEQ's feedback on that draft and is providing a final, revised Attachment II.F with this submittal.

Satisfied

☐ 42. ***Module II, Attachment II.F, Section II.F.6b.ii, Pages II.F-9 through II.F-10 –*** *The language of Section II.F.6b.ii is not consistent with what is required by 40 CFR 264.56 regarding reporting of an incident which involves the implementation of the contingency plan. The language on Pages II.F-5 and II.F-6 shall be revised to the following:*

"The owner or operator must note in the operating record the time, date, and details of any incident that requires implementing the contingency plan. Within 15 days after the incident, he must submit a written report on the incident to the Regional Administrator. The report must include:
(1) Name, address, and telephone number of the owner or operator;
(2) Name, address, and telephone number of the facility;
(3) Date, time, and type of incident (e.g., fire, explosion);
(4) Name and quantity of material(s) involved;
(5) The extent of injuries, if any;
(6) An assessment of actual or potential hazards to human health or the environment, where this is applicable; and
(7) Estimated quantity and disposition of recovered material that resulted from the incident."

RFAAP will revise Section II.F.6b.ii as requested.

DEQ will review the revised language of Section II.F.6b when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP provided a draft, modified Attachment II.F for DEQ's review on January 9, 2017. RFAAP has incorporated DEQ's feedback on that draft and is providing a final, revised Attachment II.F with this submittal.

☐ 43. ***Module II, Attachment II.F, Section II.F.2c, Pages II.F-6 through II.F-8 –*** *Section II.F.2c of attachment has been revised to remove the waste description and corresponding waste codes from the permit language. As the contingency plan is supposed to be a standalone document the section shall be revised to include the following struck language:*

"These wastes include the following:
1. Wastes which exhibit only the following hazardous characteristic(s):

a. Reactivity (hazardous waste number D003) as specified in 9 VAC 20-60-261; 40 CFR Part 261.23;

b. Reactivity (hazardous waste number D003) as specified in 9 VAC 20-60-261; 40 CFR 261.23 and the characteristic of toxicity, as specified in 9 VAC 20-60-261; 40 CFR 261.24, for one of the following constituents:

i. Lead (hazardous waste number D008);

ii. 2,4-Dinitrotoluene (hazardous waste number D030); and/or

iii. Barium (hazardous waste number D005)

c. Ignitability (hazardous waste number D001) as specified in 9 VAC 20-60-261; 40 CFR 261.21. Ignitable wastes are limited to clean up residue of propellant ingredients. Ignitable wastes are mixed with sawdust and are not a liquid when brought to the permitted treatment

Satisfied

and storage area.

2. *Wastes which are not listed pursuant to 9 VAC 20-60-261; 40 CFR 261.31, 32,and 33; and*

3. *Wastes which are one of the following (as identified in the Waste Analysis Plan):*
   a. *Off-specification propellants and propellant intermediates, generated at the facility;*

   b. *Load, assemble and pack waste, consisting of energetic materials from assembling cartridges;*

   c. *Specialty product wastes containing propellant with nitrocellulose, nitrate esters, nitroguanidine, solid explosives, and one of the following combinations of additional materials:*

      i. *40 CFR 261 Appendix VIII constituents (D003)*

      ii. *40 CFR 261 Appendix VIII constituents, chlorides and/or perchlorates (D003)*

      iii. *40 CFR 261 Appendix VIII constituents and/or metals (D003, D004-D010)*

   d. *Other miscellaneous waste, described in Module II, Attachment II.B, Appendix II.B-1, Table I, as one of the following:*

      i. *Ignitable and reactive liquids in sawdust (D001, D003)*

      ii. *Off-specification dinitrotoluene, trinitrotoluene, or Isotriol"*

RFAAP will revise Section II.F.2c to include a summary of the managed wastes consistent with the description provided in the Waste Analysis Plan.

DEQ will review the revised language of Section II.F.2c when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP provided a draft, modified Attachment II.F for DEQ's review on January 9, 2017. RFAAP has incorporated DEQ's feedback on that draft and is providing a final, revised Attachment II.F with this submittal.

☐ 44. ***Module II, Attachment II.F, Section II.F.5, Page II.F-12 –*** *Section II.F.5 references safeguards in place to prevent a fire or explosion of the reactive hazardous waste but does not provide any examples of these safeguards. The section shall be revised to incorporate some examples of these safeguards so they may be evaluated for technical adequacy.*

RFAAP will revise Section II.F.5 as requested.

DEQ will review the revised language of Section II.F.5 when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

Satisfied

RFAAP provided a draft, modified Attachment II.F for DEQ's review on January 9, 2017. RFAAP has incorporated DEQ's feedback on that draft and is providing a final, revised Attachment II.F with this submittal.

☐ *45.* ***Module II, Attachment II.F, Section II.F.5b, Pages II.F-12 through II.F-13 –*** *Section II.F.5b references standard operating procedures which guide emergency response staff to prevent the recurrence or spread of fires, explosions and release but does not list any supplemental appendices or attachments which detail these procedures. Table 1 and Appendix A which have been struck out from the submitted application contained the Emergency Procedures and RFAAP Disaster Control Plan and Plant Protection Plan respectively. The permittee shall revise the application to include the applicable portions of these plans as they apply to the OBG operations.*

RFAAP will revise Section II.F.5b as requested.

DEQ will review the revised language of Section II.F.5b when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP provided a draft, modified Attachment II.F for DEQ's review on January 9, 2017. RFAAP has incorporated DEQ's feedback on that draft and is providing a final, revised Attachment II.F with this submittal.

☐ *46.* ***Module II, Attachment II.F, Section II.F.6d, Page II.F-7 –*** *The title of Item 7 of Section II.F.6d has been revised from Storage and Treatment of Release Material to Accumulation and Treatment of Release Material. The permittee shall revise the item title to the previous language to make it consistent with the wording in the regulatory requirements of 40 CFR 264.56(g).*

As no permitted storage areas are provided at the OBG or within the confines of this permit, referencing storage of hazardous waste seemed inappropriate. The title was changed to reflect the activities included in this Permit. RFAAP will add clarifying language to this regard in Section II.F.6d.

DEQ will review the revised language of Section II.F.6d when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP provided a draft, modified Attachment II.F for DEQ's review on January 9, 2017. RFAAP has incorporated DEQ's feedback on that draft and is providing a final, revised Attachment II.F with this submittal.

Satisfied

☒ 47. ***Module II, Attachment II.F, Section II.F.7 –*** *Section II.F.7 and Table 2 reference the copies of the mutual aid agreement being kept on-site but copies of the agreements were not submitted with the application. The permittee shall submit copies of the agreements for evaluation by DEQ.*

Copies of the agreements will be provided for DEQ's review. However, consistent with the EWI Permit, we do not expect the actual agreements to be included in the Permit.

DEQ will review the Mutual Aid Agreements when submitted and the comment will be satisfied once a determination of technical adequacy is made.

Copies of the requested mutual aide agreements are included in Attachment 2 to this submittal. As noted previously, while these agreements are being provided for DEQ review, we do not expect the actual agreements to be included in the Permit.

DEQ has reviewed the mutual aid agreements and the comment is now satisfied. As agreed the documents will not be incorporated into the permit with the understanding that they will be made available for inspection upon request.

☐ 48. ***Module II, Attachment II.F, Section II.F.8 –*** *Section II.F.8 does not contain a description of the signals to be used to indicate an evacuation of the OBG. The permittee shall revise the section to contain a description of the signals used.*

RFAAP will revise Section II.F.8 as requested.

DEQ will review the revised language of Section II.F.8 when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP provided a draft, modified Attachment II.F for DEQ's review on January 9, 2017. RFAAP has incorporated DEQ's feedback on that draft and is providing a final, revised Attachment II.F with this submittal.

☒ 49. ***Module II, Attachment II.E, Table II.E-1 –*** *Table II.E.1 does not contain the names of staff which currently hold the job described. The table shall be revised to incorporate this information.*

As explained with other sections of the Permit, National Security policy prohibits the inclusion of names of personnel in the Permit to protect the security of the facility and the personnel holding those positions. RFAAP will add a reference to this policy as has been done with other sections of the application.

DEQ accepts the rationale provided by RAAP and will determine if the comment is satisfied once the revised language in Table II.E.1 is submitted.

As explained with other sections of the Permit, National Security policy prohibits the inclusion of names of personnel in the Permit to protect the security of the facility and the personnel holding those positions. RFAAP has added a reference to this policy in a footnote to revised Table II.E.1.

DEQ has reviewed the revised language in the footnote for Table II.E.1 and the comment is now satisfied.

Satisfied

☒ 50. ***Module II, Attachment II.E, Section II.E.7 –*** *Section II.E.7 has been revised to remove the standard operating procedures for the open burning ground operations. The section shall be revised to include the language as it is required to demonstrate the training program is adequate.*

RFAAP will revise Section II.E.7 to include the introductory paragraph regarding standard operating procedures (SOPs). However, inclusion of the bulleted list of procedure sections is overly burdensome, as it would require a permit modification every time the procedure is modified, even in the case that the title of the section is slightly modified or the procedure renumbered. To ensure that the SOP addresses all necessary areas of unit operation, RFAAP will provide DEQ a copy of the SOP to review as part of the permitting process. This copy will be submitted as confidential business information (CBI).

DEQ accepts the rationale provided by RAAP and will determine if the comment is satisfied once the SOPs have been submitted for review.

As explained with other sections of the Permit, National Security policy prohibits the inclusion of names of personnel in the Permit to protect the security of the facility and the personnel holding those positions. RFAAP has added a reference to this policy in a footnote to revised Table II.E.1.

DEQ has reviewed the revised language in the footnote for Table II.E.1 and the comment is now satisfied.

☒ 51. ***Module II, Attachment II.E, Section II.E.9 –*** *Section II.E.9 does not provide a demonstration that the training director is trained in hazardous waste management procedures. The section shall be revised to incorporate language which provides this demonstration.*

The information provided herein is identical to that provided with and approved for the EWI RCRA permit application. Based on clarifications provided by DEQ during our meeting on March 30, 2016, we will revised the introduction to this section to indicate that the training director ensures that the specified criteria is satisfied.

DEQ will review the revised language of Section II.E.9 when submitted by RAAP and determine if the comment is satisfied.

The information provided herein is identical to that provided with and approved for the EWI RCRA permit application. Based on clarifications provided by DEQ during our meeting on March 30, 2016, RFAAP has revised the introduction to this section to indicate that the training director ensures that the specified criteria is satisfied.

DEQ has reviewed the revised language in the response and the comment is satisfied.

☐ 52. ***Module II, Attachment II.G, Section II.G.4a , Page II.G-10 -*** *Section II.G.4a subpart (c) contains inapplicable citations for closure of a tank system and an incinerator. While DEQ recognizes the language was most likely mirrored from RAAP's EWI permit the corrected language which follows shall be submitted as a revision by the permittee:*

"(c) Complies with the closure requirements of 9 VAC 20-60-264; 40 CFR 264 Subpart G, and 264.601 through 264.603."

RFAAP will revise Section II.G.4a as requested.

DEQ will review the revised language of Section II.G.4a when submitted by RAAP and determine if the comment is satisfied.

Satisfied

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently working on the requested modifications to Attachment II.G and intends to submit a draft of the revised document for DEQ's review shortly. This comment will be addressed when the modified closure plan is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above.

☐ *53.* ***Module II, Attachment II.G, Section II.G.4b , Pages II.G-11 and II.G-12*** *- The text of Section II.G.4b has been revised to reflect that only three closure options are available from the previous four and has combined clean and risk based closure into one option. The permittee is reminded that clean closure and risk based closure are two separate closure standards and that the revised text is technically incorrect in its assumption that these standards are the same. The text shall be revised to reflect there are four distinct closure options for the OBG.*

The language of Section II.G.4b is identical to that provided with and approved for the EWI RCRA permit application. Based on conversations with DEQ during our meeting on March 30, 2016, this section will be modified to be more specific for the OBG since the potential for site contamination is greater. RFAAP will make changes accordingly.

DEQ will review the revised language of Section II.G.4b when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently working on the requested modifications to Attachment II.G and intends to submit a draft of the revised document for DEQ's review shortly. This comment will be addressed when the modified closure plan is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above..

☐ *54.* ***Module II, Attachment II.G, Section II.G.4b , Pages II.G-11 and II.G-12*** *- The language in Section II.G.4b regarding the closure options has been significantly revised from the previous permit language and does not accurately reflect the closure options and required actions which will be necessary to close the OBG. Options for closure are "clean closure" for both solids and groundwater or a "hybrid" where either soils or groundwater meet the "clean closure" standard, but the other media does not. In either of these cases the permittee must perform closure and post-closure care as a landfill and obtain a post-closure care permit. The language shall be revised to remove the closure options and detail the available routes of closure, either clean closure or closure as a landfill with the required monitoring.*

The language of Section II.G.4b was revised to be essentially identical to that provided with and approved for the EWI RCRA permit application. Based on conversations with DEQ during our meeting on March 30, 2016, this section will be modified to be more specific for the OBG since the potential for site contamination is greater. RFAAP will make changes accordingly.

DEQ will review the revised language of Section II.G.4b when submitted by RAAP and determine if the comment is satisfied.

Satisfied

RFAAP is currently working on the requested modifications to Attachment II.G and intends to submit a draft of the revised document for DEQ's review shortly. This comment will be addressed when the modified closure plan is submitted.

☐ *55.* ***Module II, Attachment II.G, Table II.G-1 –*** *There are multiple constituents which have been removed from Table II.G-1. Please provide a reference to the permit modification which was approved by the DEQ or revise the table to include the constituents in the previously approved permit.*

Table II.G-1 was revised based upon the multitude of current soil and groundwater monitoring data available on the site, as well as information available on the materials present in or expected to be formed from the combustion of the managed wastes. The original table was developed prior to the availability of this information and, therefore, was highly speculative in nature. To support the proposed removal of each constituent, RFAAP will prepare a summary of this historical data and provide justification for each constituent.

DEQ will review the justification provided when submitted by RAAP and determine if the rationale provided is acceptable and if comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently working on the requested modifications to Attachment II.G and intends to submit a draft of the revised document for DEQ's review shortly. This comment will be addressed when the modified closure plan is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above.

☐ *56.* ***Module II, Attachment II.G, Section II.G.5c, Pages II.G-16 through II.G-18 -*** *The permittee has removed the language in Section II.G.5c which references the evaluation of surface and subsurface impact and has replaced it with a reference to the SMP in Attachment II.C. The permittee is reminded that DEQ has specifically stated that the requirements of the SMP cannot be used as a substitute for sampling for closure of the unit. The permittee shall revise the language in Section II.G.5c to the language of the previously approved permit.*

RFAAP consolidated the language in the first paragraph of this section, combining two sentences. The previous version of the paragraph also referenced the soil monitoring plan (SMP) in Attachment II.C for the methodologies and procedures that would be employed. The remaining paragraphs were deleted, as they duplicated language provided in the referenced SMP (refer to SMP Section II.C.3.1 - "Sample Locations" and Section II.C.9.1 - "Hot Spot Evaluation and Soil Removal" for similar descriptions). (The original closure plan was developed prior to the SMP. When the SMP was developed, it pulled language from the closure plan). In discussions with DEQ on March 30, 2016, it was agreed that the language can remain as proposed provided that the paragraph beginning with "Prior to…" be added back to the referenced section.

DEQ accepts the rationale provided by RAAP and will review the revised language in Section II.C.3.1 when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

Satisfied

RFAAP is currently working on the requested modifications to Attachment II.G and intends to submit a draft of the revised document for DEQ's review shortly. This comment will be addressed when the modified closure plan is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above.

☐ *57.* ***Module II, Attachment II.G, Section II.G.5e, Page II.G-18 –*** *The following sentence has been removed from Section II.G.5e:*

"Additional constituents may be added to the analyses at the time of closure, pending VDEQ approval."

The language shall be revised to include this sentence as it is standard in all closure plans and ensures that additional constituents may be evaluated as needed.

RFAAP will revise Section II.G.5e as requested.

DEQ will review the revised language of Section II.II.G.5 when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently working on the requested modifications to Attachment II.G and intends to submit a draft of the revised document for DEQ's review shortly. This comment will be addressed when the modified closure plan is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above..

Section 2 of the Notice of Deficiency Addressing the Technical Completeness of the Part A and Part B Permit Applications for the Renewal of the Subpart X Open Burning and Open Detonation Permit, Technical Deficiencies of the Groundwater Modules of the Permit Application

In the third round of NODs, the DEQ groundwater technical staff reviewed all previous submissions and issued a new round of Section 2 comments. Unless noted in the new comments, all previous comments were deemed satisfied. This letter presents the new comments as provided in DEQ's January 12, 2017, NOD.

Satisfied

☒ *1.* ***Module IV, Section IV.D.3.a –*** *The permittee has revised the following language:*

"Background groundwater quality for a new monitoring parameter or constituent shall be based on data from quarterly sampling of 13MW2 obtained over the course of for one year. Existing data may be used to establish background concentrations provided it is of sufficient quality."

DEQ provides the following revision to the above:

"Background groundwater quality for a new monitoring parameter or constituent shall be based on data from quarterly sampling of 13MW2 obtained over the course of for one year. Existing data may be used to establish background concentrations provided it is of sufficient quality with approval from DEQ."

RFAAP has revised the document as requested. A final, revised Module IV is included with this submittal.

Satisfied

☒ 2. ***Module IV, Section IV.E.3 –*** *Remove "where applicable".*

RFAAP has revised the document as requested. A final, revised Module IV is included with this submittal.

☐ 3. ***Module IV, Attachment IV.1.A –*** *Remove "13MW1 may also be used as another source for background concentration data at the discretion of the Permittee".*

RFAAP has revised the document to be consistent with other sections of the Permit that allow use of 13MW1, pending approval from the Department (See comment 2S.2 of January 12, 2017 correspondence from DEQ to BAE regarding third NOD). A final, revised Module IV is included with this submittal.

☐ 4. ***Module V, Section V.B.1 –*** *To be consistent with Module IV, Section IV.D.3.a, the following language in this section should be struck:.*

Further, the facility may collect background data from 13MW1 following approval from the Department.

RFAAP has revised the document to be consistent with other sections of the Permit that allow use of 13MW1, pending approval from the Department (See comment 2S.2 of January 12, 2017 correspondence from DEQ to BAE regarding third NOD). A final, revised Module V is included with this submittal.

☐ 5. ***Module V, Section V.D.1.c –*** *The permittee has revised the following language:*

> *Background groundwater quality for a new monitoring parameter or constituent shall be based on data from quarterly sampling of 13MW2 obtained over the course of one year. Existing data may be used to establish background concentrations provided it is of sufficient quality.*

DEQ provides the following revision to the above:

> *Background groundwater quality for a new monitoring parameter or constituent shall be based on data from quarterly sampling of 13MW2 obtained over the course of one year. Existing data may be used to establish background concentrations provided it is of sufficient quality with approval from DEQ.*

RFAAP has revised the document to be consistent with other sections of the Permit that allow use of 13MW1, pending approval from the Department (See comment 2S.2 of January 12, 2017 correspondence from DEQ to BAE regarding third NOD). A final, revised Module V is included with this submittal.

☐ 6. ***Module V, Section V.H.5.b*** *– The permittee has revised the following language:*

Facility Proposed in NOD response: Background groundwater quality for a new monitoring parameter or constituent shall be based on data from quarterly sampling of 13MW2 obtained over the course of one year as specified in Permit Attachment IV.A, Appendix 6 (Statistical Analysis). Existing data may be used to establish background concentrations provided it is of sufficient quality with approval from DEQ. Background monitoring well(s) are specified in Permit Condition V.B.1.

DEQ accepts this language, as it maintains consistency with other modules.

RFAAP has revised the document to be consistent with other sections of the Permit that allow

Satisfied

use of 13MW1, pending approval from the Department (See comment 2S.2 of January 12, 2017 correspondence from DEQ to BAE regarding third NOD). A final, revised Module V is included with this submittal.

☐ *7.* ***Module VII, Section VII.F.1.b –*** *The permittee has revised the following language:*

Monitoring well 13MW2 is located upgradient of the unit and will serve as the background well for the OBG. Monitoring wells 13MW3, 13MW4, and 13MW7 are located downgradient of the unit and will serve as the point of compliance wells. Monitoring wells 13MW5, 13MW6, and 13MW-8 are the downgradient plume monitoring wells for the unit. In addition, well 13MW1 will be used as a piezometer to measure static groundwater elevations during each sampling event.. Additional monitoring wells, if required will serve as plume wells for the monitoring of the HCOCs and daughter products and for the MNA parameters listed in ***Permit Attachment VII.B***

DEQ accepts this language, as it maintains consistency with other modules.

RFAAP has revised the document to be consistent with other sections of the Permit that allow use of 13MW1, pending approval from the Department (See comment 2S.2 of January 12, 2017 correspondence from DEQ to BAE regarding third NOD). A final, revised Module VII is included with this submittal.

☐ *8.* ***Permit Attachment V.B: Compliance Groundwater Monitoring List-*** *The proposed Constituents of Concern (COC) for removal from the permit are not approved at this time as this is still an operating unit except for pyrene as this constituent is not a COC in soil.*

RFAAP submitted a separate request to remove certain constituents from OBG soil and groundwater sampling that have not been detected in the groundwater since 2005. Based on email from Mr. Ashby Scott , DEQ, dated 12/14/2016 to RFAAP, Mr. Scott noted "I've discussed the proposed modification with Leslie [Romanchik] and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list." Final revision of Permit Attachment V.B is pending completion of the risk assessment. If DEQ agrees that the discussed constituents can be removed pending the risk assessment, RFAAP proposes to revise Permit Attachment V.B prior to final issuance of the draft Permit. At this time, Permit Attachment V.B reflects removal of pyrene, dibenzofuran and di-n-octylphthalate, as well as those included in previous Class 1 permit modifications.

☐ *9.* ***Permit Attachment V.C: Open Burning Ground Calculated Background Values -*** *Pyrene should be removed from the list as it is no longer a COC.*

RFAAP submitted a separate request to remove certain constituents from OBG soil and groundwater sampling that have not been detected in the groundwater since 2005. Based on email from Mr. Ashby Scott , DEQ, dated 12/14/2016 to RFAAP, Mr. Scott noted "I've discussed the proposed modification with Leslie [Romanchik] and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list." Final revision of Permit Attachment V.C is pending completion of the risk assessment. If DEQ agrees that the discussed constituents can be removed pending the risk assessment, RFAAP proposes to revise Permit Attachment V.C prior to final issuance of the draft Permit. At this time, Permit Attachment V.C reflects removal of pyrene, dibenzofuran and di-n-octylphthalate, as well as those included in previous Class 1 permit modifications.

Satisfied

☐ 10. ***Permit Attachment V.D: Appendix IX Groundwater Monitoring List -*** *The proposed Constituents of Concern (COC) for removal from the permit are not approved at this time as this is still an operating unit except for pyrene as this constituent is not a COC in soil.*

RFAAP submitted a separate request to remove certain constituents from OBG soil and groundwater sampling that have not been detected in the groundwater since 2005. Based on email from Mr. Ashby Scott , DEQ, dated 12/14/2016 to RFAAP, Mr. Scott noted "I've discussed the proposed modification with Leslie [Romanchik] and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list." Final revision of Permit Attachment V.D is pending completion of the risk assessment. If DEQ agrees that the discussed constituents can be removed pending the risk assessment, RFAAP proposes to revise Permit Attachment V.D final issuance of the draft Permit. At this time, Permit Attachment V.D reflects removal of pyrene, dibenzofuran and di-n-octylphthalate, as well as those included in previous Class 1 permit modifications.

☐ 11. ***Permit Attachment V.E: Groundwater Protection Standards –*** *The changes are acceptable. Comment referred to Permit Attachment V.D: Appendix IX Groundwater Monitoring List.*

RFAAP submitted a separate request to remove certain constituents from OBG soil and groundwater sampling that have not been detected in the groundwater since 2005. Based on email from Mr. Ashby Scott , DEQ, dated 12/14/2016 to RFAAP, Mr. Scott noted "I've discussed the proposed modification with Leslie [Romanchik] and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list." Final revision of Permit Attachment V.E is pending completion of the risk assessment. If DEQ agrees that the discussed constituents can be removed pending the risk assessment, RFAAP proposes to revise Permit Attachment V.E final issuance of the draft Permit. At this time, Permit Attachment V.E reflects removal of pyrene, dibenzofuran and di-n-octylphthalate, as well as those included in previous Class 1 permit modifications.

☐ 12. ***Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG/HWMU-13 -*** *All COCs proposed for removal and previously accepted are not approved except pyrene as this is still an operating unit and these constituents were identified as COCs.*

RFAAP submitted a separate request to remove certain constituents from OBG soil and groundwater sampling that have not been detected in the groundwater since 2005. Based on email from Mr. Ashby Scott , DEQ, dated 12/14/2016 to RFAAP, Mr. Scott noted "I've discussed the proposed modification with Leslie [Romanchik] and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list." Final revision of Permit Attachment VII.C is pending completion of the risk assessment. If DEQ agrees that the discussed constituents can be removed pending the risk assessment, RFAAP proposes to revise Permit Attachment VII.C final issuance of the draft Permit. At this time, Permit Attachment VII.C reflects removal of pyrene, dibenzofuran and di-n-octylphthalate, as well as those included in previous Class 1 permit modifications. Additionally, pending final permit renewal, RFAAP requests ability to update Permit Attachment VII.C to reflect regulatory limits (*e.g.,* applicable ACLs, RSLs, *etc.*) in place at that time.

Section 3 of the Notice of Deficiency Addressing the Technical Completeness of the Part A and Part B Permit Applications for the Renewal of the Subpart X Open Burning and Open Detonation Permit, Technical Deficiencies of the Proposed Statistical Methods Used In the Permit Modules

Satisfied

☒ 1. ***Module II, Attachment II.C, Section II.C.7.2.3, Page II.C-18 -*** *Paragraph 1 of the draft permit states that "An outlier refers to a data point which is an inconsistently large or small value." Please note that an outlier test is applicable for background dataset. The facility is advised to include following language; "The facility will check only background data for outliers (unusually high values in the dataset). Facility may re-sample (in an area near the initial sample) if an extreme value is noticed in the compliance dataset. Re-samples will occur during the compliance period of the initial soil sampling event".*

RFAAP disagrees that outlier evaluations are only applicable for background data sets. Outliers can occur at any point in time during analysis of either background or compliance data. These outliers may occur due to problems with the sampling technique, analytical difficulties, *etc*. If the sample can be confirmed to be an outlier due to any of these reasons, elimination of it should be permissible regardless of when the outlier occurs. In a meeting between the parties on March 30, 2016, the differences on this issue appeared to relate to the term "background data." DEQ agreed that an outlier could be associated with any data (i.e., historical, background or compliance data). Additionally, with compliance data, typically a verification event would be conducted if a usually high value was observed eliminating the need for an outlier test.

If the facility has sampling problems which results in data not accurately representing the site condition, the facility should re-sample to determine if there was an error in the sampling protocol. If extreme values occur in the background or on-site data without any sampling problem, the facility should collect a re-sample during the compliance period of the initial sampling event. This will enable to the DEQ to distinguish between what may be an extreme value in the sampling location and give an indication of whether the contaminated soil is due to the facility's treatment activities. Please note that background observations which are considered to be outliers should not be in the statistical analysis to preserve the power of the test.

RFAAP acknowledges the additional comment. The language proposed is acceptable and will be incorporated to Attachment II.C.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ 2. ***Module II, Attachment II.C, Section II.C.7.2.3, Page II.C-18 –*** *The draft permit states that "the historical data should be screened for the existence of outliers (USEPA 1992 section 6.2) using the method described by Dixon (1953)." The facility is advised to clearly state that only background data will be screened for the existence of outlier(s).*

RFAAP disagrees that outlier evaluations are only applicable for background data sets. Outliers can occur at any point in time during analysis of either background or compliance data. These outliers may occur due to problems with the sampling technique, analytical difficulties, *etc*. If the sample can be confirmed to be an outlier due to any of these reasons, elimination of it should be permissible regardless of when the outlier occurs. In a meeting between the parties on March 30, 2016, the differences on this issue appeared to relate to the term "background data." DEQ agreed that an outlier could be associated with any data (i.e., historical, background or compliance data). Additionally, with compliance data, typically a

Satisfied

verification event would be conducted if a usually high value was observed eliminating the need for an outlier test.

As stated previously in DEQ Response 1-1 to Comment 1, if the facility has sampling problems which results in data not accurately representing the site condition, the facility should re-sample to determine if there was an error in the sampling protocol. If extreme values occur in the background or on-site data without any sampling problem, the facility should collect a re-sample during the compliance period of the initial sampling event. This will enable to the DEQ to distinguish between what may be an extreme value in the sampling location and give an indication of whether the contaminated soil is due to the facility's treatment activities. Please note that background observations which are considered to be outliers should not be in the statistical analysis to preserve the power of the test.

RFAAP acknowledges the additional comment. The language proposed is acceptable and will be incorporated to Attachment II.C.

The comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

☒ *3.* ***Module II, Attachment II.C, Section II.C.7.2.1, Page II.C-19 –*** *Section II .C.7.2.1, paragraph 1 of the draft permit states that "Absent the outlier evaluation discussed previously, no statistical manipulation of the data shall be performed prior to this comparison." Please note that outlier evaluation is not applicable to compliance sampling event. The facility is advised to remove above sentence from the draft permit.*

RFAAP disagrees that outlier evaluations are only applicable for background data sets. Outliers can occur at any point in time during analysis of either background or compliance data. These outliers may occur due to problems with the sampling technique, analytical difficulties, *etc*. If the sample can be confirmed to be an outlier due to any of these reasons, elimination of it should be permissible regardless of when the outlier occurs. In a meeting between the parties on March 30, 2016, the differences on this issue appeared to relate to the term "background data." DEQ agreed that an outlier could be associated with any data (i.e., historical, background or compliance data). Additionally, with compliance data, typically a verification event would be conducted if a usually high value was observed eliminating the need for an outlier test.

As stated previously in DEQ Response 1-1 to Comment 1, if the facility has sampling problems which results in data not accurately representing the site condition, the facility should re-sample to determine if there was an error in the sampling protocol. If extreme values occur in the background or on-site data without any sampling problem, the facility should collect a re-sample during the compliance period of the initial sampling event. This will enable to the DEQ to distinguish between what may be an extreme value in the sampling location and give an indication of whether the contaminated soil is due to the facility's treatment activities. Please note that background observations which are considered to be outliers should not be in the statistical analysis to preserve the power of the test.

RFAAP acknowledges the additional comment. The language proposed is acceptable and will be incorporated to Attachment II.C.

The comment is now satisfied.

A final, revised Attachment II.C is included with this submittal.

Satisfied

☒ 4. ***Module IV, Attachment IV, Appendix 6, Section B, Page IV.A-24 –*** *Appendix 6, Section B (outliers), paragraph 1 of guidance states that "Any elimination of an outlier shall be properly documented and its basis for exclusion noted." The facility is advised to replace above language from the draft permit with the following: Any elimination of an outlier data must be approved by the Department.*

RFAAP will revise Attachment IV, Appendix 6, Section B as requested.

DEQ will review the revised language of Section B when submitted.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP revised the text as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Module IV, Attachment IV, Appendix 6, Section B is included with this submittal.

☒ 5. ***Module IV, Attachment IV, Appendix 6, Section H, Pages IV.A-27 and IV.A-28 –*** *Appendix 6, Section H, (COMPARISON OF POINT OF COMPLIANCE WELL DATA TO A STANDARDDURING COMPLIANCE OR CORRECTIVE ACTION MONITORING). The facility is advised to replace language of section H with the following: The facility will initially perform a value -to-value comparison to GPS for all groundwater monitoring data. If a GPS exceedance is noted during the value-to-value comparison for a parameter(s), the facility may collect a verification sample and results from the verification sample will be compared to the GPS in a value-to-value comparison as long as the comparison is completed within 30 days of the initial sampling event. Further, the facility may collect three additional independent groundwater samples during the compliance period for the suspect constituent(s) in order to perform a statistical comparison to GPSs that is based on ACL or MCL. The facility should calculate lower normal confidence limit to compare it to the standard compliance wells data. The facility should calculate upper normal confidence limit to compare it to the standard corrective action monitoring wells data. The level of confidence of the interval should be 80% for a sample size of 4-7 and 90% for a sample size of 8-10.*

RFAAP will revise Module IV, Attachment IV, Appendix 6, Section H with the language suggested.

DEQ will review the revised language of Section H when submitted.

RFAAP provided a draft submittal addressing this comment on June 24, 2016. In this submittal, RFAAP revised the text as requested. Formal submittal of this revision is awaiting DEQ review of the draft documents that were provided.

DEQ has reviewed the revised language and the comment is now satisfied.

A final, revised Module IV, Attachment IV, Appendix 6, Section B is included with this submittal.

Section 4 of the Notice of Deficiency Addressing the Technical Completeness of the Part A and Part B Permit Applications for the Renewal of the Subpart X Open Burning and Open Detonation Permit, Technical Deficiencies of the Alternative Treatment Technology Review of the Permit Application

General Comments

Satisfied

☐ 1. *The Alternative Treatment Analysis should provide a detailed description of the waste stream, including chemical composition. This description should include the total quantity of energetic material (EM) produced, a breakdown of what percentage of the waste is considered "non-contaminated" verses EM contaminated with foreign object debris (FOD), and approximate proportions of EM types (single-base, composite, etc.). If possible, an estimation of the proportion of FOD within the contaminated waste stream should also be derived as this could have significant implications for the evaluation of alternative treatments.*

In a meeting between the parties on March 30, 2016, RFAAP questioned what detail on the wastes above that presented in the permit was desired. DEQ clarified that they wanted the Alternative Treatment Technologies Report (ATTR) to be a standalone document. Therefore, additional detail from that provided in the Permit is not necessarily required; the information presented in the Waste Analysis Plan should just be repeated in the ATTR as appropriate.

As a result of this discussion, RFAAP agreed to add a description of the wastes managed to the ATTR. This description will be similar to that provided in the Waste Analysis Plan. Information on the historical distribution of the various waste groups will also be provided.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP provided a draft outline submittal addressing this comment on September 13. 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the referenced waste description in the ATTR to include (1) a general description of NC-based propellants and generic process descriptions, (2) a general description of explosives and generic process description, and (3) a general description of waste streams. RFAAP will also include information on three-year history of the streams and distribution of waste treated at the EWI and OBG. Additionally, a better description of the wastes that need to be treated at the OBG, differences in waste stream production activities and demilitarization of obsolete product, and a potential list of alternative treatment of proposed new thermal treatment process will be addressed based on the data available.

Formal submittal of this revision is awaiting DEQ review of the draft outline, Section 1. Introduction. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further comment is provided on the draft ATTR outline.

Satisfied

☐ 2. *In order to provide an adequate baseline for comparison, a full evaluation of the current open burning and incineration processes should be presented prior to the potential alternative treatments. The evaluations should include:*

- *A detailed description of the process*
- *Current throughput in kg/month,*
- *Maximum throughput*
- *Capability to treat the various propellants produced at the facility*
- *Characterization of secondary waste streams such as air emissions and residual soil contamination*
- *Ability to meet applicable regulatory requirements*
- *Costs*
- *Requirements for worker safety*
- *Any limitations associated with the processes*

In a meeting between the parties on March 30, 2016, DEQ explained their hopes with the level of detail, walking through the bullets provided above. In response to those discussions, RFAAP offers the following:

- RFAAP will add a description of the current onsite treatment options to the ATTR. These descriptions will be limited to the level of detail already present in permitting materials.
- The throughput for each unit varies significantly due to production changes. Additionally, there are concerns with plant and corporate security in publically documenting waste and production numbers. To satisfy this request, RFAAP will prepare a summary of historical (past three year) waste processing records for both the EWI and the OBG. This summary will be submitted as confidential business information.
- The maximum throughputs for each unit are in their respective permits. We will add this information to the ATTR.
- In the process description for the EWI, RFAAP will include a discussion on the limitations associated with the waste materials that can be processed in the EWI. (Materials not able to be processed in the EWI are sent to the burning ground for destruction.)
- RFAAP will include general discussions on how each of the waste streams are generated with the waste information requested under Item 4.1 above.
- RFAAP will provide a general discussion on the ability of the OBG and the EWI to meet all current permit limitations. We will discuss discharge streams from each and how they are regulated.
- RFAAP will provide a measure of the overall feasibility of each treatment technology and alternative on a qualitative basis, rather than detailing costs of each option.
- RFAAP will provide a qualitative evaluation on worker safety, providing generally information such as "labor intensive/high exposure technology" versus "limited exposure/limited exposure" technology.
- RFAAP will provide an overall summary for each technology of the evaluations provided in each of the prior bullets.

Satisfied

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the process description in the ATTR as necessary to address the point of comparison-specifics listed in this NOD. It is noted that some, if not all of this detail may or will not be available. The evaluation will include the expansion of the current EWI to treat the materials sent to the OBG and will address foreign object debris screening. Only production non-thermal or non-incineration treatment technologies will be reviewed (supercritical water oxidation and a similar technology and biological treatment options) in a separate evaluation with an additional separate evaluation of the thermal or incineration treatment technologies review. The matrix used for the assessment will be upgraded to address the points of comparison-specifics listed in this NOD and affected tables will be modified.

Formal submittal of this revision is awaiting DEQ review of the draft outline, Section 3. Technology Alternatives, Section 4. Assessment of Identified Alternatives, and Section 5. Summary of Findings. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further comment is provided on the draft ATTR outline.

☐ 3. *Please evaluate technologies with potential for the successful treatment of large quantities of EM in the same manner as described in Comment 2 where applicable. At a minimum all technologies that have been demonstrated at the pilot level or above should be included in this analysis. Technologies that do not have the capability to be scaled up (such as the Donovan Chamber) should be screened out of the detailed analysis for clarity. The matrices provided are limited in scope and score technologies on a highly subjective scale. Some of the definitions used for the criteria may not be appropriate or are not intuitive. Please see Comment 15 for more information regarding the criteria used to evaluate alternative treatment technologies.*

RFAAP will modify the matrix provided with the ATTR based on DEQ's comments provided in the March 30, 2016 meeting. The ATTR will present a hierarchal evaluation of the technologies, ranging from those that are possible but not practical or fully developed to those that may be possible with several modifications, etc.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the process description in the ATTR as

Satisfied

necessary to address the point of comparison-specifics listed in this NOD. It is noted that some, if not all of this detail may or will not be available. The evaluation will include the expansion of the current EWI to treat the materials sent to the OBG and will address foreign object debris screening. This discussion will consider the capability of the alternatives to meet (1) RCRA requirements, (2) DOD requirements, and (3) other environmental requirements for air and water. Only production non-thermal or non-incineration treatment technologies will be reviewed (supercritical water oxidation and a similar technology and biological treatment options) in a separate evaluation with an additional separate evaluation of the thermal or incineration treatment technologies review. The matrix used for the assessment will be upgraded to address the points of comparison-specifics listed in this NOD and affected tables will be modified.

Formal submittal of this revision is awaiting DEQ review of the draft outline, Section 3. Technology Alternatives, Section 4. Assessment of Identified Alternatives, and Section 5. Summary of Findings. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further comment is provided on the draft ATTR outline.

☐ 4. *To what extent is recycling of waste EM utilized? With over 163,000 kg of waste EM produced annually there appears to be significant potential for recycling. Recycling material could result in significant reductions to both operating costs and environmental releases. Processes to safely reintroduce waste EM into the production process (such as foreign object debris (FOD) screening) should be evaluated. Ideally, other methods to reduce the amount of waste generated should also be considered in the permit, if not in the Alternative Treatment Analysis.*

RFAAP already utilizes rework material in their production lines where possible. While waste reduction is a primary focus and waste minimization on ongoing goal of RCRA, we believe the current waste load to the EWI and the OBG to be that necessary based on current plant production demands, product quality requirements, and processing limitations. RFAAP will modify the ATTR to include some discussion of the efforts currently being taken to accomplish this goal.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to review specifics listed in this NOD. A description of current re-work activities in the propellant process, some waste minimization activities, and a historical effort will be discussed.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

Satisfied

☒ 5. *Throughout various portions of the document it is noted that DDESB has not approved several technologies. As noted in the January 23, 2015 Information Paper by Luke Robertson, "Actual AE [ammunition and explosives] demilitarization procedures are established by the Defense Logistics Agency, the DoD Components, or the Single Manager for Conventional Ammunition (SMCA)." DDESB's primary role is to ensure worker and public safety from explosive risks and evaluates situations on a case-by-case basis. By stating that a technology has "not been approved by DDESB," the impression is given that a technology does not meet explosives safety criteria and thus is not viable. Please eliminate DDESB approval as a screening criteria for alternative treatment technologies.*

DDESB approval is critical to ANY explosives management process and cannot be eliminated. The use of non-DDESB approved processes is counter to current DOD policy. RFAAP will provide an overview of this selection matrix and ruling policy documents in the revised ATTR and will explain why a lack of DDESB approval makes any technology a less preferred option.

DEQ acknowledges that DDESB plays an important role in the explosives management process. However, as DEQ understands this role DDESB reviews processes on a case by case basis and requires a submittal of design and sitting for approval. DDESB does not evaluate the effectiveness of new technologies, only their safety (not including environmental risks). At this preliminary stage, full designs and sitting are not feasible for RFAAP to submit to DDESB. Use of DDESB approval as a screen in the alternative treatment technology evaluation therefore biases the selection process to existing technologies and prevents consideration of newer, potentially more efficient ones. The alternatives evaluation may consider previous DDESB approvals at other sites when evaluating technologies and discuss potential hurdles to eventual DDESB approval within discussions of feasibility. However, lack of

DDESB approval alone should not be considered sufficient to eliminate a technology and the evaluation should be clear regarding the role, timing, and submittal requirements for the DDESB process.

RFAAP will revise technology selection matrix as requested and not consider DDESB approval as a primary requirement; however, RFAAP will consider safety as a primary requirement as highlighted in the meeting between the parties on March 30, 2016, detailed under *Section 4 of the Notice of Deficiency, General Comments 2.*

The comment is now satisfied.

☒ 6. *Please include a brief discussion of the policy framework that the treatment technologies evaluated are subject to. This discussion should include both RCRA and DoD policy requirements such as the Single Manager for Conventional Ammunition's Joint Conventional Ammunition Policies and Procedures, Army Regulation 700-144, and DoD 4145.26-M. The ability of a technology to satisfy these rules, guidance, and regulations should be considered a primary metric used in the evaluation.*

RFAAP can provide this information to DEQ and in the ATTR, but please note, per our response to NOD 4.5, DDESB is very much part of this process. The role of the DDESB will be further explained and clarified pursuant to this NOD and NOD 4.5.

Response accepted pending review of submittal, but note that at this stage the requirements of Army Regulation 700-144 and DoD 4145.26.M should be the primary regulatory and policy points of comparison in addition to applicable RCRA laws and regulations.

RFAAP will consider the guidance in Army Regulation 700-144 which references DoD 4145.26.M; however, RFAAP does not recommend following the details in DoD 4145.26.M which is primarily for the construction of a selected technical alternative as the ATTR is to assist in a potential alternative selection. The DDESB approved technologies have the

Satisfied

advantage of having already been through the Army Regulation 700-144 and DoD 4145.26.M requirements and are proven for that treatment option; those technologies that have not been approved by the DDESB, but have been reviewed by the DDESB would require further development to meet the Army Regulation 700-144 and DoD 4145.26.M requirements.

The comment is now satisfied.

☐ 7. *The evaluation makes no mention of the plan to incinerate 95% of RFAAP's explosive waste using a combined EWI and contaminated waste processor facility referenced in a paper dated November 10, 2015 that is available on the facility's website. The paper notes that design for the facility will begin this year. The technology should be evaluated in the alternative treatment analysis, as it appears that RFAAP has already determined it to be a viable treatment option.*

RFAAP has secured funding to design a combined EWI/CWP facility. At this time, one of the goals is to significantly reduce the waste load going to the OBG. However, a complete elimination of the OBG will not be possible. Furthermore, as this unit has not yet been designed, we cannot guarantee that the goals on waste load to the OBG will be satisfied. There are materials targeted for this facility that may or may not be capable of being treated in it. In addition, while funding for the design has been secured, the actual cost for construction of the facility is unknown and those funds have not been secured. RFAAP will add a discussion and update on this project to the ATTR.

For clarity, DEQ requests that this technology be evaluated alongside open burning and other potential treatment technologies.

RFAAP will add a discussion and update on this project to the ATTR.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to include a description of efforts to minimize the OBG treatment of wastes, and the design of a new combined EWI/CWP design to address the reduction in OBG operation (OBG will be needed to treat certain FOD). As the potential for the EWI/CWP system is still be evaluated (and a proposed system design), only a generic description of the design will be provided.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

Specific Comments for the Technical Deficiencies of the Alternative Treatment Technology Review of the Permit Application

Satisfied

☐ 1. ***Alternative Treatment Technologies to Open Burning of Propellants, Section 3.1.2, Supercritical Water Oxidation with Pretreatment, Pages 3 and 4*** *- The Army study referenced that evaluated Supercritical Water Oxidation was specific to Camp Minden and M6 propellant. It is unclear how applicable this evaluation is to Radford as the EM to be treated at Camp Minden was considered to be unstable due to improper storage or needed to be treated on a time-critical basis. DDESB did not approve in part because at the time none of the systems evaluated had been tested for large-scale M-6 destruction and the challenges of treating such a large quantity of shock-sensitive material in a short time.*

RFAAP contends that there are other concerns with the use of SCWO that prevented its use at Camp Minden and, furthermore, that prevents its use at RFAAP. In addition, there are elements of the October 2000 failure that are directly applicable to the RFAAP application. RFAAP will expand this discussion in the ATTR and will include reference to the ongoing SCWO project at the Blue Grass Army Depot.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to review specific items identified in this NOD. Contact has been made with the Blue Grass Army Depot demil pilot treatment team and vendors supplying SCWO equipment. Upon initial review, the SCWO does not seem proven for all of the items currently processed at the OBG.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

☐ 2. ***Alternative Treatment Technologies to Open Burning of Propellants, Section 3.1.2, Neutralization Process for SCWO, Page 3, Last Paragraph*** *- The October 2000 incident described here should not be considered an inherent failure of the technology. According to the cited report, "The severity of the incident might have been mitigated if consideration had been given to the reaction that was taking place between the propellant and the caustic. Failure to stop the steam trace heating on the recirculation loop helped to sustain the temperature needed for the reaction to continue, and closing the valves at both ends of the segment of the loop below the tank ensured that the gases produced would build up pressure." Please include a description of how and why the incident occurred as well as the corrective actions suggested by NRC such as the use of sound engineering practices and better training for personnel.*

RFAAP contends that there are other concerns with the use of SCWO that prevented its use at Camp Minden and, furthermore, that prevents its use at RFAAP. In addition, there are elements of the October 2000 failure that are directly applicable to the RFAAP application. RFAAP will expand this discussion in the ATTR and will include reference to the ongoing

Satisfied

SCWO project at the Blue Grass Army Depot.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to address the specifics listed in this NOD. Since the above description is not what is in the Categorized Comments List and this was a one-time incident with oversight from program contractor, RFAAP suggests deleting the reference.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

☐ *3.* ***Alternative Treatment Technologies to Open Burning of Propellants, Section 3.1.2, Super Critical Water Oxidation, Pages 3 and 4*** *-The 2013 NRC paper cited does not appear to make reference to DDESB approval after a brief review. Additionally, the report is focused on the destruction of chemical weapon munitions (CWM) as opposed to the EM being evaluated during the Alternative Treatment Analysis. It is unclear from the DDESB memo as to whether or not DDESB has actually evaluated SCWO. Has the Army or BAE requested DDESB review of any SCWO units? It is DEQ's understanding that at least one SCWO unit has been approved and used for large scale use (the Blue Grass Chemical Agent Destruction Pilot Plant). Please provide more information as to the applicability of this technology towards conventional munitions and explosives treatment.*

RFAAP contends that there are other concerns with the use of SCWO that prevented its use at Camp Minden and, furthermore, that prevents its use at RFAAP. In addition, there are elements of the October 2000 failure that are directly applicable to the RFAAP application. RFAAP will expand this discussion in the ATTR and will include reference to the ongoing SCWO project at the Blue Grass Army Depot.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to address DEQ's comments. However, please note that It is difficult to provide more information as to the applicability of SCWO towards conventional munitions vs. explosives treatment as the information reviewed thus far suggests limited application of SCWO and even more limited application with energetics treatment.

Satisfied

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

☐ 4. ***Alternative Treatment Technologies to Open Burning of Propellants, Section 3.1.6, Pages 5 and 6 –*** *Section 3.1.6 states that examples of alternative treatment technologies provided by DEQ all require size reduction of the case hardened propellant grain. However RAAP has not provided an explanation as to why the contaminated waste could not be wetted prior to grinding, cut using a hydromilling, or cut using liquid nitrogen. Please provide the reasoning for not adjusting the grinder operation to accommodate the contaminated waste as the current language states that safety issues were identified with hydromilling but does not explicitly state them.*

The size reduction concept and technology was not discussed or further developed in the Army plan. While some combination of potential technologies may present a feasible concept, a large-scale engineering effort such as that which would be required to develop this concept relative to this technology is outside the scope of the ATTR. RFAAP will, however, include a section on size-reduction technologies in the ATTR and provide a discussion on their applicability to the RFAAP wastes.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to address the specifics listed in this NOD as a separate sub-section of Section 3. Technology Alternatives. After various technologies have been discussed and noted in each discussion if size reduction is needed the following will be addressed: (1) OBG does not require size reduction, (2) EWI requires size reduction, (3) if size reduction is needed or not needed for each technology, and (4) a description of size reduction technologies and pros and cons. The hazards associated with size reduction will also be described.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

☐ 5. ***Alternative Treatment Technologies to Open Burning of Propellants, Section 3.2, Pages 6 through 9 –*** *The permittee has evaluated several demilitarization technologies which do not seem to have any applicability to the waste stream being discussed. Please provide an explanation as to why these technologies for dismantlement of finished rockets, ammunition and ordinance are being presented when the waste stream being discussed is raw propellant.*

RFAAP wanted to provide a complete picture of demilitarization technologies that are available to address concerns that the public may have about implementation of this technology for RFAAP materials. However, recognizing DEQ's concern to eliminate the

discussion of non-relevant technologies, we will remove these from the ATTR.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. This outline indicated that discussion of demil technologies would be removed from the ATTR because treatment of conventional ammunition rounds or chemical munitions is not equivalent to treatment of the energetic components (or production intermediates) within these compounds. Following review and comment on this outline, RFAAP plans to revise the ATTR to eliminate the discussions of demil technology.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

☐ 6. ***Alternative Treatment Technologies to Open Burning of Propellants, Section 3.2.2, Page 7*** *- How does this technology differ from the incinerator currently used at the facility? Would it be possible to scale up this technology to deal with the significant waste stream currently produced? If the technology can treat fully assembled ammunition as suggested in the description, how would FOD impact its use?*

The deactivation furnace is designed to treat fully loaded ammunition items, not exposed propellant. As DEQ pointed out in their comments, there are considerable differences between treating fully loaded conventional ammunition items and exposed propellant. These units have fed packaged propellant in limited amounts during performance tests. These instances presented serious safety concerns related to premature ignition of the propellant, clogging of the feed chute on the kiln, and fires in the control system due to uncontrolled transfer of packaging materials downstream. (All of which stemmed from the unit not being designed to process raw propellant). In addition, the inner construction of the kiln used in this technology is also not amenable to exposed ignition of propellant. RFAAP provided information to this regard in the ATTR, explaining the material handling, safety, and throughput limitations with this technology.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to provide a discussion on the inapplicability of the APE1236 furnace to the materials being processed at RFAAP. (Note that the presence of liquid nitrate esters in RFAAP's waste streams requires very special pre-processing of the wastes – no "dry" feed of this material has been demonstrated safe – and

therefore, the APE1236 system, as designed, would not be amenable to use with RFAAP's wastes).

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

☐ *7.* ***Alternative Treatment Technologies to Open Burning of Propellants, Section 3.3, Page 9*** *- Please include any technologies such as SCWO that have been successfully utilized at the production level in this section.*

RFAAP will include a hierarchal discussion in the ATTR, one category of which eliminates technologies that have not be successfully utilized at the production scale.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to provide a discussion of the selection process, including the process of elimination applied to the reviewed technologies. This will include elimination of technologies that have not be used at the production scale, as well as those that are not demonstrated with NC-based propellants or materials containing liquid nitrate esters.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

☐ *8.* ***Alternative Treatment Technologies to Open Burning of Propellants, Section 3.3.3, Pages 10 and 11 –*** *Section 3.3.3 states that the Actodemil process is problematic because of residual metals left in the end product fertilizer. Please explain why the process could not be modified to allow for the metals to be precipitated out of the solution before final processing into the end product?*

While redesigning the Actodemil process is outside the scope of this ATTR, RFAAP was able to further research these limitations. The Actodemil process binds the metals in humic acid and a HUMAXX proprietary reagent similar to Ethylenediamine-tetraacetic acid (EDTA). EDTA is used in chelation therapy for the treatment of acute and chronic lead poisoning. It works by pulling toxins (including heavy metals such as lead, cadmium, and mercury) from the bloodstream., which prevents precipitation of the metals. Unfortunately, the EDTA-like reagent from HUMAXX does not totally precipitate metals and can actually bind to plant components, making those metals available for plant uptake. RFAAP will add a summary of this limitation to the ATTR.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to

Satisfied

determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to provide a discussion similar to that described above for the Actodemil process.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

☐ *9.* ***Alternative Treatment Technologies to Open Burning of Propellants, Section 4.0, Pages 11 and 12 -*** *Please include expansion of the current explosive waste incinerator (EWI) operations in the assessment of identified alternatives. The submitted Alternative Treatment Analysis provides no information as to why EM contaminated with FOD cannot be treated utilizing this technology. Furthermore, if FOD would impact the EWI please discuss the feasibility of screening the contaminated EM waste stream for FOD as part of this analysis. Federal guidance for ammunition and explosives production appears to require FOD screening within the production process, and it is unclear as to why this screening could not be applied to the contaminated EM waste stream.*

RFAAP will add some of this information to the ATTR to the level that information is currently developed. However, please recognize that redesigning the EWI system or the feed system is outside the scope of the ATTR.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to provide a discussion of why EM contaminated with FOD cannot be treated utilizing the current explosive waste incinerator (EWI) operations.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

Satisfied

☐ 10. ***Alternative Treatment Technologies to Open Burning of Propellants, Section 4/Table 1, Pages 11 and 12 -*** *The criteria and overall evaluation of alternatives needs to be more substantive. The criteria in particular are either evaluating aspects not intuitive to their definitions or only capture a portion of aspects required for evaluation as per Comment 2 of the General Comments section of Section 4. Comparison of these alternatives to the status quo (which is left largely undefined by the document, see Comment 1) using a subjective rating system does not provide the analysis that would be required for proper evaluation. For instance, a theoretical treatment that would result in zero environmental releases would score exactly the same as a technology that creates a secondary waste stream requiring treatment at a waste-water treatment plant. In addition, many of the technologies carried forward because "pilot or production units are available" are not feasible on a production scale (e.g. Donvan Chambers).*

RFAAP will assess all technologies consistent with the bulleted list of evaluations provided in NOD 4.2 and will design their evaluation matrix/table based on these bullets, providing information to compare each basis presented in NOD 4.2.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. Following review and comment on this outline, RFAAP plans to revise the ATTR to assess all technologies consistent with the bulleted list of evaluations provided in NOD 4.2.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

☐ 11. ***Alternative Treatment Technologies to Open Burning of Propellants, Table 1, Criteria Definitions -*** *The definitions for each criterion are poorly defined, and often the analysis provided in the matrix does not match well with the provided definition. In general, quantifiable metrics should be used as criteria whenever possible. Specific issues with criteria definitions and applications are listed below. Before moving forward, DEQ and BAE should have agreement on what and how criteria will be used in the final evaluation.*

- *Safety Hazards: The table defines Safety Hazards as "Treatment of energetic and associated pre-treatment, treatment, and post-treatment." This definition is incredibly broad and does not intuitively reflect discussions of safety. The general assumption is that this criterion refers to worker safety. However, statements such as "Requires additional chemicals" or "Two-step process of digesting the propellant and then neutralization-oxidation" have no specific context in regards to worker safety. Prior DDESB approval of a technology should be noted here.*
- *Waste Stream Variability: Without the required context of the exact chemical nature of the waste stream this evaluation is of limited used. This criterion should evaluate what percentage of the waste stream has the potential to be treated using the technology and what specific classes of propellants or portions of the waste stream could not be treated. As previously noted, it is unclear how some of the descriptions evaluating technologies for this category are applicable. As an example, "Only one detonation can occur every other day per EDS. Cutting charges are required to treat the chemical munitions" refers not to the capability of the technology to treat various waste streams but the maximum throughput the technology is*

Satisfied

capable of. This category also limits evaluations to one technology at a time when combinations of technologies may be capable of completely treating the waste stream.

- *Environmental Releases: This criterion should provide specifics as to the nature of environmental releases related to each technology. DEQ requires knowledge of what constituents would make up the secondary waste stream and the quantity generated. An effort should be made to provide values from research papers, peer-reviewed literature, or other official documentation whenever possible. If these sources are unavailable estimates can be provided using mass-balance equations or modeling software where applicable. Next to worker safety, this evaluation is the most critical to DEQ's review of the permit regardless of how difficult it is to monitor or model.*
- *Engineering Controls: No Comments*
- *Layout Possibilities: I suggest replacing this criterion with "Feasibility" to better incorporate design restrictions, throughput, etc.*
- *Support: To what degree would this impact the selection of the technology? In theory vendors ought to be able to provide the appropriate technical support for any equipment they provide.*

RFAAP has multiple concerns with the level of detail requested in this NOD. Several of the requests require effort similar to an engineering design review as opposed to a feasibility study. However, based on our discussions with DEQ on March 30, 2016, we will provide a new table that provides more detail on the ATTR process and technologies evaluated. We will craft this table so that it can standalone for subsequent discussions on alternative treatments to the RFAAP OBG. Furthermore, we will make sure that evaluation provided for each category/definition is appropriate for that definition.

DEQ will review the revised language of the Alternative Treatment Analysis when submitted to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP submitted a draft outline of a revised ATTR to DEQ on September 13, 2016. We are awaiting DEQ comment on this submittal prior to revising the ATTR. In this submittal, RFAAP noted a new standalone table for subsequent discussions on alternative treatments to the RFAAP OBG will be provided.

Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. No actual submittal of the revised ATTR is required until further information is provided on the required report.

Section 5 of the Notice of Deficiency Addressing the Technical Completeness of the Part A and Part B Permit Applications for the Renewal of the Subpart X Open Burning and Open Detonation Permit, Technical Deficiencies of the Risk Assessment Protocol of the Permit Application

Satisfied

☐ *1.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Introduction -*** *In the introduction section, please add a section that discusses alternate treatment methods and provides reference of the alternate treatment technology evaluation report that is prepared by the facility.*

Satisfied

Considering the significant comments provided on the ATTR, RFAAP will provide a temporary placeholder for this discussion in the RAP and will delay full implementation of this NOD until such time that a final, approved ATTR is available.

DEQ understands that the alternate treatment method section will change in response to DEQ comments. To ensure that the risk assessment does not need to be updated/delayed due to these changes, please provide a very brief description of what the alternate treatment methods covers and provide a complete reference so that the reader can find this information easily. The purpose of this section is to inform the reader on where to find more information on the alternate treatment methods. DEQ does not believe that adding this information in the RA needs to be delayed till full implementation of NOD.

RFAAP will modify the introduction of the RAP to provide the requested reference to the ATTR being prepared and submitted under separate cover.

DEQ will review the new information when submitted and will determine if the comment is satisfied.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted.

☐ 2. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 1.4. Study Area Description, Pages 1-3*** *- In the third paragraph, the protocol mentions that numerous creeks and streams and smaller ponds are 'generally not used for fishing on a reliable consumption basis.' Please provide source of this information- e.g., angler survey or other such information. In absence of actual data supporting this assertion, please remove this statement.*

RFAAP can provide the requested data. However, we wish to clarify that we were not proposing to eliminate these waterbodies from consideration in the fishing scenario, but were merely clarifying that in large, inclusion of these overestimates the risk to the population.

This response is confusing, DEQ is not asking to include a risk assessment for fish from each pond. DEQ is requesting for RAAP to provide supporting data/basis for RAAP's assertion that the ponds are not used for fishing

RFAAP will add a reference to the RAP substantiating this claim as requested.

DEQ will review the new information when submitted and will determine if the comment is satisfied.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted.

☐ 3. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 2.1.1. Site-Specific Emissions Sampling, Page 2-2-***

i. *VDEQ understands that this section cannot be completed until flyer testing results are available and therefore the final list of COPCs to be included in quantitative risk assessment (QRA) cannot be developed at this time. However, please include the information about the chemical list for each waste group that can be treated at the OB ground. Please include a table similar to - but appropriately updated with the latest information - tables 2-1 through 2-9 from the previous HHRA report dated 07/27/2015. VDEQ understands that these tables will be refined based on flyer testing data.*

Satisfied

RFAAP will provide the requested information in the revised RAP from the 2005 HHRA report (note the error provided in the report date in DEQ's comment).

DEQ will review the information provided by RAAP when submitted and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ *ii. Please use the following guidelines for determining the final COPC list:*

- *Compounds detected* ***in at least one*** *or more test run samples and not meeting any of the exclusion criteria below will be included in the MPRA;*
- *Compounds reported as non-detect in all of the test run samples will be excluded from the COPC list* ***provided that the DL is lower than the lowest risk based screening criteria available at the time of testing from EPA RSL table –indoor air;***
- *Compounds present in test run samples that are also present in the method blank at greater than 50 percent of the test level will be excluded from the COPC list;* ***at 5x concentration for non-common laboratory chemicals and 10x for common laboratory contaminants will be included in the COPC list (please refer to the QAPP for the flyer testing for more details);***
- ***All J and U flagged data will be included as COPC and other laboratory flags will be considered as described in the QAPP and SAP;***
- *Compounds without any chemical specific* ***emission factor*** *fate, transport, and/or toxicity data will be excluded from the COPC list, but will be discussed qualitatively in the MPRA report;* ***and***
- ***Any chemical that is present in the waste group, not detected in the test run but based on thermodynamic modeling is reasonably suspected to be present in emissions- these include PICs.***.

In general, RFAAP has no objections to this request. During the meeting, DEQ offered the following clarifications on this NOD:

- The comparison of the DL to the residential indoor air criteria is only to assess the ability of the DL to be used to screen out constituents (i.e., is the detection limit low enough). Absent this, the indoor air criteria will have no use in the risk assessment.

- On the inclusion of blank-detected compounds in the risk assessment - For those compounds that are not common laboratory contaminants, any compound present in the blank sample at a level ≥ 1/5th of the run sample may be excluded. For those compounds that are common laboratory contaminants, any compound present in the blank sample at a level ≥ 1/10th of the run sample may be excluded.

Satisfied

DEQ will review the revised Section 2.1.1 when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ *4.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 2.1.2. Supplemental Emission Factors, Page 2-2*** *- Please provide a table listing bang box & AP-42 emission factors, and a last column that lists the more conservative value from these two sources. VDEQ understands that the final emission factor chosen for the calculations will depend on the results of flyer testing. Please note that the results of flyer testing will be compared against the last column of the table and the maximum emission rate will be used in HHRA.*

The intent of the flyer testing is to provide site-specific emissions data for the OBG. If this emissions data will not be allowed for use in the risk assessment if it is lower than non-site specific default emission factors, there is no point in collecting the data. Furthermore, the most **recent** data should be used in the assessment, as each iteration of factor reflects an improvement in the ability to collect data or analyze/model emissions from a source. A significant amount of work went into development of the new AP42 emission factors, including an evaluation of the older bang-box data. If, after consideration of all this data, ASTM determined a more appropriate, lower value was representative of OB emissions, than that lower value should be used. Requiring the facility to use the higher of a myriad of emission factors presents an overly conservative and significantly unrepresentative estimate of risk from the facility.

As discussed at the March 31, 2016 meeting between DEQ and RAAP, data from the flyer sampling test event will be used when available and after a review by DEQ. For chemicals that do not have flyer sampling test data, RAAP will use an emissions rate which represents the worst-case emission scenario using the maximum emissions rate from Bang Box and AP-42 references. While AP-42 represents newer data, the factors for ordinance detonation are marked 'draft.' As the FAQ on the EPA website states, "AP-42 sections designated as 'final' have completed the public comment process and all issues have been resolved. Sections designated as 'draft' reflect the fact that the comment period on these sections has passed, but not all issues have been resolved. EPA might receive additional data or comments that would cause a re-evaluation of the available data and possibly open another comment period. Users are encouraged to use factors from finalized sections, if available, but may decide that the draft emissions factors provide better estimates after reviewing the supporting documentation." Further, the waste stream for OB may or may not be consistent, it also contains items that are not pure ordinance related (e.g. floor sweeps etc.) and exact mixture waste treated at OB ground may not match cartridge size and other categories evaluated in the AP-42 evaluation. Given several unknowns in the air emission estimation and waste group fluctuations, it is prudent to assess human health in a way that reduces the probability of false negative outputs. Therefore, a more conservative approach is deemed the most appropriate.

RFAAP would prefer to defer further comment on this NOD until after the results of the flyer testing are

Satisfied

available. The results of the flyer testing will provide more information on what level of data supplement is required. Based on this information, RFAAP will then review the AP-42 and bang box emission factors and provide a pollutant by pollutant review of the appropriateness of each to RFAAP waste streams and emission estimates.

DEQ will review the new information when submitted and will determine if the comment is satisfied.

RFAAP recently received word from USEPA that the results of the flyer testing are expected in late February 2016. We hope to schedule a meeting with DEQ and USEPA, as well as other parties, to review this data, its quality, and any limitations identified in late March 2016. RFAAP should be able to provide further resolution on this issue after that meeting.

☐ 5. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 2.2 Discussion of Selected COPCs, Page 2-3 -***

i. ***General comment -*** *The protocol refers to EPA R6 HHRAP guidance as source for COPCs. This reference is correct. But the list of COPCs, especially groups such as D/F and PAHs, may not be completely reflective of the wastes managed at the OB facility. Further, the thermodynamics of OD process are different than incinerators or similar controlled combustion processes, thus resulting in somewhat different combustion products. Therefore, please consider EPA R 6 guidance as a starting point and add, as necessary, to the COPC list based on facility specific information. This approach also applies to chemical specific parameters (including toxicity values, VOC & mutagenic status) and exposure/input defaults used in human as well as ecological risk assessment. This comment also applies to subsections and other sections of the report as well.*

While the COPC lists provided in the HHRAP are written as guidance for hazardous waste combustion facilities, they also reflect general limits on analytical capability and provide those chemicals that can generally be determined via standard stack sampling methods and/or that have fate and transport data available. Including compounds not provided on this list provides little value if they cannot be analytically determined (recognizing the ultimate goal is to provide quantification of OBG emissions via the flyer program) or quantitatively assessed. If DEQ wishes that RFAAP consider additional compounds in the assessment, we request that DEQ provide a specific list of those compounds they feel are necessary. We will then review this list against our waste materials and process knowledge and provide specific feedback on each compound. (Note that during a meeting between the parties on March 31, 2016, DEQ clarified that the referenced sources provided in the HHRAP should be used as the source of fate and transport data. If these sources do not have data available for a certain compound, it need not be included in the quantitative assessment).

HHRAP guidance was developed over 10 years ago and as analytical capabilities have significantly improved since then relying solely on HHRAP guidance may not be the most appropriate approach. As RAAP mentioned at the Mach 31, 2016 meeting, flyer testing will not be able to test for every compound which needs to be included in the risk assessment. Generally speaking as a starting point, all the chemicals that are present in every waste stream, including combustion byproducts of each of these chemicals, are to be included in the COPC list. Additionally, chemicals which can be analyzed by standard EPA analytical methods for VOC, SVOC, Dioxin/Furans, PCBs, energetics, and TAL metals are to be included. The justification for not including specific chemicals (e.g., certain metals) or groups of chemicals (e.g. PCBs) needs to be included in the application by the permittee for DEQ's approval. Please note that as part of the permit application, the permittee is to provide a complete and correct list of COPCs which is reflective of the waste treated at the unit for DEQ's review and approval. Therefore, DEQ will not be able to develop unit-specific COPC list for the permittee but requests the facility to refer to this comment to help develop a complete COPC list that is reflective of the OB unit operations. As discussed at the March 31, 2016 meeting, the chemicals which do not have either F and T/emission

Satisfied

factors for air modeling or toxicity data will be discussed qualitatively only.

RFAAP will revise the COPC discussion in the OBG RAP and determine if the addition of any compounds is appropriate based upon the chemicals typically found in the RFAAP waste streams. Note that we cannot provide an exact chemical composition of each of our wastes due to the fact that these chemical formulations would be protected under confidentiality agreements and military protocols.

DEQ would like to clarify the following:

(a) Based on previous DEQ comments, the facility will develop and provide a list of chemicals that are present in waste and could be present in emissions as a result of combustion process for DEQ's review and approval. DEQ cannot provide list of chemicals that may be present in facility's waste streams.

(b) DEQ is not requesting proprietary formulations - only the names of the chemicals that are in the waste streams treated at OB unit.

RFAAP is currently working to compile the requested list of chemicals. After this is developed, we will submit it to DEQ for review prior to incorporating this into the risk assessment protocol.

☐ *ii. Please include Hexachlorobenzene & Pentachlorophenol under section 2.2.*

The HHRAP specifically states that "these chlorinated compounds are difficult to make even under controlled conditions [and] the combustion properties of these chlorinated compounds indicate that they aren't likely to be formed as PICs if they aren't present in the waste feed stream." As such, USEPA no longer recommends automatically including these compounds in risk assessments. They only recommend their inclusion for waste feeds containing the compounds, wood preservatives, pesticides, or highly variable waste streams, like municipal solid waste. As none of the wastes at the RFAAP contain these compounds, contain a significant amount of chlorine, or meet the other criteria specified by USEPA, inclusion of these compounds is not inappropriate and counter to USEPA guidance.

While the wastes produced by RAAP may not contain chlorine compounds the wastes produced by tenant organizations, which are allowed to be burned at the OBG with proper notification to DEQ, may contain chlorine compounds. Please provide information which demonstrates that no waste produced by tenant organizations contains chlorine compounds.

RFAAP is not asserting that the RFAAP's wastes contain no chlorine. The wastes do, as documented in historical analytical results, contain a small amount of chlorine. However, RFAAP asserts that the chlorinated compounds referenced in DEQ's original NOD are not present in our waste streams. As such, and using the HHRAP as a reference, RFAAP asserts that it is not reasonable to assume that the referenced compounds (hexachlorobenzene and pentachlorophenol) would be present in emissions.

Facility's response does not clarify if tenant's waste streams contain hexachlorobenzene and pentachlorophenol. Please provide this information.

The waste streams managed at the OBG do not contain hexachlorobenzene or pentachlorophenol.

☐ *6.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, General comment -*** *Please specify if emissions from open burning will be estimated using the POLU13 combustion model that calculates emissions based on propellant material mixing with air then*

Satisfied

burned to form atmospheric pollutants. If so, which waste streams will be used for the modeling and how are these specific waste streams representative of the worst-case emission scenario?

The goal of the flyer testing is to eliminate as much modeling as possible. If, in fact, sufficient data is available from the flyer testing, there will be no need to utilize POLU13, as measured values will already represent the actual emissions from the unit. During a meeting between the parties on March 31, 2016, DEQ requested that a brief description of POLU13 be added to the RAP as a back-up plan for those constituents not able to be determined via flyer testing. RFAAP will make this addition to the RAP.

DEQ will review the revised RAP when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement

☒ *7.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, General comment -*** *Please specify if the incinerator trial burn data for combustion byproducts from the burning of propellant wastes at RAAP will be considered since the same waste streams that are burned in the incinerator also will be burned at the Open Burning Ground.*

RFAAP does not intend to use any test data from the incinerators in application of the OBG risk assessment. Not only is the form of the wastes sent to the incinerator very different from those treated at the OBG, the method of combustion is also considerably different. Therefore, we do not consider the EWI emissions data to be appropriate for use at the OBG.

The comment is now satisfied.

☐ *8.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 2.2.2. Polynuclear Aromatic Hydrocarbons, Page 2-3*** *- In addition to the 7 PAH mentioned in R 6 guidance, please include the remaining 13 PAHs from the RSL table. Please consult latest update of the RSL table for toxicity values.*

RFAAP will consider the inclusion of these PAHs pending their likelihood for formation from the wastes that are treated at the OBG. Assuming that these PAHs are included in the risk assessment, we request DEQ provide appropriate fate and transport data for them, as they are not available from the Region 6 guidance. (Note that during a meeting between the parties on March 31, 2016, DEQ clarified that the referenced sources provided in the HHRAP should be used as the source of fate and transport data. If these sources do not have data available for a certain compound, it need not be included in the quantitative assessment).

DEQ will review the revised Section 2.2.2 when submitted by RAAP and determine if the comment is satisfied then.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be

Satisfied

considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Please note that we expect this data request to be at least partially satisfied with the results of the flyer testing (providing information on the presence of organics in the air emissions). RFAAP recently received word from USEPA that the results of the flyer testing are expected in late February 2016. We hope to schedule a meeting with DEQ and USEPA, as well as other parties, to review this data, its quality, and any limitations identified in late March 2016. RFAAP should be able to provide further resolution on this issue after that meeting.

☐ *9.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 2.2.8. Metals, Page 2-5*** *- VDEQ understands that the final list will be developed after the flyer test, but please include all TAL (target analyte list) metals (Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tih, V, Zn) and Hg (elemental and divalent) in the initial list of COPCs.*

RFAAP does not feel it appropriate to include metals in the COPC list that are not present or not expected to be present in the waste materials being combusted at the OBG. Unlike organics, if a metal is not present in the waste feed, it is not possible for it to be present in the emissions. RFAAP will provide a target analyte list for metals that reflects all metals reasonably expected to be present in the waste feed. However, many of those requested by DEQ in this NOD are not expected to be present.

DEQ will review the revised Section 2.2.8 when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Please note that we expect this data request to be at least partially satisfied with the results of the flyer testing. RFAAP recently received word from USEPA that the results of the flyer testing are expected in late February 2016. We hope to schedule a meeting with DEQ and USEPA, as well as other parties, to review this data, its quality, and any limitations identified in late March 2016. RFAAP should be able to provide further resolution on this issue after that meeting.

☒ *10.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 2.2.8.1. Chromium, Page 2-5*** *- The last sentence about recalculating chromium as trivalent chromium is not acceptable as there is no speciation data available. In absence of the speciation data, all chromium will be considered to be in hexavalent form. Please revise.*

RFAAP will initially perform the assessment assuming all emitted chromium is in the hexavalent form (assuming that it is not possible to speciate chromium in the flyer testing). However, the statement provided indicates that, should chromium be a driver in the assessment, RFAAP will consider the potential overestimation of impacts and quantify that potential overestimate by recalculating all risk assuming all chromium is trivalent. We would

propose using this recalculation in determining an appropriate safety factor for any permit limitation resulting from chromium risk or hazard.

RAAP's response is adequate except for the proposal for recalculation. If hexavalent chromium becomes the risk driver and RAAP wishes to revise the risk assessment, RAAP will need to provide the supporting data and justification to support the assumption of trivalent chromium.

RFAAP will provide the requested data if recalculation of risk becomes necessary.

The comment is now satisfied.

☐ *11.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 2.2.8.2. Lead, Page 2-5*** *- In addition to IEUBK, please include ALM.*

RFAAP will add ALM modeling to Section 2.2.8.2 of the RAP.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement

☐ *12.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 2.2.8.3. Mercury –***

i. This section is unclear- mercury species have different toxicity via different routes of exposure and distribution percentages assume elemental, divalent as well as methyl mercury. Will all emissions be treated as 'total' and distribution of various species be done and then each species will be included in QRA? What toxicity values will be used?

RFAAP will modify the text to indicate that mercury speciation will be consistent with recommendations provided in the HHRAP and will further detail this speciation. The toxicity data used will be that for each individual mercury species. Total mercury will only be used to establish the initial emission factor.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email

Satisfied

correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ *ii. The bullets under mercury mentions some speciation related distribution numbers that seem to be in line with R 6 guidance. For food items, please conservatively assume all mercury to be in methyl mercury form.*

RFAAP disagrees with considering all mercury in food items to be in methyl mercury form. The speciation criteria provided in the HHRAP are based on scientific analyses and deviation from them without scientific data to justify such a deviation is inappropriate. Assuming that mercury is in the most hazardous form despite scientific data showing a different distribution is overly conservative. Despite this point, RFAAP will provide an initial assessment of food exposure using the toxicity data for methyl mercury for all types of mercury assessed. However, should this result in significant risk to the receptor, risk will be reassessed using data specific to the mercury congener being evaluated. (Note: All mercury speciation will still be handled according to the recommendations specified in the HHRAP).

RAAP's approach of evaluating all food items using methylmercury and then if needed performing a reassessment using different species is adequate. However, please clarify if this reassessment is done will the mercury species used will reflect the predicted species and phase specific allocations provided in EPA HHRAP?

If the reassessment is necessary, the mercury speciation found in the HHRAP will be used as the basis for the revised approach.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

Please note that RFAAP did provide a response to this NOD with our previous correspondence. It appears as if DEQ missed the response in their review. The response is repeated below for ease of reference:

> If the reassessment is necessary, the mercury speciation found in the HHRAP will be used as the basis for the revised approach.

☒ *iii. Please note that based on flyer data, some of the mercury speciation and distribution assumptions may need to be revised.*

RFAAP wishes to clarify that there is no intent (nor identified capability) to collect speciated mercury emissions data using the flyer technique. Therefore, we do not expect that the data generated will result in any different distribution than that provided in the RAP.

The comment is now satisfied.

☐ *13.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds****, Please include discussion about Nickel in a separate subsection under section 2.2.*

RFAAP will add a separate discussion on Nickel to Section 2.2 of the RAP.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ

Satisfied

will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☒ 14. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3., Dispersion and Deposition Modeling*** *- The comments provided in the current section of the NOD, Section 5, relate only to the HHRA and EcoRA. VDEQ's Office of Air Quality Assessments (AQA) will be providing technical and detailed comments on this section and for all the proposed inputs to the model including grid spacing, terrain, use of surrogate compounds, meteorological data and averaging time.*

RFAAP has reviewed AQA's comments provided with the overall NOD transmittal and has responded to each. DEQ indicated that no separate comments from AQA are being provided as an addendum to the initial NOD letter.

The comment is now satisfied.

☐ 15. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, General comments about Section 3*** *–*

i. *While Human Health Risk Assessment Protocol (HHRAP) for Hazardous Waste Combustion Facilities provides a very detailed discussion about HHRA for combustion facilities, please also refer to EPA Region 3 OB OD permitting guidelines for OB specific requirements to ensure the required information is included in the protocol. This guideline can be found at:*

http://www3.epa.gov/reg3wcmd/ca/pdf/RCRA_OpenBurnOpenDet_Guide.pdf

RFAAP will review the EPA Region 3 guidance and incorporate information as appropriate.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

ii. *Please provide all input parameters that will be used in the modeling.*

Satisfied

As there are a significant number of input parameters utilized in the air emission modeling, the fate and transport assessment, and the final risk calculations, we request further clarification on which input parameters DEQ wants specified.

Please provide a table (or several tables, if needed) of all the air modeling inputs which will be used. If a specific website will be used to obtain certain standard or default values, please provide the web address and name of the source. Except for meteorological data, if any site-specific information is used please provide supporting data/information which justifies the use of site-specific values. This comment also applies to the response for 17.i.

RFAAP will develop the requested table for review by DEQ. After DEQ agrees that all relevant items are provided, RFAAP will incorporate this to the RAP.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

Please note that RFAAP did provide a response to this NOD with our previous correspondence. It appears as if DEQ missed the response in their review. The response is repeated below for ease of reference:

> RFAAP will develop the requested table for review by DEQ. After DEQ agrees that all relevant items are provided, RFAAP will incorporate this to the RAP.

☐ *16.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.2.2. Emission Scenario, Pages 3-2 to 3-3 –***

i. Please provide some more details and description of the propellant and skid burn procedures and process.

RFAAP will modify the descriptions provided in the RAP to be consistent (the same level of detail as) those provided in the 2005 RAR.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

Satisfied

☐ *ii. From this section it is unclear exactly how many modeling runs will be performed and using what burn conditions and which waste groups. Please provide a table listing the model runs and conditions it represents.*

RFAAP will review Section 3.2.2 and provide clarifying tables as appropriate.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☒ *iii. This section lists several operational scenarios. Please note that these will have to be included in the permit as explicit operating conditions and the modeling will need to be run using scenarios that represent these conditions. Based on information in section 3.2.2 and Table 3-2 the following conditions are identified:*

- *Half the pans, i.e., 8 pans are ignited during any burn,*
- *Total maximum capacity of 8000 lbs for propellant and 2000 lbs for skid burn per day; not more than 29200 lbs per year,*
- *One burn event per day- either skid or propellant but never both on the same day,*
- *Conservatively assume 365 burn events per year,*
- *Burn only during daylight hours,*
- *Burns only during favorable weather conditions- wind speed between 3-15 mph, no precipitation or thunderstorms occurring or in the vicinity,*
- *Disposal event restricted during wind speed of 3-15 mph.*

RFAAP recognizes that the operating restrictions employed in the modeling may be incorporated as Permit limitations and finds each of them to be reasonable limitations.

The comment is now satisfied.

☐ *iv. Skid burn has potential to burn for 7 hours or more but the modeling will be looking at only 1st hour. How will the emissions from the remaining time be included in the air modeling? VDEQ understands that this simmering time will have very different emission properties but may also have a different chemical profile than the one considered in the 1st hour. Please provide a discussion on this aspect and please include this item in the uncertainty analysis as a contributor to potential underestimation of risk.*

Note that RFAAP is proposing to model the skid burn in a manner identical to that previously modeled in terms of burn duration versus modeled duration. RFAAP will provide more detail in the RAP on the proposed methodology.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

Satisfied

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☒ *v. If burns are not going to be allowed on days when there is a reasonable probability of precipitation (permit condition would need to state this explicitly), the pollutants may be sufficiently dispersed that wet deposition in the study area may be negligible. However the particulates that may be released in air during OB may still be deposited via wet deposition when rain follows the OB event. Since OBODM cannot calculate wet deposition, the uncertainty section must clearly state this limitation which may under predict overall risk.*

RFAAP will include a description on OBODM limitations in the uncertainty discussions in the Risk Assessment Report (RAR).

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

No further action is required on this NOD at this time. It is RFAAP's understanding that the above NOD serves as a recommendation/request for the risk assessment report (RAR), not the RAP. Therefore, this NOD is satisfied in terms of the RAP.

☐ *vi. Section 3.2.2 provides discussions of the burn and section 3.2.3 lists model runs but it is unclear how the proposed model runs reflect all the discussions provided in Section 3.2.2. Please provide the link between these two sections.*

RFAAP will modify Sections 3.2.2 and 3.2.3 to provide the clarity requested by DEQ.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

Satisfied

☐ *17.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.2.3. Material Characteristics, Page 3-5 –***

i. Please provide fugacity coefficient and the phase. Please also provide all the other input parameters, assumptions, and defaults that will be used in the modeling.

As there are a significant number of input parameters utilized in the air emission modeling, the fate and transport assessment, and the final risk calculations, we request further clarification on which input parameters DEQ wants specified.

Please see the response for 15.ii.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

DEQ's comment referred discussion of this item back to NOD 5.15(ii). Please note that RFAAP did provide a response to this NOD (5.15(ii) with our previous correspondence. It appears as if DEQ missed the response in their review. The response is repeated below for ease of reference:

> RFAAP will develop the requested table for review by DEQ. After DEQ agrees that all relevant items are provided, RFAAP will incorporate this to the RAP.

☒ *ii. It is unclear why the facility wants to use surrogate COPCs when the COPC list, emission factors, results of flyer test, etc. are available. Surrogate compounds are typically used for new facilities for which compound-specific information is not available. Please provide equations that will be used for proposed calculations and also explain why this approach will represent more health-protective air concentrations.*

The surrogate COPCs are provided for air modeling purposes only. These surrogate pollutants will be used to provide a unity-type air concentration and deposition parameter based on a 1 g/s emission rate for each type of COPC that the surrogate represents. The modeled concentrations and deposition rates will then be scaled based on the estimated emissions of each and every COPC. Note that RFAAP is not proposing to only assess two COPCs in the risk assessment. We are merely proposing to run the air model for a vapor phase surrogate and a particle phase surrogate to develop the unity-based air concentrations and deposition rates, as is common practice.

DEQ concurs with RAAP's rationale and the comment is now satisfied.

☒ *18.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.3. Receptor Grid, Page 3-6 –***

i. The maximum concentrations at grid level will be the sum of the particulate and vapor phase concentrations, thus representing the maximum theoretical concentration (not counting wet deposition)?

The ground-level pollutant concentrations will be calculated in accordance with the equations provided in Section 5 the HHRAP and the referenced appendices (minus the wet deposition component). The ground-level air concentration will be the modeled air concentration (vapor phase plus particle phase) at the given location. The media concentrations will be a

Satisfied

combination of the modeled air concentrations and deposition parameters.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

No further action is required on this NOD at this time. It is RFAAP's understanding that the above NOD serves as a recommendation/request for the risk assessment report (RAR), not the RAP. Therefore, this NOD is satisfied in terms of the RAP.

☐ *ii. Please ensure the following are identified on the grid and the predicted concentrations are available: current schools, daycares, hospitals, nursing homes, hospice and similar elderly care centers.*

The specified location of each special subpopulation receptor is provided in Table 4-6. A figure will be provided in the RAR depicting each of these locations on a map. In addition, each of these locations will be included in a discrete receptor grid in the modeling runs.

DEQ will review the figure RAAP will submit to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☒ *iii. Please include surface water bodies on the grid and include predicted concentrations at those locations.*

RFAAP will include a discrete receptor grid for all waterbodies. In the RAR, RFAAP will provide the predicted concentrations at each of these locations.

DEQ will review the revised Section 3.3 when submitted by RAAP and determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

No further action is required on this NOD at this time. It is RFAAP's understanding that the above NOD serves as a recommendation/request for the risk assessment report (RAR), not the RAP. Therefore, this NOD is satisfied in terms of the RAP.

Satisfied

☒ 19. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.5.1. Averaging Times, Page 3-9*** - *The modeling may be carried out for every daylight hour but for risk assessment purposes, please select the 'worst case' operating scenario for averaging time.*

RFAAP anticipated using the worst-case modeling runs for the risk assessment as explained in Section 3.5.1. In a meeting between the parties on March 31, 2016, DEQ concurred with this approach and indicated that no further action is required.

The comment is now satisfied.

☐ 20. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.1.3. Water bodies and Watersheds, Pages 4-4 to 4-6*** –

i. *In place of using GPS to identify current receptor, VDEQ strongly recommends that risk assessment be carried out using maximum predicted surface water concentrations based on air modeling results. Once these calculations are done, current receptors etc. may be discussed as additional consideration for risk management decisions.*

Recognizing that the location of each waterbody is a fairly well established historical location and that new waterbodies do not generally appear in an assessment area within any reasonable timeframe, RFAAP will model the waterbodies using the actual coordinates for those waterbodies. In addition, each watershed will be modeled based on the sum of the general receptors located within that watershed. Drinking water input locations are also well defined and not subject to new withdraw points without substantial infrastructure modifications or permitting actions. Therefore, these too will be based on actual geographical coordinates.

This response is confusing. Per the meeting on March 31, 2016, the quantitative risk assessment is to be conducted using the worst case waterbody concentration for fishing (and recreational activities). If there is the presence of a waterbody which is used for drinking water, then it will be included in QRA using the predicted concentrations specific to this waterbody. Please make changes to Section 4.1.3 accordingly.

RFAAP will review the section to clarify the approach that will be used for modeling waterbodies.

DEQ will review the new information when submitted and will determine if the comment is satisfied.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted.

☒ ii. *VDEQ understands that there may be fish consumption advisory on several waterbodies within the study area, but the human and ecological risk assessment calculations will not eliminate any exposure pathway based on the advisories.*

RFAAP is not proposing to eliminate any exposure pathway based on these advisories. We are merely providing information on the advisories that exist and indicating that these are not in place due to any specific actions by the RFAAP. (We are adding to the description of the exposure setting and may utilize this information in a future uncertainty discussion).

The comment is now satisfied.

Satisfied

☐ 21. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.2 Exposure Scenarios, Page 4-****7 -Please also include 'surface water via deposition' in the bulleted list.*

RFAAP will revise the bulleted list in Section 4.2 as requested.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ 22. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.2.1.1. General Receptors, Page 4-7*** *- Please also include recreational receptor for direct exposure to surface water.*

During a meeting between the parties on March 31, 2016, DEQ clarified that they were referring to a recreational receptor (e.g., someone swimming in the impacted waters, experiencing dermal exposure), not a recreational fisher. DEQ agreed to provide further information on the details for this exposure scenario (e.g., pathways, duration, frequency, etc.). Once this information is provided, RFAAP will add the recreational receptor to the RAP.

Please use the EPA RSL 'Recreator Surface Water Equations' and exposure defaults (where available) to calculate risk/hazard for this receptor. The recreational exposure defaults for surface water are as follows:

- *Water ingestion rate (L/hr) 0.05*
- *Exposure Time (hr/event) 2*
- *Event frequency (events/day) 1*
- *Skin Surface Area-adult (cm2) 19,652*
- *Skin Surface Area-child (cm2) 6,378*
- *Exposure Frequency (days/years) 195*
- *Exposure Duration -adult (years) 20*
- *Exposure Duration-child (years) 6*
- *Body Weight –adult (kg) 80*
- *Body Weight-child (kg) 15*

Satisfied

RFAAP will revise the RAP to include the recreational receptor and will utilize the exposure criteria provided above by DEQ.

DEQ will review the new information when submitted and will determine if the comment is satisfied.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted.

☒ *23.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.2.2.1. General Receptors, Page 4-10*** *- This section name is repeated. Please correct. This section and several other sections mention that the HHRA will be refined using 'realistic' land use and/or food consumptions, etc. Please note that the facility has no control over activities and exposures of off-site receptors therefore 'site-specific' consideration cannot be considered. Therefore, please remove such language from this section and elsewhere in the protocol.*

While RFAAP has no control over the activities of off-site receptors, local zoning offices do draw jurisdictions and establish areas in which different types of activity are permitted. For example, without extensive re-zoning efforts, an area zoned industrial cannot be used for agricultural farmland or a housing development. In addition, those areas for which extensive clearing of land or existing neighborhoods would be required to conduct subsistence farming, or for which the terrain (e.g., steep grade or cliff) would prohibit subsistence farming, or those areas falling within a transportation line (*e.g.,* railway thoroughfare) would not be considered for the farming scenario. An examination of the exposure scenario map provided in Figure 4-2 reflects these considerations.

DEQ requires further clarification from RAAP to satisfy the comment. DEQ believes RAAP will conduct a QRA using maximum concentrations as described under response 18.i for all the receptors (except fishing/recreational where maximum concentration for a waterbody will be used). In addition, RAAP will make a case for various other locations as described in response 23. Please confirm whether this is an accurate summary of the calculations to be completed for the QRA.

The summary provided above by DEQ is accurate.

The comment is now satisfied.

☐ *24.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.2.1.2. Special Subpopulations, Page 4-8*** *- Schools and day care centers have different exposure scenarios so please separate the two. Please also refer to comments below related to Section 4.3.3. Another section 4.2.2.2 has the same name which is confusing- please either combine the sections or give different names to each section.*

RFAAP will establish a separate exposure scenario for schools and daycare centers. However, recognizing that EPA guidance presents these two locations as having the same exposure assumptions, we request clarification from DEQ on the assumptions they propose we use for each scenario.

DEQ's comment was related to the information provided in October 2015 report Section 4.2.1.2 and Table 4.4 which listed day care facilities and schools as having separate exposure defaults. Based on the discussion at the March 31, 2016 meeting, a separate line item will be provided in Table 4.4 representing daycare age (0-6 years) and elementary school student age (6-10 years). DEQ remains unclear how the other exposure defaults will be used for the elementary school student as proposed by the facility. Per March 31, 2016 meeting, DEQ is requesting RAAP to provide exposure defaults for this

Satisfied

receptor. This comment also applies to response 26.

RFAAP will revise Section 4.2.1.2 and Table 4.4 as requested.

DEQ will review the new information when submitted and will determine if the comment is satisfied.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted.

☐ *25.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.2.2. Exposure Pathways, Page 4-8*** *- Please add inhalation and dermal pathway of exposure of soil for all receptors. Please also provide all the exposure defaults for every receptor and each media that will be used for calculations in a table. Please obtain the exposure from EPA RSL user's guide; for defaults that are not available in the RSL guidance, please refer to EPA's exposure factors handbook and EPA R 6 HHRAP guidance. This comment also applies to section 4.3 and all subsections.*

RFAAP will add the requested pathways to each scenario. RFAAP will provide information on the exposure defaults for each exposure scenario in the RAR, as requested during our March 31, 2016, meeting.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ *26.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Table 4.4 -*** *Please specify that inhalation includes vapor and particulates. Further child receptor is counted from 0-6 years, not 1 to 6 years. Schools can have students up to age of 18 years, so please explain why only 10 years is selected.*

RFAAP will modify Section 4.3.1.1 of the RAP to clarify that the air concentration is a combination of the vapor and particulate concentrations.

During a meeting between the parties on March 31, 2016, RFAAP further explained the age ranges of each receptor that was chosen. DEQ requested several modifications to these child receptors:

- Daycare should be reflective of children from 0 to 6 years old, not 1 to 6 years old.
- School scenario should be clarified as an elementary school scenario.

- Assessment of middle schools and high schools is not necessary at this time, as generally the daycare and elementary school students are more susceptible to risks from exposure.

RFAAP will make the changes requested and will verify the body weights that will be used for each scenario.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time. Please also see the response to Comment 24.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☒ *27.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.2.3. Exposure Locations, Page 4-10*** *- Please use the maximum deposited concentration (same concentration value) for each receptor for human health and land based ecological receptors for QRA. Information regarding current receptors at the predicted area of maximum deposition and locations of sensitive receptors may be discussed separately for risk management decision making and/or uncertainty analysis.*

In a meeting between the parties on March 31, 2016, RFAAP clarified that they intended to assess risk as the location with the highest modeled air concentration and the location with the highest modeled deposition rates. This will likely result in assessment at multiple locations. (One, worst-case location that includes the highest air concentration and highest deposition rate will not be modeled, as it is overly conservative). DEQ indicated that they found this approach to be acceptable.

The facility has proposed the following: The maximum modeled air concentration -annual and hourly - will be used for inhalation and acute risk assessment, respectively and highest depositional (volatile and particulate) will be used for soil and all other related media concentrations. Please confirm if this is an accurate summation of what is being proposed.

The summary provided above is incorrect. RFAAP will perform the risk assessment at multiple locations. One location for this assessment will be that receptor with the maximum air concentration (Location A). The assessment of the receptor at this location will use the air concentrations and deposition rates from Location A. Another location (Location B) will be that receptor with the maximum deposition rate. The assessment of the receptor at this location will use the air concentrations and deposition rates from Location B. RFAAP will not create or model a fictional location that uses the air concentration from the receptor with the maximum air concentration and the deposition rates from the receptor with the maximum deposition rates. This presents an inaccurate, unrealistic, and in appropriate depiction of impact of unit emissions on the surrounding community.

Satisfied

Based on the meeting discussion of March 31, 2016, no further discussions are required for the proposed two locations for risk assessment (maximum air concentration and maximum deposition).

Reviewing DEQ's comment, RFAAP understands that this comment is now satisfied.

☒ *28.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.3. Quantification of Exposure, Page 4-13*** *- Please provide information on what equations, what input assumptions and values, and what algorithms will be used to calculate the exposure point concentration for each media studied. If commercial software is used for this purpose, VDEQ will need to evaluate the software for adequacy review. This comment applies to all the subsections of 4.3.*

RFAAP indicates in the RAP that the HHRAP Volume III will be used to calculate media concentrations. We are uncertain of what specification is required above and beyond this reference.

Per the discussions with RAAP on March 31, 2016, RAAP will provide exposure/input values which are different from the ones provided in the RSL table and EPA HHRAP with text justifying the use of these non-default values. For exposure defaults, the EPA RSL values will supersede EPA HHRAP where available. All the input values used in the calculation will be included in the HHRA report. This comment also applies to Response 30.

RFAAP will provide the exposure and input values as requested in the RAR. Any values differing from those provided in the above references will be justified.

DEQ will review when the exposure defaults become available. On a related note, DEQ has released a quantitative risk Assessment tool called VURAM. This access based tool and User's Guide are available at available at: http://deq.state.va.us/Programs/LandProtectionRevitalization/RemediationProgram/RiskAssessment.aspx. The facility may consult this tool and user's guide to ensure that the risk assessment calculations meet DEQ requirements. The facility may choose to use this tool for quantifying risk once all media concentrations are available but note that this tool does not include calculations for risk via mother's milk. If facility decides to use this tool, additional exposure scenario not included in VURAM will need to be calculated outside of VURAM and added to overall risk.

No further action is required on this NOD at this time. It is RFAAP's understanding that the above NOD serves as a recommendation/request for the risk assessment report (RAR), not the RAP. Therefore, this NOD is satisfied in terms of the RAP. We would, however, like to schedule a conference call with DEQ risk assessment staff to discuss the release of VURAM and how it will factor into this risk assessment, the protocol, and the methodologies employed.

☒ *29.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.3.1.2. Soil Concentrations, Page 4-14*** *- There is no screening level evaluation for RCRA permitting related RA. All COPCs that have emission factor and toxicity will be included in the quantitative risk assessment for human health and ecological evaluation. Please remove any references to screening level evaluation throughout the document for both human and ecological risk assessment, including section 4.3.1.3 and section 7.3.*

In regards to the human health risk assessment, the word screening is not applied in this discussion. We consistently refer to the human health risk assessment as the MPRA (multipathway risk assessment).

The term screening is applied to the ecological assessment and used in Sections 4.3.1.3 and 7.3

Satisfied

based on similar wording and descriptions provided by USEPA in their guidance document (and DEQ's recommended reference) *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities.* Therefore, the use of the word "screening" is consistent with USEPA terminology and DEQ recommendations.

DEQ concurs with RAAP's rationale and the comment is now satisfied.

☒ *30.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.3.1.3. Surface Water and Sediment Concentrations, Page 4-14*** *- Please provide the full reference citation for Volume three of HHRAP. Please provide all input variables.*

RFAAP will add the requested citation. However, we request DEQ provide further clarification on which input parameters DEQ wants specified as there are a significant number of input parameters utilized in the modeling, fate and transport assessment, and the final risk calculations.

Please see the response to Comment 28.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP did provide a response to NOD 5.28 in our referenced response. Having responded to that, RFAAP felt that this NOD was also addressed. Regardless, based on the comment received in response to NOD 5.28, no further action is required on this NOD at this time. It is RFAAP's understanding that the above NOD serves as a recommendation/request for the risk assessment report (RAR), not the RAP. Therefore, this NOD is satisfied in terms of the RAP.

☒ *31.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 4.3.3. Exposure frequency and Duration*** *- Please refer to Comment 23 above. The facility may use the exposure assumptions and scenarios specified in R 6 guidance and toxicity values which have been developed to account for toxicity to account for sensitive receptors or evaluate sensitive receptor separately as proposed. If the facility chooses to evaluate sensitive receptor separately, please provide references and rationale for selecting exposure values. Exposure at school may be 180 days but daycare may be far greater. Therefore please use 350 days/year. Further, childcare can have infants up to 12 years of age. Please make necessary adjustment. What is the source of the assumption of a 7 day stay in nursing home? How are hospice and longer term facilities accounted for? Also for elderly, how is the immune-compromised status and differential susceptibility to be accommodated in the calculations? Please provide more information on the data source for a nursing home stay of 3 years. Please also provide the equations that will be used to calculate intake concentrations for sensitive populations.*

RFAAP will provide the requested information in the revised RAP.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

No further action is required on this NOD at this time. It is RFAAP's understanding that the above NOD serves as a recommendation/request for the risk assessment report (RAR), not the RAP. Therefore, this NOD is satisfied in terms of the RAP.

Satisfied

☐ 32. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 5.1. Toxicity Information for noncarcinogenic effects, and Section 5.2. Toxicity Information for Carcinogenic Effects, Page 5-1*** *- Please consult the latest update of the EPA Region 3 RSL table to obtain carcinogenic as well as noncarcinogenic toxicity values. While the RSL table itself obtains toxicity values from several primary sources (IRIS, PPRTV, ATSDR MRLS, CalEPA RELS and cancer potency values and provisional PPRTVs and HEAST), VDEQ recommends using the RSL table so that it is easy to keep a track of updates in relation to the date of report. The RCRA Corrective Action website lists several compounds that are used as surrogate compounds. Please consult this list. Chemicals that have SFO and/or IUR in the RSL table will be considered to be a carcinogen. Chemicals that have a RfD and/or RfC in the RSL table will be considered to be noncarcinogens and chemicals that have both carcinogenic and noncarcinogenic toxicity values, both, risk and hazard will need to be calculated. Please make necessary changes in the text to reflect this information.*

RFAAP will revise Section 5.2 accordingly.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ 33. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 6.1. Noncarcinogenic Hazard Inde3x Estimate, Page 6-1*** *–*

i. *The TRI report is neither representative of background concentrations, nor does it in any capacity give any indication of background concentrations of any of the constituents. The TRI report simply reports permitted and some fugitive emissions by certain groups of industries that have inventories exceeding a certain quantity. Therefore, please do not use TRI values as background levels. Please remove this entire discussion from the protocol.*

RFAAP was not using the TRI values as background concentrations, but was using them as a representation of the lack of other facilities that are contributing to the level of regulated constituents in the assessment area. This is necessary and important both when establishing target values for the risk assessment, as well as discussing and evaluating modeled impacts on the surrounding area. We feel the discussion important to document surrounding industrial activities and aide future discussions in the RAR. However, to clarify that the intent of this section is only for information purposes only (and not to base some alternate risk/hazard criteria on), RFAAP will move this discussion to another portion of the RAP.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

Satisfied

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ *ii. Target level HQ for individual noncarcinogens irrespective of target organ (i.e., hazard from one chemical via all exposure media and pathways for a receptor): 0.25. Target level HI for all noncarcinogens irrespective of target organ (i.e., hazard from all COPCs combined via all exposure media and pathways for a receptor): 1.0 The target level for blood lead levels in children is no more than 5% of children exceeding a blood lead level of 10 μg/dL.*

RFAAP finds these targets appropriate and will modify the discussion in Section 6.1 of the RAP to reflect this specification.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ *34.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 6.2. Carcinogenic Risk Estimate, Page 6-3*** *- Chronic Exposure: Individual risk (i.e., risk from one chemical via all exposure media and pathways for a receptor): at or below 1E-6. Cumulative risk (i.e., risk from all chemicals via all exposure media and pathways for a receptor): at or below 1E-4.*

RFAAP finds these targets appropriate and will modify the discussion in Section 6.2 of the RAP to reflect this specification.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

Satisfied

☐ 35. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 6.3. Acute Hazard Assessment, Page 6-3*** *- Please provide a table listing COPC specific acute toxicity value that is proposed to be used and the source of this value. Please use acute exposure Target level AHQ for individual noncarcinogens irrespective of target organ: not to exceed 0.25.*

RFAAP will provide a table with the requested toxicity values. However, information on the values proposed is provided in the RAP in Section 5.1. Consistent with this discussion, RFAAP will provide the requested table once a final COPC list has been determined.

The recommended target for the acute hazard assessment seems overly conservative and is not consistent with USEPA guidance. However, since prior applications of the OBG risk assessment at the RFAAP utilized this target criteria, RFAAP will modify the RAP to use the values proposed above.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ 36. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 7.2. Ecological COPC selection, Page 7-4*** *- The list of COPC and the concentration of COPC must be same for ecological and human health risk assessment. This list may be adjusted based on availability of TRVs, NOELs, and LOELS. Please clarify this in the report.*

RFAAP agrees that the initial COPC list will be the same for both assessments. However, the actual list of COPCs included in the assessment will vary depending upon human and ecological criteria available on each COPC. We will revise this section to clarify this.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

Satisfied

☐ *37.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Table 7-1. Habitat Distributions Within the Assessment Area, Page 7-3 and Appendix A - Table 1 in Animal Survey at RAAP by Radford University*** *- It appears that the habitats listed in these tables needs to be included in the screening level ecological risk assessment using EPA Region 6 SLERA protocol. Please consult this document for further details.*

In the RAP provided, RFAAP proposed to perform an initial screening level ecological assessment that compared modeled concentrations to ecological screening criteria. During a meeting between the parties on March 31, 2016, DEQ indicated that this level of assessment was not acceptable and that a more detailed assessment, consistent with that described in the SLERA must be performed. RFAAP will modify the RAP to provide this revised type of assessment.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ *38.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 7.4. Phase II assessment, Page 7-5*** *- Please refer to Comment 27 regarding 'Phase I' and rename this section. This section is incomplete as it does not have information regarding habitats, food webs, representative species, assessment endpoints, measurement endpoints, BCFs, BAFs, FCM, TRVs, and other toxicity related information, concentration calculation for each food items, etc. Please include a very detailed discussion of the step-wise process by which ecological risk assessment will be carried out. Please use the following ESQ: For all COPC for a receptor at a given location: acceptable ESQTotal will be at or below 1.*

In the RAP provided, RFAAP proposed to perform an initial screening level ecological assessment that compared modeled concentrations to ecological screening criteria. During a meeting between the parties on March 31, 2016, DEQ indicated that this level of assessment was not acceptable and that a more detailed assessment, consistent with that described in the SLERA must be performed. RFAAP will modify the RAP to provide this revised type of assessment. DEQ indicated that they will provide a series of reference sources of ecological criteria to RFAAP for use in this assessment.

Please see attached hierarchy of references for SLERA (Attachment 1 – NASA Wallops Appendix D-2 and D-3).

RFAAP will review the references provided and will incorporate information from each of them into our protocol for an ecological risk assessment as appropriate.

DEQ will review the new information when submitted and will determine if the comment is satisfied.

Satisfied

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted.

☐ *39.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 8.1. Types of Uncertainty, Page 8-1*** *- Please add the following types of uncertainty: wet deposition is not included thereby underestimating the risk; COCP that do not have either emission factor or toxicity values are not counted in risk/hazard calculation, thus underestimating risk; uncertainties associated with sampling and laboratory based analysis that may under or overestimate risk.*

RFAAP will revise Section 8.1 accordingly.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ *40.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 8.1.1. Assumptions and Variables, Page 8-1*** *- For the most part, the exposure defaults are conservative and more likely to result in overestimating than underestimating human risk. This approach ensures protection of the public health as well as scientific validity, and minimizes serious errors in estimating risks and potential liability. This section needs to explain the rationale for selection of conservative defaults. Further, as mentioned previously, 'site-specific' parameters do not apply. Therefore please remove language indicating use of 'site-specific' exposure parameters.*

Many of the considerations that feed the risk assessment are based on site-specific factors, such as waste composition, site location, exposure setting, subpopulation locations, *etc*. However, we recognize that DEQ's intent with this comment was to prevent the use of site-specific exposure factors/consumption practices for individuals within the assessment area. The values proposed for these factors will be consistent with the HHRAP and will be defined in the RAP and RAR.

The response indicates the detailed information requested by DEQ will be provided at a later date. DEQ will review the new information when available and determine if the comment is satisfied at that time.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This

Satisfied

comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

Section 6 of the Notice of Deficiency Addressing the Technical Completeness of the Part A and Part B Permit Applications for the Renewal of the Subpart X Open Burning and Open Detonation Permit, Technical Deficiencies of the Air Modeling of the Risk Assessment Protocol of the Permit Application

General Comments

Satisfied

☒ 1. *All input and output files (e.g., OBODM, pre-processing and post-processing files), including any spreadsheets and 3rd party software project files (e.g., BEEST, Lakes, Trinity, utility programs) shall be provided to DEQ in electronic format.*

RFAAP will provide all modeling files in electronic format with the RAR.

DEQ will review the modeling files upon receipt to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

No further action is required on this NOD at this time. It is RFAAP's understanding that the above NOD serves as a recommendation/request for the risk assessment report (RAR), not the RAP. Therefore, this NOD is satisfied in terms of the RAP.

☒ 2. *The final risk assessment report should include graphics (e.g., contour maps) that show the extent of the air quality impacts and shall utilize a base map that is readily understandable by the general public. DEQ encourages the applicant to also submit Geographic Information System (GIS) shape files of the air quality impacts if available.*

RFAAP will provide the requested information in the RAR.

DEQ will review the revised protocol upon receipt to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

No further action is required on this NOD at this time. It is RFAAP's understanding that the above NOD serves as a recommendation/request for the risk assessment report (RAR), not the RAP. Therefore, this NOD is satisfied in terms of the RAP.

☒ 3. *A complete copy of all modeling correspondence should be sent to the DEQ Air Division's Office of Air Quality Assessments and the DEQ Land Division.*

RFAAP will provide a copy of all modeling-related correspondence to both the DEQ Air Division and the DEQ Land Division as requested.

DEQ will review the revised protocol upon receipt to determine if the comment is satisfied.

Satisfied

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

No further action is required on this NOD at this time. It is RFAAP's understanding that the above NOD serves as a recommendation/request for the risk assessment report (RAR), not the RAP. Therefore, this NOD is satisfied in terms of the RAP.

☒ 4. *Generally speaking, every input parameter that will be used for the modeling will need to be included in this protocol for DEQ's review and approval.*

As there are a significant number of input parameters utilized in the air emission modeling, we request further clarification on which input parameters DEQ wants specified. During a meeting between the parties on March 31, 2016, DEQ indicated that they will provide a specific table of parameters that they wish to have specified in the RAP.

This comment is now rescinded by DEQ. No table is needed and the comment is satisfied.

☐ 5. *The protocol should provide a justification for the use of OBODM in terms of this model being the best available tool to characterize worst-case exposures. Also, can AERMOD be used in addition to the OBODM model to evaluate wet deposition and particle phase emissions in complex terrain?*

OBODM was selected as the model for this application, as it was the model recommended by DEQ and provided in EPA Region 3's OBOD guidance (reference page 4-9 of EPA's guidance). While AERMOD can be used to model wet deposition from air emission sources, we do not feel it appropriate to do so for this application. EPA specifically recommended the use of OBODM despite its limitations in this area, recognizing that OB activities were not conducted during precipitation events, thereby nullifying the concerns with this deficiency. We do not intend to utilize AERMOD in this effort to supplement the OBODM modeling. RFAAP will prepare a separate submittal providing the necessary justification for this approach.

DEQ will review the revised protocol upon receipt to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently reviewing available data on model performance for both OBODM and AERMOD and is working on the separate submittal referenced in our previous comment. We will provide this documentation once it is complete. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

Specific Comments for the Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds Air Modeling :

Satisfied

☐ *1.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 1.4, Page 1-3 -*** *The protocol states that "USEPA guidance indicates that a 10-kilometer (km) radius is usually more appropriate for air dispersion and deposition modeling." Please provide the reference for this information.*

RFAAP will modify Section 1.4 to include the requested reference.

DEQ will review the revised protocol upon receipt to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☐ *2.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.1, Page 3-1*** *- The latest version of OBODM is Version 01.3.0024 which was released on February 9, 2010.*

RFAAP will update the OBODM version in Section 3.11.

DEQ will review the revised protocol upon receipt to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☒ *3.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.2.2, Pages 3-2 through 3-4*** *- The applicant has several assumptions in Table 3-2. These include the maximum amount of waste (total), the maximum amount of waste (per pan), the duration of each burn, the hours for each burn, and the conditions for each burn. These assumptions will likely need to be included in enforceable permit conditions.*

RFAAP recognizes that the assumptions specified in Table 3-2 may be incorporated as Permit limitations and finds each of them to be reasonable limitations.

DEQ concurs with the applicant's response and the comment is now satisfied.

Satisfied

☐ 4. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.2.2, Pages 3-2 through 3-4*** *- Consistent with recommendations contained in 40 CFR Part 51,*
Appendix W - Guideline on Air Quality Models, the OB modeling should include a range of conditions that ensure that the burn scenario that causes maximum ground-level concentrations is identified. Therefore, a detailed discussion of the possible scenarios, including the model input parameters, should be provided prior to the commencement of the modeling analysis.

RFAAP provided a description of the two main burn scenarios (propellant burns and skid burns) in the RAP and provided information on the differences between these two in Section 3.2.2 of the RAP. There are no burn scenarios other than these two scenarios. In a meeting between the parties on March 31, 2016, DEQ clarified that they were simply looking for an increased level of detail in the descriptions provided. RFAAP will make modifications as requested.

DEQ will review the revised protocol upon receipt to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

☒ 5. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.2.4, Page 3-6*** *- We recommend using NAD83 or WGS84 instead of NAD27 in Table 3-4 because the results are more easily translated to Google Earth and other software packages.*

RFAAP will revise all maps and coordinate descriptions to utilize the NAD83 datum as requested.

DEQ concurs with the applicant's response and the comment is now satisfied.

☒ 6. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.2.4, Page 3-6*** *- Please provide a graphical representation (i.e., a satellite image) of the coordinates in Table 3-4.*

RFAAP will add a new figure to the RAP that provides a graphical representation of the pan coordinates.

DEQ concurs with the applicant's response and the comment is now satisfied.

☒ 7. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.3, Pages 3-6 through 3-7*** *– DEQ recommends the use of a higher resolution receptor grid than what is being proposed by the applicant. Specific guidance is located at:*

http://www.deq.virginia.gov/Portals/0/DEQ/Air/Assessments/dispersion/VA_Modeling_Guideline_03172015.pdf

Specifically, DEQ and EPA Region III recommend 25-meter receptor spacing along the facility's ambient

Satisfied

air boundary (e.g., fenceline). In addition, it is suggested that 50-meter receptor spacing be used within 1 kilometer (km) of the facility, 100-meter spacing from 1 to 3 km, 250-meter spacing from 3 to 10 km, and 500-meter spacing beyond 10 km. Also, it is recommended that refined modeling be conducted using 50-meter receptor spacing to ensure that the maximum impact has been identified in the event that any maximum occurs beyond the initial 50-meter receptor grid.

RFAAP notes that the receptor grid proposed is consistent with EPA guidance provided in the HHRAP. However, RFAAP can reduce the receptor spacing within the defined receptor grid as requested. We do not agree with expanding the receptor grid to an extent of 50 kilometers (>30 miles) from the source, especially considering that prior modeling efforts have shown the most impacted locations are less than 3 kilometers from the source. In a meeting between the parties on March 31, 2016, DEQ agreed with this proposed modification.

DEQ did not specifically recommend using a grid to an extent of 50 kilometers (>30 miles) from this facility. The general DEQ modeling guidelines suggest that AERMOD is valid to a range of 50 kilometers. DEQ concurs that a smaller grid that ensures that the maximum impact is captured is appropriate. A grid extending to 10 kilometers is likely adequate.

☒ *8.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.3, Pages 3-6 through 3-7*** *- We recommend using NAD83 or WGS84 instead of NAD27 for all receptor locations because the results are more easily translated to Google Earth and other software packages.*

RFAAP will revise all maps and coordinate descriptions to utilize the NAD83 datum as requested.

DEQ concurs with the applicant's response and the comment is now satisfied.

☐ *9.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.3, Pages 3-6 through 3-7*** *- We recommend using the USGS National Elevation Dataset (NED) in lieu of USGS Digital Elevation Models (DEM) because the NED data is generally considered to be more accurate. The applicant should use the highest resolution USGS NED available which is typically 10-meter data.*

RFAAP actually used the NED in establishing the receptor and source elevation data. The description provided in Section 3.3 was incorrect and will be revised accordingly.

DEQ will review the revised protocol upon receipt to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently preparing data and reviewing documentation to complete other sections of the RAP. RFAAP intends to submit a modified, complete document for review. This comment will be addressed when the modified protocol is submitted. Pursuant to email correspondence with DEQ on January 30, 2017, this response satisfies the initial burden on this NOD to fulfill the completeness requirements referenced above. A complete, revised protocol is not necessary to fulfill this requirement.

Satisfied

☐ 10. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.4, Pages 3-7 through 3-9*** *- Applicants in regulatory modeling analyses are allowed to substitute for up to 10 percent of the data; conversely, the meteorological data base must be 90 percent complete (before substitution) in order to be acceptable for use in regulatory dispersion modeling. Please provide the supporting documentation for purposes of assessing compliance with the 90 percent completeness criteria for the Virginia Tech, Kentland Farm data. The 90 percent requirement applies on a quarterly basis such that 4 consecutive quarters with 90 percent recovery are required for an acceptable one-year data base. The 90 percent requirement applies to each of the variables: wind direction, wind speed, stability, and temperature and to the joint recovery of wind direction, wind speed, and stability.*

The level of effort requested by DEQ in this evaluation is substantial. During a meeting between the parties on March 31, 2016, RFAAP agreed to provide further information on the Kentland Farm data and complete an assessment as to the completeness and availability of it. However, before proceeding with this completeness review, RFAAP will provide an evaluation of the quality of the data consistent with the information requested in NOD 6.12 below.

DEQ will review the RFAAP data quality evaluation, consistent with the information requested in NOD 6.12, and will then determine if additional quality assurance documentation is needed.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP provided a verbal summary of our initial assessment of the Kentland Farm data quality assessment in a teleconference with DEQ on January 12, 2017. This verbal summary was followed with an e-mail summary of our conversations to date with Virginia Tech staff and attempts to contact the consultant responsible for the station (MapTech) on January 17, 2017. DEQ's response to this e-mail indicated that they will attempt to contact the consultant, as well as their contacts at Virginia Tech, to assess the data. If this evaluation indicates that the Kentland Farm data is not accessible, DEQ will prepare a meteorological data file for RFAAP's used based on the nearest available National Weather Service site with available data.

☒ 11. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.4, Pages 3-7 through 3-9*** *- The applicant should use up to 5 years of the Kentland Farm data. EPA guidance (Section 8.3.1.2 of 40 CFR Part 51, Appendix W) stipulates that a minimum of 1 year of onsite data can be used but that additional data up to 5 years should be used if available.*

Recognizing the request for a detailed completeness review for each quarter and each year of data utilized, we believe the requirement to use five years of essentially site-specific data to be overly burdensome. As EPA guidance specifies one year of site-specific data is adequate, we feel that one year of data should be all that is required. DEQ clarified that at least one year of data must be used but more years, up to five, is preferred. DEQ recommended that the quality and completeness assessments be completed before this discussion is finalized.

DEQ does not concur with the RFAAP's response for several reasons. As previously stated, EPA guidance (Section 8.3.1.2 of 40 CFR Part 51, Appendix W) stipulates that a minimum of 1 year of site-specific data can be used but that additional data up to 5 years should be used if available. There appears to be a significant period of data available for the Kentland Farm site. DEQ does not agree that utilizing 5 years of these data for input to the model represents an "overly burdensome" requirement since all air permit applicants conducting modeling conform to these methods. In addition, Kentland Farm, while in relatively close proximity to the RFAAP, does not constitute "site-specific data" as

outlined in Appendix W. Five years of data has also been selected by EPA as an appropriate period of record because it sufficiently represents the year-to-year variability in meteorological conditions.

RFAAP defers further comment on the amount of data appropriate for inclusion until we complete the requested quality review of the data. If in this review, RFAAP determines that the referenced Kentland farm data is appropriate and adequate data meeting the referenced QA/QC criteria is available, RFAAP will provide further response on the use of one or five years of data at that time. (For example, if in our review RFAAP determines that three years of acceptable data is available, then RFAAP will proposed to use three years of data. If RFAAP determines that five years of acceptable data is available, then RFAAP will propose to use five years of data). However, we believe it necessary to complete this review until we can comment further.

The comment is now satisfied.

☒ *12.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.4, Pages 3-7 through 3-9*** *- Please provide any Quality Assurance Project Plan (QAPP) and supporting documentation that details how the data was collected and how it was quality assured.*

RFAAP will have to work with the Virginia Tech meteorological staff to develop the requested documentation. Recognizing that this will require considerable effort, we request further information from DEQ on what specific information they would like presented on the data and data collection methodologies. During a meeting between the parties on March 31, 2016, DEQ agreed to provide an example QAPP and/or bulleted list of quality evaluations that must be made on the data.

DEQ will provide the example QAPP document for the Dominion Virginia Power Ambient Air Monitoring Station and Dominion Virginia Power Air Quality Monitoring Program Quarterly Monitoring Report to RFAAP for review. Both documents are included as Attachments 2 and 3 of this document.

RFAAP will use the provided documents in reviewing and assessing the Kentland Farm data and will use them in guides in developing the requested QAPP.

The comment is now satisfied.

☒ *13.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.4, Pages 3-7 through 3-9*** *- The applicant should use upper air data from NWS Station 53829 (Roanoke/Blacksburg) in lieu of data from NWS Station 13723 (Greensboro/High Point/Winston Salem).*

According to the NWS reliability score for the last three months, data from NWS 53829 presents multiple reliability problems. Therefore, we chose NWS 13723, as it presents much more consistent and favorable reliability scores from the NWS. During a meeting between the parties on March 31, 2016, DEQ indicated that they have performed a completeness assessment on the Roanoke data and found the data from the period between 2010 and 2014 to be acceptable. DEQ will provide a copy of this data. (In their assessment of the data, DEQ substituted any missing data from the Roanoke station with data from the Greensboro/Highpoint station). RFAAP will review the data once it is provided by DEQ and provide a final proposal/justification for the source of upper air data.

DEQ will provide the upper air data to RFAAP for use in the modeling analysis.

We appreciate DEQ's assistance in this effort and will utilize the data provided. Once we have

information on the years we anticipate to use in the model, we will provide this information to DEQ.

The comment is now satisfied.

☒ 14. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.4, Pages 3-7 through 3-9*** *- The applicant should also refer to Section 6.8 of EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications, February 2000, for procedures on treatment of missing data and substitution methods.*

RFAAP will revise the reference in Section 3.4 to indicate that the requested document will be used for missing data substitution.

DEQ concurs with the applicant's response and the comment is now satisfied.

☒ 15. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.5.1, Page 3-9*** *- The applicant assumes that "…only one burn can be conducted per day (due to safety restrictions), the actual maximum number of events per year is 365 events, rather than the 3,285 considered in the annual modeling scenario, which assumes 10 events per day (one event for every hour between 0800 and 1700 hours)." These assumptions will likely need to be included in enforceable permit conditions.*

RFAAP recognizes that the assumptions specified in Section 3.5.1 may be incorporated as Permit limitations and finds each of them to be reasonable limitations.

DEQ concurs with the applicant's response and the comment is now satisfied.

☐ 16. ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.5.2, Page 3-9 –*** *Even though the applicant states that the OB operations will not be conducted during precipitation events, it is possible for some of the compounds emitted during a burn to adsorb to atmospheric particulates and gases where they may remain until removed through precipitation (wet deposition). Therefore, please discuss the possibility of using AERMOD for the purposes of quantifying the wet deposition pathway. Omission of wet deposition may underestimate the off-site soil and surface water concentrations.*

While AERMOD can be used to model wet deposition from air emission sources, we do not feel it appropriate to do so for this application. USEPA specifically recommended the use of OBODM despite its limitations in this area, recognizing that OB activities were not conducted during precipitation events, thereby nullifying the concerns with this deficiency. We do not intend to utilize AERMOD in this effort to supplement the OBODM modeling.

With these considerations, we disagree that omission of wet deposition will underestimate off-site concentrations. If OB operations are not conducted during precipitation events, then the contribution from wet deposition is essentially zero.

During a meeting between the parties on March 31, 2016, RFAAP agreed to provide a series of comparisons between AERMOD runs and OBODM runs that have been conducted for multiple scenarios as multiple facilities to substantiate our proposal to not supplement the OBODM run with AERMOD runs.

DEQ will review the modeling comparisons between AERMOD and OBODM upon receipt to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment

Satisfied

still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently reviewing available data on model performance for both OBODM and AERMOD and is working on the separate submittal referenced in our previous comment. We will provide this documentation once it is complete.

☐ *17.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.5.2, Page 3-9 -*** *If used, the AERMOD wet deposition analyses should be consistent with the latest EPA guidance contained on EPA's Technology Transfer Network Support Center for Regulatory Atmospheric Modeling:*

AERMOD Deposition Algorithms – Science Document (Revised Draft)
http://www.epa.gov/ttn/scram/7thconf/aermod/aer_scid.pdf

Deposition Parameterizations for the Industrial Source Complex (ISC3) Model, M. L. Wesely, P. V. Doskey, and J. D. Shannon, Environmental Research Division, Argonne National Laboratory, June 2002.
http://www.epa.gov/ttn/scram/7thconf/aermod/driscdep.zip

RFAAP does not intend to utilize AERMOD in the OBG risk assessment process. Additional information justifying this decision will be provided in a separate submittal.

DEQ will review the modeling comparisons between AERMOD and OBODM upon receipt to determine if the comment is satisfied.

No response for this comment was received by RAAP with the 9/14/2016 NOD response. The comment still stands as unsatisfied and shall be addressed in the next submission or the application may be considered technically incomplete.

RFAAP is currently reviewing available data on model performance for both OBODM and AERMOD and is working on the separate submittal referenced in our previous comment. We will provide this documentation once it is complete.

☒ *18.* ***Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds, Section 3.5.3, Page 3-10 -*** *The use of the independent study, Explosion Dust Particle Size Measurements (Pinnick et. al, 1983), is subject to DEQ Land Division approval. Generally, DEQ recommends that the applicant make an effort to develop site-specific particle size distribution data in lieu of national default values.*

RFAAP requests further information on when we can expect DEQ review and comment on the proposed particle size distribution data. We do not expect to be able to collect site-specific particle size distribution data with the flyer study. Therefore, this prior study is the best available data for this effort. Considering this, DEQ agreed in the March 31, 2016, meeting that the proposed particle size distribution provided in the RAP is acceptable.

DEQ concurs with the applicant's response on the basis that the facility cannot collect site-specific particle size distribution data and the comment is now satisfied.

Attachment 2
Revised Permit Sections

ATTACHMENT II.C

SOIL MONITORING PROGRAM

SOIL MONITORING PROGRAM
FOR THE
OPEN BURNING GROUND (OBG)
RADFORD ~~FACILITY~~ ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

Commented [RFAAP1]: Suggested revisions added June 2015 as part of the RCRA permit renewal application for the RFAAP open burning ground

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~~May 15, 2015~~February 2017

DAA Job No. B03204-142

TABLE OF CONTENTS

~~TABLE OF CONTENTS ..... i~~
CERTIFICATION SHEET iii

II.C.1. Introduction ..... 1~~1~~
II.C.1.1. Site Description 2
II.C.1.2. Definitions ..... 3~~3~~
II.C.2. Geologic Setting ..... 3~~3~~
II.C.2.1. Soils Occurrence and Properties ..... 5~~4~~
II.C.2.2. Hydrogeology ..... 5~~4~~
II.C.3. Soil Monitoring Program ..... 6~~5~~
II.C.3.1. Sample Locations ..... 7~~5~~
II.C.3.2. Soil Monitoring Analyte List and Detection Determination ..... 8~~6~~
II.C.3.3. Monitoring Frequency ..... 2~~8~~
II.C.4. Sampling and Analysis Plan ..... 2~~8~~
II.C.4.1. Sample Collection Order ..... 2~~9~~
II.C.4.2. Field Log Book/Laboratory Logbook ..... 3~~9~~
II.C.4.3. Soil Sample Collection Procedures ..... 3~~10~~
II.C.4.3.1. Equipment Decontamination ..... 4~~11~~
II.C.4.4. Sample Preservation and Handling ..... 5~~11~~
II.C.4.5. Chain-of-Custody (COC) Documentation ..... 5~~11~~
II.C.4.6. Disposition of Decontamination Waste Water/Investigation Derived Wastes ..... 8~~14~~
II.C.5. Analytical Procedures ..... 9~~14~~
II.C.6. Quality Assurance/Quality Control ..... 10~~15~~
II.C.6.1. Field QA/QC Program ..... 11~~15~~
II.C.6.2. Laboratory QA/QC Program ..... 11~~15~~
II.C.7. Soil Data Evaluation ..... 13~~16~~
II.C.7.1. Laboratory Analytical Data Validation ..... 13~~16~~
II.C.7.2. Evaluation of Laboratory Analytical Data and Data Management ..... 13~~16~~
II.C.7.2.1. Data Management ..... 14~~17~~
II.C.7.2.2. Treatment of Missing Data Values ..... 14~~17~~
II.C.7.2.3. Treatment of Data Outliers ..... 14~~17~~
II.C.7.2.4. Evaluation of Data Above Reporting Limits ..... 14~~17~~
II.C.7.2.5. Selection of Statistical Method ..... 15~~17~~
II.C.7.3. Verification Sampling ..... 15~~17~~
II.C.8. Reporting Requirements ..... 18~~18~~
II.C.9. Interim Measures ..... 19~~19~~
REF
Toc47
41607

27 \h
19~~19~~

II.C.9.1. Hot-Spot Evaluation and Soil Removal ..... 19~~19~~
~~1231123347888910101113141515151717171818181819161717 18~~

LIST OF TABLES

Table II.C-1 Identification of Constituents of Potential Concern
Table II.C-2 Example Presentation and Calculation of Dioxin/Furan Results
Table II.C-3 Sampling and Preservation Procedures
Table II.C-4 Summary of Background Data, OBG Soil Monitoring Program
Table II.C-5 Facility -Wide Background Study Report, December 2001

Commented [RFAAP2]: Tables added based on e-mail request received from DEQ on 05/06/2016

LIST OF FIGURES

Figure II.C-1 Regional Site Location Map
Figure II.C-2 Site Location and Topography
Figure II.C-3 Site Layout and Proposed Sample Locations
Figure II.C-4 Site Soils and Background Sampling Locations
Figure II.C-5 Photographs of Typical Sample Location Conditions

LIST OF APPENDICES

Appendix II.C- A Example Chain-of-Custody Form

CERTIFICATION SHEET

Virginia Professional Certification:

I certify that I have supervised preparation of the attached report, that it has been prepared in general accordance with industry standards and practices, and that the information contained herein is truthful and accurate to the best of my knowledge.

Name: Michael D. Lawless, PG, CPG

Signature:

Virginia Professional Certification Type and Number: Professional Geologist # 832

Company: Draper Aden Associates

Address: 2206 South Main Street

City/State/Zip: Blacksburg, Virginia 24060

II.C.1. ~~1.0~~ INTRODUCTION

This Soil Monitoring Program (SMP) ~~has been~~was developed to monitor for potential impacts to surface soils resulting from the operation of the Open Burning Ground (~~OB Ground~~OBG) at the Radford Army Ammunition Plant (~~Radford~~ RFAAP) in Radford, Virginia. The duration of the program will be over the lifetime of the RCRA Operating Permit. ~~The OB Ground is also designated as Solid Waste Management Unit 13 (SWMU-13) in the EPA Corrective Action Permit for the facility. Historical and ongoing groundwater monitoring at the site has indicated that no statistically significant evidence of a release of hazardous constituents as defined under 40 CFR 264.93 has been detected in the groundwater at the OB Ground.~~ The SMP –outlines the procedures and techniques ~~that~~ for soil sample collection, sample preservation and shipment, chain-of-custody (COC) control, and laboratory analyses that will be utilized. ~~during groundwater monitoring for the Unit.~~ The SMP also documents how quality assurance and quality control (QA/QC) activities will be implemented to ensure data are of sufficient quality. The results of the SMP will be used to detect the presence of a release of hazardous constituents from the ~~OB Ground~~OBG to the surface soils comprising the Unit.

The purpose of this SMP is to evaluate the potential for surface soil impacts from the operation of the ~~OB Ground~~OBG by providing an accurate representation of surface soils. This will be accomplished by collecting an adequate number of representative samples, QA/QC samples, and background samples. ~~To this end, this program will~~ The SMP –outlines the methods and procedures to be used to establish representative background concentrations of explosives and other compounds of potential concern (COPC), identify the protocols for soil sampling, sample handling, preservation, ~~chain of custody~~COC and shipping, and decontamination procedures of sampling equipment. The SMP was based on the original 2005 SMP prepared for the facility.

In addition, this program description ~~will address~~addresses the procedures to be taken for the evaluation of "hotspots" (i.e., areas of significant concentration), should they be detected, and the protocol for interim measures that may be required to remediate any hotspots.

As the facility is within the 100-year floodplain, a major consideration in the design of this program was to comply with the requirements set forth in 40 CFR 264.18 (b) pertaining to floodplains, as follows:

> (b) *Floodplains.* (1) A facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout ~~or~~ of any hazardous waste by a 100-year flood, *unless* the owner or operator can demonstrate to the Regional Administrator's satisfaction that:
>
> (i)~~.~~ Procedures are in effect which will cause the waste to be removed safely, before flood waters can reach the facility, to a location where the wastes will be vulnerable to flood waters;

not

Commented [RFAAP3]: This statement is inaccurate. SWMU-13 is the portion of the riverbank between the OBG southern boundary (i.e., fence-line) and the New River. In other words, SWMU-13 is located outside the current operational area of the OBG.

Commented [RFAAP4]: This sentence is no longer accurate, as OBG groundwater is in corrective action for perchlorate and carbon tetrachloride (Permit Module VII).

Commented [RFAAP5]: Revised June 2016 per NOD 1s.10. Original language restored.

(ii) For existing surface impoundments, waste piles, land treatment units, landfills, and miscellaneous units, no adverse effects on human health or the environment will result if washout occurs, considering:

(A) The volume and physical and chemical characteristics of the waste in the facility;

(B) The concentration of hazardous constituents that would potentially affect surface waters as a result of washout;

(C) The impact of such concentrations on the current or potential uses of and water quality standards established for the affected surface waters; and

(D) The impact of hazardous constituents on the sediments of affected surface waters or the soils of the 100- year floodplain that could result from washout.

The analysis of soil samples and subsequent provisions for remediation will, in effect, serve as the *procedures which will cause the waste to be removed safely, before flood waters can reach the facility, to a location where the wastes will not be vulnerable to flood waters.*

Commented [RFAAP6]: Revised June 2016 per NOD 1s.11. Original language restored.

This work will be in accordance with the following documents that are incorporated in part into this program by reference. They are:

- *Draft Final Open Burning Ground/Open Detonation Permitting Guidelines, VDEQ, February 2002*
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), Chapters 1 and 9, US EPA, Revision 5, April 1998, as updated.*
-
- *Draft Guidance Manual for Closure Plans and Post-Closure Plans September 28, 2001*
- *Superfund Program Representative Sampling Guidance, Volume 1: Soil, Interim Final, OSWER Directive 9360. 4-10, EPA 540/R-95/141, PB96-963207, December 1995*
- *ASTM Standard Guide for Soil Sampling in the Vadose Zone, Designation D 4700-91 15, July 15, 1991 (re-approved revised 2015 1998)*
- *Draft Human Health Risk Assessment for the Open Burning Ground, Radford Army Ammunition Plant, CH2M Hill, June 2004.*
- *Facility-Wide Background Study Report, IT Corporation, January 2001*

Commented [RFAAP7]: Revised to reflect current document

Commented [RFAAP8]: Removed this reference as the risk assessment is being reconducted as part of the permitting effort. A reference to the new risk assessment report will be added upon its completion, if appropriate.

II.C.1.1. 1.1 Site Description

The Radford AAPRFAAP is located in the mountains of southwestern Virginia within Pulaski and Montgomery Counties. A Site Location Maps are presented as **Figure II.C -1 1 and Figure II.C-2**. The facility is situated in one of a series of narrow valleys typical of the Valley and Ridge physiographic province of the Appalachian Highland Region of North America.

Oriented in a northeast-southwest direction, the valley is approximately 25 miles long. The valley has a width of approximately eight miles at the southwest end and narrows to approximately two miles at the northeast end. ~~Radford AAP~~RFAAP lies along the New River in the relatively narrow northeast corner of the valley. The maximum elevation at ~~Radford AAP~~RFAAP is 2,225 feet above mean sea level (MSL) in the southeast corner and the minimum elevation is approximately 1,675 feet above MSL along the New River at the northern property boundary. ~~Radford AAP~~RFAAP is divided by the New River into two sections. The southern section, which comprises approximately two-thirds of ~~Radford AAP~~RFAAP, is called the "Main Plant." The remaining northern one-third section is called the "Horseshoe Area." The ~~OB Ground~~OBG is located in the Horseshoe Area.

The ~~OB Ground~~OBG is the waste propellant burning ground. A Site Plan for the Unit is included as **Figure II.C-3**. Material that cannot be burned in the Explosive Waste Incinerators is open burned at this Unit. As shown on the Site Location Map (**Figure II.C-2**), the ~~OB Ground~~OBG is located within the 100-year flood plain of the New River at the southeastern end of the Horseshoe Area. The Unit is located approximately 70 to 150 feet north of the river at an approximate elevation of 1,695 feet MSL (Site Plan, ~~II.C~~ **Figure II.C-3**). The topography across the Unit is relatively flat; however, approximately 75 to 100 feet north of the Unit the ground surface slopes steeply upward. The elevation of the New River at the western end of the ~~OB Ground~~OBG is approximately 1,690 feet MSL; the elevation of the New River at the eastern end of the Unit is approximately 1,686 feet MSL. Past improvements to the area included a stormwater management design that provides protection from run-on and run-off during 25-year flooding events.

II.C.1.2. ~~1.2~~ Definitions

The following definitions apply to this document:

Hazardous Constituents. Constituents specified in a facility's permit for which the surface soils must be monitored. Hazardous constituents are constituents identified in ~~Appendix VIII of~~ 40 CFR Part 261 Appendix VIII that are reasonably expected to be in or derived from waste contained in a regulated unit.

II.C.2. ~~2.0~~ GEOLOGIC SETTING

The Valley and Ridge physiographic province consists of folded and thrust-faulted Paleozoic sedimentary rocks ranging in age from Cambrian to Mississippian. Post-deformation weathering of these thrust-faulted and overturned Paleozoic rocks has resulted in the formation of resistant sandstone and dolomite ridges separated by valleys underlain by more easily eroded shale and limestone. Well developed karst features such as sinkholes and caves are common in the Valley and Ridge.

The general geology at ~~Radford AAP~~RFAAP consists of limestone/dolomite bedrock covered by weathered residual deposits and/or alluvial deposits. The alluvial deposits consist of typical fluvial deposits of interbedded clay, silt, and sand/gravel deposits with cobble lenses. The thickness of the alluvial deposits ranges from a few feet to approximately 50 feet, with an average thickness of 20 feet. The residual deposits consist of clay, silt, and clasts resulting from

the physical and chemical weathering of the parent bedrock. The residual deposits typically underlie the alluvium, except in locations where the residuum has been eroded to bedrock and replaced by alluvium. The thickness of the residual deposits ranges from a few feet to approximately 40 feet. Underlying the alluvium and residuum throughout most of ~~Radford AAP~~RFAAP is a series of dolomite, limestone and shale strata known as the Cambrian-aged Elbrook Formation. The Elbrook Formation is the major outcropping formation as well as the predominant karstic formation below the facility. Sinkholes, solution channels, pinnacled surfaces, and springs are common to the Elbrook Formation.

The ~~OB Ground~~OBG is underlain by an approximately 13-20 feet thick alluvial deposit. Based on a review of boring logs for monitoring wells that were installed at the ~~OB Ground~~OBG, the alluvial deposit consists of clay and silt overlying sand and gravel. The alluvium appears to be laterally continuous across most of the site, although the thickness, composition, and texture vary between monitoring well locations. The alluvium is underlain by Middle Cambrian Age carbonate bedrock of the Elbrook Formation. The Elbrook Formation is comprised of dolomite and limestone with lesser shale and siltstone.

In 1992, the USEPA reviewed and compared historical aerial photography to assess sinkhole presence and development, and to analyze apparent photo-lineaments. A fracture trace/sinkhole location map of ~~Radford AAP~~RFAAP was prepared (USEPA, 1992). The fracture trace map illustrates a northwest-trending lineament passing through the ~~OB Ground~~OBG to the east of monitoring well 13MW2. Furthermore, a geologic map of the area illustrates a splay of the Pulaski Thrust Fault trending to the northwest through the western portion of the Unit (Schultz, VDMR open file in preparation).

II.C.2.1. ~~2.1~~ Soils Occurrence ~~And~~ and Properties

According to the *Facility-Wide Background Report (Section 1.0)* the ~~OB Ground~~OBG is underlain by Wheeling s~~S~~andy l~~L~~oam (see **Figure II.C-4)**. The Wheeling ~~Sandy~~ unit comprises about 11% of the soils at the Radford Plant site. The Wheeling is characterized by low slopes (0-2%). The unit is described as a surface layer of 10~~-~~ inches of dark brown sandy loam underlain by 50~~-~~ inches of dark brown gravely sandy loam subsoil. At depths greater than 60~~-~~ inches below ground surface the soil is ~~predominately~~ predominantly ~~-~~a mixture of silt and sand with minor amounts of clay. Depth to bedrock is at least 60~~-~~ inches.

The permeability and water capacity of the Wheeling is moderate. Surface runoff is slow. The organic matter content is moderately low, and the soil is moderately to strongly acidic. The hazard of erosion from the Wheeling soil unit is characterized as slight.

II.C.2.2. ~~2.2~~ Hydrogeology

The general hydrogeologic setting for ~~Radford AAP~~RFAAP is characterized by porous alluvial sediments overlying weathered and unweathered dolomite and limestone. In areas where the porous alluvial sediments are the uppermost water-bearing zone, ~~ground water~~groundwater flow is generally from topographically high areas to topographically low areas. In some areas of ~~Radford AAP~~RFAAP, the uppermost water-bearing zone is within the limestone and dolomite bedrock. The karst features within the bedrock aquifer can provide conduits for rapid transport

of ~~ground water~~groundwater to the New River, which is the discharge area for regional ~~ground water~~groundwater flow.

Seasonal variations in precipitation can affect the direction of ~~ground water~~groundwater flow within the bedrock aquifer at ~~Radford AAP~~RFAAP. During wet seasons (high flow conditions), ~~ground water~~groundwater flow may occur in higher elevation conduits that are not normally saturated during dry seasons (low flow conditions). As a result, flow directions may change significantly as different conduits are accessed. Additionally, flow may short-circuit the predominant flow paths and be redirected, discharging in unexpected areas.

In addition to seasonal variations, ~~ground water~~groundwater levels within the bedrock aquifer may fluctuate dramatically during heavy precipitation events. ~~Ground water~~Groundwater levels in the karst bedrock aquifer generally respond to heavy precipitation within approximately 14 hours, and may rise several feet in a short time. This condition exists throughout ~~Radford AAP~~RFAAP, especially in areas where surface water infiltrates through sinkholes. Stormwater that flows into the sinkholes travels downward rapidly through conduits into the bedrock aquifer. Because ~~ground water~~groundwater may flow very quickly through these conduits, stormwater which infiltrates in the uplands of the facility may discharge to the New River in a matter of a few days following a storm event. The turbulent flow created by these conditions aerates the infiltrating water. The increased dissolved oxygen content can significantly affect the chemistry of the ~~ground water~~groundwater, increasing the concentration of many commonly occurring inorganic analytes. It is this direct connection between surface water and ~~ground water~~groundwater and the rapid movement of ~~ground water~~groundwater through the aquifer that is vital to interpreting the migration of both naturally occurring and released constituents in the ~~ground water~~groundwater~~groundwater~~ at ~~Radford AAP~~RFAAP.

II.C.3. SOIL MONITORING PROGRAM

~~3.0 SOIL MONITORING PROGRAM~~

The SMP will be used to monitor for the presence of a release of hazardous constituents from the operation of the ~~OB Ground~~OBG to the surface soils of the Unit. The zone of monitoring is defined as the uppermost surface soils (zero to six-inches below ground surface) at selected locations located within the operating unit. The objective of the SMP is to obtain representative data to evaluate ~~for~~ potential impacts to the surface soils over time. Soil samples will be collected and compared to specific regulatory limits and background values which will function as action levels. If specific action levels are exceeded, interim measures will be implemented.

II.C.3.1. ~~3.1 s~~Sample ~~locations~~ Locations

The soil sample locations ~~proposed for SMP~~ are based on a judgment and knowledge of the site. **Figure~~-~~ II.C-3** presents the proposed sample locations ~~of the samples~~. Sample matrices will be limited to the uppermost soil horizon. The sampling of surface water runoff from the site is addressed by the site Virginia Pollutant ~~Pollution~~ Discharge Elimination System (VPDES) permit. Outfall 017 is included in the plant-wide permit. Groundwater samples are collected ~~quarterly~~ semiannually as part of the ~~existing~~ RCRA ~~Operational Permit for the Unit~~ groundwater monitoring program. As the objective of the SMP is to evaluate ~~if~~ the potential for contamination ~~hazardous constituents~~ to leave the site via airborne deposition to the soils, the uppermost soil horizon has been targeted. Vertical delineation of the soil is not proposed as impacts to soil~~s~~ below the uppermost horizon are not subject to site erosion and vertical migration is addressed by the groundwater monitoring program.

Commented [RFAAP9]: Revised June 2016 per NOD 1.2. Reverted back to original permit language and inserted contamination back into sentence. All references changed back to contamination from impact in document as requested.

The proposed sample locations are based on ~~a highly biased~~ the observation that the "worse case" impacts will be within the immediate vicinity of the burn pans and within the overlapping ejecta zone of the pans. These locations were selected to represent the areas of greatest potential for impacts. The rationale that supports the selection of the sample locations is that soils will be transported by erosion and the worst case areas of deposition serve as the primary source area for the migration of impacted soils.

In addition to the samples adjacent to the burn pans, two discrete grab soil samples will be collected randomly along the southern border boundary of the ~~OB Ground~~OBG~~s~~ (SB-1 and SB-2) and ~~one~~ two discrete grab soil sample~~s~~ will be collected randomly along the northern border boundary of the ~~OB Ground~~OBGs ~~(NB)~~ (NB-1 and NB-2). Also, one grab soil sample will be collected at the southeast corner of the ~~OB Ground~~OBG inside the ~~proposed~~ berm (Berm-1) and one grab soil sample from the center-bottom of the sediment basin (Pond-1).

The soil sample locations presented in **Figure II.C-3** are functionally in between the burn pans of each burn pad location~~s~~. Each impervious concrete burn *pad* is~~n~~ defined as the area of raised topography that houses the location of two individual burn *pans*. Burn *pans* are the ceramic or clay lined vessels that hold the waste propellant before and during the process of open burning. The sample locations represent an area that will be subject to overlapping zones of ejecta from each pan. The ejecta zone for each pan is conservatively defined as twenty (20)-feet in all directions. This ejecta zone delineation is based on repeated observation of the open burning operations by plant personnel and evaluation of slow motion videos of the operation by

graduate researchers from Virginia Tech. As presented in **Figure II.C-3,** there will be a total of eight~~8~~ grab soil samples collected from designated sample locations during each sampling event. The location of the random samples, the sample before the berm and the center of the pond are not depicted, as those locations may vary between events. In an effort to accurately measure the temporal variation (change over time) of constituent concentrations at the designated sample locations, it is proposed to collect samples within a zone of ~~ten~~ 10 feet in diameter at each location during each subsequent sampling event. In practice this would entail recording a triangulated location each event that could be reproduced each subsequent sampling event. The actual sampling location will correspond to an area of low topography between each pan that functions as the runoff conduit for the pad. These areas are erosion channels that flow towards the river-side berm and ultimately to the sedimentation basin ~~pond~~ that precedes Outfall 017. These channels are not vegetated and are comprised of open soils. **Figure II.C-5** presents photographs of a typical sample location.

B~~B~~ackground soil samples ~~will be~~were collected at a location on the far side of the Horseshoe area of the plant in the same soils group, the Wheeling Unit, as the soil at the ~~OB Ground~~OBG. Background soil s~~S~~amples ~~will be~~were collected for analysis of volatile and semivolatile constituents, monitored at the time of the initial permit implementation, by SW 846 Methods 8260~~B~~ and 8270~~C~~. **Figure II.C-4** presents the ~~proposed~~ background sample location and Table II.C-4 presents the background sampling results~~.~~ ~~At the time of the initial permit implementation, f~~~~Four replicate samples will be were collected from two sample locations for future statistical evaluation. Upper confidence levels (UCLs) for constituents detected above their respective Reporting Limits will be calculated.~~ Background soil s~~S~~amples ~~f for Methods 8330 and 8332 f~~or energetics and nitroglycerin (SW-846 Methods 8330 and 8332, respectively) ~~respectively,~~ were not and will not be collected due to the high degree of false positives associated with those analytical methods. ~~those tht methods.~~ Background soil samples ~~will not be~~were not collected for i~~I~~norganics ~~will not be collected~~ as adequate data was collected for these constituents as part of ~~those values have already been determined in~~ the Facility-W~~-w~~ide Background Study. Table II.C-5 provides the background values for inorganics detected during the Facility-Wide Background Study. Future background ~~sampling efforts~~ samples ~~will~~may be collected to establish site specific background concentration limits. Future background sampling efforts will be based on sufficient independent samples. A~~and~~ dditional background sampling will be ~~collected~~ completed at the discretion of the Permittee or as requested by DEQ.

II.C.3.2. ~~3.2~~ Soil Monitoring Analyte List ~~A~~and Detection Determination

The hazardous constituents for which the ~~OB Ground~~OBG will be monitored are listed in **Table- II.C-1**. This list is derived from the significant amount of analysis applied to selecting ~~Compounds of Potential Concern (COPC)~~ –COPCs that was conducted in the *Detection Groundwater Monitoring Program – Open Burning Ground, Draper Aden Associates*~~,~~ and other site assessments conducted for the OBG and other units at the facility, such as human health or ecological risk assessments. ~~the *Human Health Risk Assessment for the Open Burning Ground, Radford Army Ammunition Plant, CH2M Hill, June 2004* and the associated Master Constituent List (MCL) that was compiled for the Risk Assessment.~~ The constituents presented in **Table II.C-1** are ~~derived from the (MCL) and were revised in subsequent permit modifications; therefore, they are constituents that are~~ reasonably expected to be in, or derived from, the wastes treated at the ~~OB Ground~~OBG and represent a reliable indication of ~~the presence of~~potential

Commented [RFAAP10]: Edited to reflect background samples were collected and proposed language for future collection of background samples.

Commented [RFAAP11]: Added table providing background sampling results at request of DEQ

Commented [RFAAP12]: Added table providing background sampling results at request of DEQ

Commented [RFAAP13]: Revised in accordance with VDEQ-approved Class 1 Permit Modification dated June 12, 2014.

Commented [RFAAP14]: Revised June 2016. Table of background results added as a separate attachment per DEQ e-mail request on 05/06/2016. See 6T.Att II.C Table II.C-4 Summary of Background data.

Commented [RFAAP15]: Revised June 2016 per DEQ e-mail request on 05/06/2016.

Commented [RFAAP16]: Made general edits to this section to correct inconsistencies

Commented [RFAAP17]: Revised 2/2017 in response to NOD 1s.13. Added a generic reference to human health and ecological risk assessment at this time. This will be changed to directly reference the new OBG risk assessment when it is complete.

Commented [RFAAP18]: Revised 2/2017 in response to NOD 1s.13. Added a generic reference to human health and ecological risk assessment at this time. This will be changed to directly reference the new OBG risk assessment when it is complete.

Commented [RFAAP19]: Analytes removed and added (*e.g.*, hex chrome) via permit modification

hazardous constituents in the soil. The list includes hazardous constituents that were expected to be potentially present at the RFAAP based on project Safety Data Sheets (SDSs) and proprietary formulation data. In developing the list, special attention was paid to the list of hazardous constituents provided in ~~The compounds listed in the Master Constituent List~~MCL ~~were compared to the list of hazardous constituents presented in Appendix VIII of~~ 40 CFR Part 261 Appendix VIII. ~~Appendix VIII. In~~, ~~addition, the comparison process included an evaluation of the Material Safety Data Sheets for the proprietary compounds and other generic substances listed in the Master Constituent List~~ MCL ~~in order to determine the specific chemical constituents of those substances. Those constituents that comprise the substances listed in the MCL that are also listed in Appendix VIII of 40 CFR Part 261~~ ~~Appendix VIII~~ ~~are presented in **Table 1.**~~ Also included in **Table II.C-1** are ~~those~~ energetic compounds ~~that are typically reported in~~ (SW-846 Method 8330)~~ for energetics~~, as well as Total Petroleum Hydrocarbons-Diesel Range Organics (TPH-DRO). Soil samples will be collected for TPH-DRO analyses ~~will be collected and conducted~~ at Pads 1, 4 and 7 as diesel and kerosene is occasionally used as an accelerant at those locations.

Non burn pad sampling locations which include; the two discrete grab soil samples collected randomly along the southern and northern border boundaries of the ~~OB Ground~~OBGs (SB-1, SB-2, and ~~NB~~NB-1, and NB-2), the one grab soil sample collected at the southeast corner of the ~~OB Ground~~OBG inside the ~~proposed~~ berm (Berm-1), and the one soil sample from the center-bottom of the sediment basin (Pond-1) will only be analyzed for the following constituents:

- Arsenic
- Barium
- Cadmium
- Chromium (Total)
- Chromium (Hexavalent)
- Chromium (Trivalent, by difference)
- Lead
- Selenium
- Bromomethane
- Trichloroethene
- Bis(2-Ethylexyl) phthalate
- Diethyl phthalate
- Dimethyl phthalate
- Di-n-butyl phthalate
- 2,4- Dinitrotoluene
- N-Nitrosodiphenylamine
- Dioxins/furans
- 2,4,6-Trinitrotoluene
- 2-Amino-4, 6-dinitrotoluene
- 4-Amino-2, 6-dinitrotoluene
- HMX
- Nitroglycerin

Commented [RFAAP20]: Revised June 2016 per DEQ e-mail request on 05/06/2016.

The analytes listed in **Table II.C-1** will serve as the ~~parameter~~ constituent list for the ~~Soil Monitoring Program~~SMP. Detection will be defined as an analytical result above the laboratory Method De~~e~~tection Limit (MDL). If an MDL for a constituent is above the current RSL value, the constituent will be reported at ½ of the MDL. ~~-~~The laboratory Reporting Limit (RL) is analogous to the Limit of Quantitation/Quantitation Limit (LOQ/QL) for each ~~parameter~~constituent. RLs for each constituent are presented in **Table II.C-1**. Constituents not detected above the MDL will be reported as Not Detected (ND). ~~Radford AAP~~RFAAP will list each constituent detected above the MDL.~~in soil~~. Additionally, RFAAP will also list o~~Also listed o~~n the table ~~will be~~ the laboratory specific Method Detection Limit (MDL) for each constituent. If the laboratory reports an ~~estimated concentration~~ estimated concentration ~~is recorded~~ between the MDL and the RL, that estimated concentration will be J-flagged on the table. It is important to note; however, that the definition of a detection for this program will be an exceedance of the MDL, not the RL. As shown on **Table II.C-1**, the MDLs and RLs for each of the constituents are well below the respective designated action levels (benchmarks).

The Program Action levels (primarily the USEPA Region III~~3~~ Industrial Regional Screening Levels (RSLs~~, formerly RBCs~~) are in Table II.C.1 and are current as the effective date of this permit. Action Levels must be updated to the latest Region III RSL for Industrial Sites using 1e-6/HQ1 for the annual soil monitoring program. RSLs will be updated on a bi-annual basis (every two years). This will be done in the form of a Class I Permit modification. The rationale for this approach is due to the fact that the SMP will be part of a RCRA Operating Permit; therefore, effectively changing the Action Levels on a non-routine basis could result in violations that are out of the control of both the permittee and the VDEQ.

~~Because~~ 4-n~~N~~itrophenol has no Region III RSL value.~~,~~ ~~Radford AAP~~RFAAP will analyze for this compound, and if detected above the ~~Reporting Limit~~RL, ~~a site specific risk evaluation will be conducted. The risk evaluation will entail comparing~~the result will be compared to ecological screening level for 4-nitrophenol in soil ~~the result to a~~listed in the June 23, 2000 USEPA memorandum Entitled *Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders.* This document recommends 7.0E+00 mg/kg as an ecological screening level for 4-~~-~~n~~N~~itrophenol in soil. The memorandum can be reviewed in its entirety at: http://www.epa.gov/region4/waste/fedfac/ecoproc2.pdf.

~~If ten or more non-carcinogenic COPCs are detected during a single sampling event, the concentrations will be compared to 1/10 of the RBC of those constituents. This comparison is a qualitative evaluation and will have no bearing on the risk evaluation of the site, and will not trigger corrective actions or interim measures at the site.~~

Tables II.C-1 and II.C-2 present the dioxin/furan (D/F) "action level". The AL ~~,AL~~ will be the Region III RSL for 2,3,7,8 TCDD equivalent (Toxicity Equivalent Quotient [TEQ]). The

Commented [RFAAP21]: Revised definitions and provided additional clarification in this paragraph RE levels of detection and use of them

Commented [RFAAP22]: In the April 29, 2015 DEQ ltr, DEQ proposed an alternate schedule for the AL update. The rationale presented in this section for AL update every 2 years remains current and the proposed alternate schedule for AL update by DEQ was not incorporated.

Commented [RFAAP23]: Revised June 2016 per DEQ e-mail request on 05/06/2016.

Commented [RFAAP24]: This comparison is an alternative benchmark for comparison. To date, no detections above RL.

Commented [RFAAP25]: This paragraph removed per DEQ's recommendation. Reference e-mail direction from DEQ provided on 05/06/2016.

procedure for calculating the 2,3,7,8 TCDD equivalent (TEQ) will be to multiply all detections above the MDL of those compounds listed in **Table II.C-2** by their respective toxicity equivalent factors (TEFs). –The multiplication products will be summed and the resulting total sum will be compared to the AL. Additional information can be found in the USEPA Mid-Atlantic Risk Assessment User's Guide, Toxicity Equivalence Factors~~ (May2010November 2014), Section 2.3.5 – Toxicity Equivalence Factors at:~~

~~http://www.epa.gov/reg3hsed/risk/human/r~~http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm~~b-concentration_table/usersguide.htm~~.

Commented [RFAAP26]: Revised June 2016 per DEQ e-mail request on 05/06/2016.

II.C.3.3. ~~3.3~~ Monitoring Frequency

The SMP will be performed ~~on an annual basis (every twelve months)~~annually and the analysis will be conducted for the constituents listed in **Table II.C-1**. RFAAP will re-evaluate the~~ OBG Soil Monitoring Program~~ SMP every three~~3~~ years and at that time may request to modify the monitoring and sampling locations and/or constituent list in accordance with 40 CFR 270.42.

II.C.4. ~~4.0~~ SAMPLING AND ANALYSIS PLAN

Commented [RFAAP27]: RLSO assumed no change to these references. Future revisions may be required if needed.

The Sampling and Analysis Plan (SAP) for ~~Soil Monitoring Program~~the SMP is based on the following reference documents:

- *Draft Final Open Burning Ground/Open Detonation Permitting Guidelines, VDEQ, February 2002*
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), Chapters 1 and 9, US EPA, Revision 5, April 1998 and updates~~,~~*
- *Draft Guidance Manual for Closure Plans and Post-Closure Plans September 28, 2001*
- *Superfund Program Representative Sampling Guidance, Volume 1: Soil, Interim Final, OSWER Directive 9360. 4-10, EPA 540/R-95/141, PB96-963207, December 1995*
- ASTM Standard Guide for Soil Sampling in the Vadose Zone, Designation D 4700-15~~91~~, July 15, 1991 (re~~-approved 1998~~vised 2015)
- EEE Consulting (EEE), 2005. Soil Monitoring Program for the Open Burning Ground (OBG). Radford Army Ammunition Plant, Radford, Virginia, Dated April, 2005.

Procedures and techniques for soil sample collection, sample preservation and handling (shipment), ~~chain-of-custody~~COC control, analytical procedures, and field and laboratory quality assurance/quality control (QA/QC) are included in the SAP. Soil sample collection shall be conducted in accordance with the protocols described in this section.

II.C.4.1. ~~4.1~~ Sample Collection Order

Commented [RFAAP28]: This section updated based on 2014 results

~~During the initial sampling event the soil samples will be collected sequentially, beginning at sample location 1 and progressing through sample location 8. In future events,~~ I~~i~~n order to minimize the potential for cross-contamination, soil samples will be collected in the

order from least ~~contaminated~~ impacted location to the most ~~contaminated~~impacted. T~~t~~he suggested sampling order is noted below but should be evaluated prior to the annual sampling event ~~.~~ The s~~S~~uggested sampling order based on the 2014 annual soil monitoring event is:

- NB-1, NB-2, SB-1, SB-2, Berm-1, Pond-1, PAD-8 , PAD-3, PAD-2, PAD-1, PAD-5, PAD-7, PAD-6, PAD-4

II.C.4.2. ~~4.2~~ Field Log Book/Laboratory Logbook/~~LABORATORY LOGBOOK~~

A f~~F~~ield l~~L~~og ~~b~~book is used to record field information and activities ~~for each well~~at each sample location. The f~~F~~ield l~~L~~og b~~B~~ook will include the following information:

- Sample Location Designation Identification
- Weather conditions and relative moisture of soil
- S~~s~~ampling date, time, and equipment used
- S~~s~~ample identifications (by constituents or method)
- ~~p~~Pr~~r~~eservatives used, if any
- Constituents or method to be analyzed
- Sampler's and sample preparers' names
- ~~constituents Cconstituents or method to be analyzed~~
- ~~Ssamplers' and sample preparers' names~~

The contract laboratory will keep ~~a logbook~~records to document the processing steps that are applied to the sample. All sample preparation techniques and instrumental methods must be identified in ~~this logbook~~the laboratory records. The results of the analysis of all quality control samples should be identified specific to each batch of groundwater samples analyzed. The ~~logbook~~ laboratory records should also include the time, date, and name of person (and company affiliation if subcontracted) who performed each processing step.

It should be noted that these are minimum requirements for the laboratory. The analytical laboratory must develop, implement and maintain a quality system program to generate data of known and documented quality based on national performance standards adopted under the National Environmental Laboratory Accreditation Program (NELAP). Analytical laboratories producing compliance data must be VELAP accredited under 1VAC30-46, also called the Virginia Environmental Laboratory Accreditation Program (VELAP). VELAP accreditation under 1VAC30-46 incorporates TNI standards and its quality system requirements.

Commented [RFAAP29]: Revised June 2016 to incorporate VELAP requirements and respond to comments provided in NOD 1s.19.

II.C.4.3. ~~4.3~~ Soil Sample Collection Procedures

Soils will be collected from the uppermost six inches of soil using dedicated stainless steel ~~tulip bulb samplers~~ ~~trowel~~sampler capable of collecting an undisturbed soil sample, as described in *ASTM Standard Guide for Soil Sampling in the Vadose Zone, Designation D 4700-15~~91~~, ~~July 15, 1991 (re-approved 1998~~2006~~)~~2015*. Each sampler will be marked with a permanent marker on the wooden handle with the sample location ~~as presented in~~ (See **Figure II.C-3**). The sample location will be located using a method of triangulation as described below:

Commented [RFAAP30]: Revised June 2016 in response to NOD 1s.20. Further revised 2/2017 to reflect language in ASTM standard.

- Using a plastic measuring tape, at each burn pad the location of the pad sampling point will be located by measuring the midpoints of the lengths of both pans at the pad, and then triangulating the lowest point between the two pans from the measured midpoints.
- This sample location will be recorded in the field logbook with the measurements noted.
- This triangulation process will be repeated during each subsequent sampling event.
- A horizontal separation of approximately 2-feet will be established for each subsequent future sampling point.

Commented [RFAAP31]: Revised June 2016 to reinstate struck language per NOD 1s.21.

The procedures to be used at each location are as follows:

1. Samplers will wear a ~~fresh~~ new pair of ~~Latex~~ nitrile g~~G~~loves at each location. Level D Personal Protective Equipment (PPE) will be worn (steel toed boots, eye protection and gloves).
2. The sample location will be triangulated and recorded in field logbook.
3. A sheet of plastic sheeting will be laid out to accommodate sample vessels and equipment.
4. Using the dedicated ~~tulip bulb~~stainless steel sampler, samplers will advance a boring in native soils to a depth of six-inches below ground surface. A disposable, high-density polyethylene (HDPE) sampling device is required for the collection of the soil aliquot to be submitted for hexavalent chromium. Samples will be placed in the respective laboratory provided sample ~~vessels~~ container and placed on ice in designated coolers for transport. Should additional soil ~~material~~ be required, borings directly adjacent to the first boring can be advanced.
5. Soil material directly adjacent to the sampling location will be manually re-graded to fill in any borings.
6. Decontaminate the ~~tulip bulb~~stainless steel sampler in a designated location as described in **Section 4.3.1.** Once the sampler is completely dry, place the sampler in a one-gallon zip-lock plastic bag for storage until the next sampling event.
7. Remove plastic sheeting and proceed to the next sampling location.

Commented [RFAAP32]: Added due to potential contamination from stainless steel sampling device.

II.C.4.3.1. ~~4.3.1~~ Equipment Decontamination

The dedicated sampling equipment will be decontaminated prior to use at the site, and after use at each sampling location. Decontamination will be performed in a manner such that the decontamination solutions may be captured. The dedicated sampling equipment will be decontaminated as follows:

- Wash equipment with phosphate-free detergent.
- Rinse equipment with deionized water.
- Rinse equipment with isopropanol.
- Rinse equipment with deionized water.

Following decontamination, the equipment will be allowed to air dry or dried using clean disposable wipes.

II.C.4.4. 4.4 Sample Preservation and Handling

Sample analysis will be performed by a VELAP accredited laboratory. Samples will be preserved with the proper preservatives in accordance with USEPA SW-846 (Test Methods for Evaluating Solid Waste, latest edition). Prior to sample collection, sample vessels containers will be prepared by the analyzing laboratory. Preservatives (as required by analytical methods) will be added to samples immediately after they are collected if the sample containers are not pre-preserved by the laboratory. More detailed Sample preservation information is provided in **Table II.C-3**.

Commented [RFAAP33]: Revised June 2016 to incorporate VELAP requirements and respond to comments provided in NOD 1s.22.

All sample containers shall be packed in a cooler with ice as soon as they are collected. Upon the completion of activities at the Unit, the coolers will be packed with additional ice for transport to the contract laboratory. The samples will be relinquished directly from the samplers to representatives from the contract analytical laboratory for transport to the laboratory, or the samples will be shipped to the laboratory by common carrier.

In the event that final receipt by the laboratory of any shipping container or sample bottle indicates evidence of compromised sample integrity, the laboratory QA/QC officer or his/her representative shall notify the operator within 24 hours of receipt. Subsequent to notification, sample integrity will be evaluated and appropriate actions will be taken to assure representative samples. Sample integrity determinations and needs for additional actions will be conducted according to QA/QC guidance from USEPA SW-846 (Test Methods for Evaluating Solid Waste, latest edition). Resampling will be conducted if determined necessary.

II.C.4.5. 4.5 Chain-of-Custody (COC) Documentation

The soil monitoring program incorporates a chain-of-custody COC program to track the route and handlers of the soil samplescustody of the samples from time of collection to shipment to and receipt at the laboratory. The monitoring of sample possession from field sampling to laboratory analysis is important in the event that unexpected laboratory lab results occur and the security of documentation of transportationsample possession is can be evaluated. This documentation contains several records and logs that assist in the quality control of the program.

- Sample labels are used to prevent misidentification of samples. The labels are completed and affixed to the sample containers prior to field sampling. The labels contain the following information:

- Sample identification number
- Name of sampler (initials)
- Date and time of sample collection
- Sampling location
- Constituents to be analyzed

~~Sample~~ Additionally, sample custody seals should be affixed over each shipping cooler ~~be used~~ when a common carrier transports the sample shipment to the laboratory. These seals ensure that the samples have not been disturbed during transportation. The sample identification and date will be included on the sample custody seal.

Commented [RFAAP34]: Revised June 2016 in response to NOD 1s.23.

... COC control for all samples will consist of the following:

Commented [RFAAP35]: Updated to reflect the GW monitoring SAP

1. Labels will be placed on individual sample containers while sampling indicating the sampler's name, date and time of sample collection, place of collection, and preservation method used for the sample.

2. A custody seal should be placed on the shipping container or on the individual sample bottles. Custody seals provide prevention or easy detection of sample tampering. The custody seal should bear the signature of the collector and the date signed. The custody seal can be placed on the front and back of a cooler, around the opening of a polyethylene overpack bag or on the lid of each sample container.

3. No sample should be brought back to the laboratory for preservation. It is recommended that two polyethylene overpack bags be used in shipping. The first will contain the sample bottles, the second the ice needed to keep the samples at less than or equal to 6 degrees Celsius (C). A temperature history of the samples should be maintained as a QC measure. Upon receipt of the shipment, the laboratory should record the temperature on the COC. The method holding time is defined by the analytical method and listed in Table II.C-3. Holding time refers to the period from sample collection to sample extraction and/or analysis.

4. A COC record should be completed and should accompany every sample shipment. The COC record should contain enough copies so that each person possessing the shipment receives his/her own and should be designed to allow the Permittee to reconstruct how and under what circumstances a sample was collected, including any problems encountered. An example of a COC form that includes the necessary information is included as ~~Attachment~~Appendix II.C-A.

5. Samples will be packaged and labeled for shipment in compliance with current U.S. Department of Transportation regulations. All samples will be shipped priority/overnight via commercial carrier or hand delivered to the laboratory.

~~5~~6. Samples will arrive at the laboratory via the overnight delivery service or hand delivery. Upon delivery to the laboratory, the ice chests will be checked for intact custody seals and the samples will be unpacked and the information on the accompanying COC records will be examined. If the samples shipped match those described on the COC form, the laboratory sample coordinator will sign the form and assume responsibility for the samples. If problems are found with the sample shipment, the laboratory sample custodian will sign the form and record the problems in the "remarks" section.

~~6~~7. Any missing samples, missing sample tags, broken sample bottles, or unpreserved samples will be noted on the COC record. If there are problems with individual samples, the sample custodian will inform the laboratory coordinator of such problems. The laboratory custodian will then contact the Permittee to determine a viable solution to the problem.

~~7~~8. All information relevant to the sample will be secured at the end of each business day. All samples will be stored in a designated sample storage refrigerator, access to which will be limited to laboratory employees.

The chain-of-custody record is filled out for each Unit and accompanies the samples to the ~~contract~~ laboratory. The completed form is returned to ~~Radford~~ RFAAP with the analyses for each Unit. An example COC~~chain- of custody~~ form is included in ~~Appendix A~~Attachment II.C-A. The sample possession is established from time of collection to the time of analysis. This record contains the following information:

- ~~sample~~ Sample identification and location
- ~~signature~~ Signature of sampler
- ~~date~~ Date and time of sampling
- ~~sample~~ Sample type
- ~~identification~~Identification
- ~~number~~ Number of containers
- ~~required~~ Required analysis
- ~~signatures~~ Signatures of person(s) involved in possession
- ~~times~~ Times and dates of possession
- ~~method~~ Method of transportation
- ~~tracking~~ Tracking number from transporter
- ~~statement~~ Statement for packing on ice
- ~~temperature~~ Temperature upon arrival at the laboratory~~during shipment (min & max)~~
- ~~internal temperature upon arrival at laboratory~~

A sample analysis request sheet can further clarify the samples for each requested constituent. This additional check sheet will be utilized when necessary (i.e., beginning of a new contract with a new laboratory). This sheet sent along with the samples will contain the following information:

- ~~name~~ Name of person receiving samples
- ~~laboratory~~ Laboratory sample number
- ~~date~~ Date of sample receipt
- ~~analysis~~ Analysis to be performed
- ~~internal~~ Internal temperature during shipping.

Commented [RFAAP36]: Revised June 2016 to incorporate VELAP requirements and respond to comments provided in NOD 1s.23.

The above information represents minimum requirements. The analytical laboratory must develop, implement and maintain a quality system program to generate data of known and documented quality based on national performance standards adopted under the National Environmental Laboratory Accreditation Program (NELAP). Analytical laboratories producing compliance data must be VELAP accredited under 1VAC30-46, also called the Virginia Environmental Laboratory Accreditation Program (VELAP). VELAP accreditation under 1VAC30-46 incorporates TNI standards and its quality system requirements.

II.C.4.6. ~~4.6~~ Disposition of Decontamination Waste Water/Investigation Derived Wastes

All decontamination water that is generated during sampling activities will be collected in containers and subsequently emptied into the Biological Wastewater Treatment Plant at ~~Radford AAP~~RFAAP.

The investigation derived sampling materials will be drummed onsite. When the drum is deemed full the contents will be analyzed for hazardous characteristics by ~~Radford AAP~~RFAAP. The materials will be disposed of as hazardous waste if the results indicate that characteristic criteria are met, or as a solid waste if the data indicate that the wastes are not hazardous. The appropriately licensed and permitted disposal contractor will be selected by ~~Radford AAP~~RFAAP. The location where hazardous wastes are transported will be a facility permitted by EPA under 40- CFR Part 270.

II.C.5. ~~5.0~~ ANALYTICAL PROCEDURES

The analytical methods set forth in USEPA SW-846 (Test Methods for Evaluating Solid Waste, latest edition) will be used to analyze all constituents. Recommended analytical methods and associated ~~qu.antitation limits~~ RLs are listed in **Table II.C-1**. ~~A National Environmental Laboratory Accreditation Conference (NELAC) accredited laboratory will perform the work. Additionally, T~~the laboratory must be accredited for the analytical method, matrix and target analyte (where applicable) by the Virginia Environmental Laboratory Accreditation Program (VELAP).

Commented [RFAAP37]: Updated to reflect current DEQ requirement for VELAP laboratory

All records of analysis will be distributed to the VDEQ as specified in **Section 8.0~~7.4~~**, as well as maintained on site.

II.C.6. QUALITY ASSURANCE/QUALITY CONTROL

~~6.0 QUALITY ASSURANCE/QUALITY CONTROL~~

II.C.6.1. ~~6.1~~ Field QA/QC Program

The field QA/QC program is designed to ensure the reliability and validity of the field data gathered as part of the overall soil monitoring program. The field QA/QC program consists of regular inspection and decontamination of field instruments, and routine collection and analysis of trip and equipment blanks and blind duplicates.

For each sampling event, one trip blank shall be filled with laboratory-grade reagent water in the laboratory that has been selected to conduct the soil analyses. The trip blank shall be analyzed only for the same volatile organic compounds for which the samples will be analyzed. The trip blank shall accompany the sampling kit, in the transport cooler, at all times.

Equipment blanks will be collected to monitor the decontamination of randomly selected equipment that may be used in the sampling process. The equipment blank shall be prepared by rinsing the decontaminated sampling device with laboratory-grade reagent water and transferring the water from the sampling device to the sample containers. The equipment blank will be returned to the laboratory for analysis for the maximum number of constituents being analyzed in soil. One equipment blank will be collected during each sampling event at the ~~OB Ground~~OBG if required. The equipment blank will be analyzed for site-specific constituents.

One blind field duplicate sample ~~also~~ will also be collected during each sampling event. The blind field duplicate will be analyzed for the ~~site-specific~~ same constituents as all other samples. The soil sampling location ~~monitoring well~~ from which the blind duplicate is collected will be noted on the Field Log for that ~~well~~soil sampling location.

Commented [RFAAP38]: Corrected to remove reference to monitoring well.

The occurrence of constituents in blank samples may serve to invalidate the analytical results of the affected constituents. Additional blanks or duplicate samples may be prepared and analyzed to address specific, unanticipated conditions at ~~s.~~ t the discretion of the Permittee.

II.C.6.2. ~~6.2~~ Laboratory QA/QC Program

The analytical laboratory must develop, implement and maintain a quality system program to generate data of known and documented quality based on national performance standards adopted under the National Environmental Laboratory Accreditation Program (NELAP). Analytical laboratories producing compliance data must be accredited under 1VAC30-46, also called the Virginia Environmental Laboratory Accreditation Program (VELAP). VELAP accreditation under 1VAC30-46 incorporates The NELAC Institute (TNI) standards and its quality system requirements. The QA/QC plan for each VELAP accredited laboratory can be provided for review, if requested. ~~As previously noted, the laboratory performing the analysis must be VELAP accredited for the matrix (soil), method and analyte, where applicable. The contract laboratory is to provide a QA/QC plan for laboratory analysis according to USEPA SW-846 (Test Methods for Evaluating Solid Waste). This plan utilizes standards, laboratory blanks, duplicates, batch spikes, and matrix spikes for calibration and identification of potential matrix~~

Commented [RFAAP39]: Revised June 2016 in response to NOD 1s.24. Language provided was developed with help of DCLS. Further revised February 2017 based on further DEQ comment on NOD 1s.24.

~~interferences. This data is on file at the laboratory and is routinely reviewed by Radford AAPRFAAP personnel. This data is a measure of performance as well as an indicator of potential sources of cross contamination. This control data is for performance review and not for correction of soil analysis data.~~

~~The contract laboratory will keep a logbook to document the processing steps that are applied to the sample. All sample preparation techniques and instrumental methods must be identified in this logbook. The results of the analysis of all quality control samples should be identified specific to each batch of groundwater samples analyzed. The logbook should also include the time, date, and name of person who performed each processing step.~~

~~Dilution during analyses has a major impact on the overall quality and usability of the soil monitoring data. Large dilution factors may mask hazardous constituents that are present at low concentrations, which may result in constituent concentrations not being identified. Therefore, when multiple analyses using sequential dilutions are required, the results from these multiple analyses will be reported.~~

In addition to the trip and equipment blanks and blind field duplicates collected for the field QA/QC program, the VELAP accredited laboratory shall prepare and analyze matrix spikes, matrix spike duplicates, laboratory control samples and/or other QA/QC samples as specified in their laboratory quality manual. ~~at least one matrix spike for each sampling batch or every 20 samples. The laboratory shall also prepare and analyze either one matrix duplicate or matrix spike duplicate for each analytical method employed.~~ Sufficient sample volume shall be collected in the field so that the laboratory can prepare the requisite QA/QC samples.
~~matrix spike and matrix spike duplicate.~~

II.C.7. ~~7.0~~
II.C.7. ~~SOIL~~ SOIL DATA EVALUATION

II.C.7.1. ~~7.1~~ Laboratory Analytical Data Validation

Commented [RFAAP40]: Revised June 2016. This section updated to reflect current guidance.

Laboratory analytical data will be validated ~~based on~~ in accordance with the following guidance documents:

- *Test Methods for Evaluating Solid Wastes - Physical and Chemical Methods*, USEPA SW-846, 3rd edition - Final Update I, II/IIA and III), as updated;
- *USEPA ~~Contract Laboratory Program~~ National Functional Guidelines for Superfund Organic Methods Data Review*, ~~October 1999 and *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*, June 2008~~August 2014, where applicable and as updated.
- *USEPA ~~Contract Laboratory Program~~ National Functional Guidelines for Inorganic Superfund Data Review*, ~~October 2004 and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, January 2010*,~~August 2014, where applicable and as updated.
- ~~*guidelines outlined in SW-846, "USEPA Contract Laboratory Program National Functional Guidelines for* Organic Data Review" *(USEPA, 1994a), "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Data* Review" (USEPA, 2008) "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" (USEPA, 2004), and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review" (USEPA, 2010), as applicable.~~

Analytical laboratory QA/QC data will be evaluated for conformance with and adherence to prescribed data quality objectives.

The evaluation of the analytical laboratory's compliance with the analytical methods and validation of the results will be based on a limited review of the following items: QC deliverables package, QC history documentation, technical holding times, preservation requirements, instrument performance (tune) check, instrument calibrations, blank sample analyses, surrogate spike recoveries, laboratory control samples, matrix spike, matrix spike duplicate, or sample duplicate analyses, interference check sample results, and internal standard requirements where appropriate. The review will be limited mainly to summary sheets provided by the laboratory, unless a notable discrepancy in the data package requires review of the ~~raw~~ instrument data.

II.C.7.2. ~~7.2~~ Evaluation ~~Of~~ of Laboratory Analytical Data ~~And~~ and Data Management

The analytical results of each sampling event conducted at the ~~OB Ground~~OBG must be assessed on a case-specific basis. The probability of elevated constituent concentrations must be weighed against the evidence of natural geochemical variations, and field or laboratory error. A review of the analytical data obtained from each sampling event will be conducted.

In general the evaluation of the analytical data for this program involves the direct comparison of validated results to the Action Levels presented on **Table II.C- 1**. If a result is in excess of the proposed action level for a given constituent, ~~Radford AAP~~RFAAP may choose to verify the result in accordance with the procedure outlined in this section. Should the process of verification confirm impacts greater than the Action Levels, and an alternative source demonstration is not pursued, then Interim Measure Corrective Actions will be proposed in accordance with **Section 89.0** of this document.

II.C.7.2.1. ~~7.2.1~~ Data Management

Chemical analytical data will be managed as both non-qualified data and interpreted data. Non-qualified data refers to concentration values as they appear on the laboratory Certificate of Analysis. Interpretation of the non-qualified data may include, but is not necessarily limited to, the treatment of low and zero values, missing data, and outliers. Each report shall identify interpreted data.

II.C.7.2.2. ~~7.2.2~~ Treatment of Missing Data Values

If a sampling event results in a missing data value, an attempt to resample for the missing value shall be made within two weeks of notification by the analytical laboratory of the missing data value.

Commented [RFAAP41]: Revised June 2016 in response to NOD 1s.25.

II.C.7.2.3. ~~7.2.3~~ Treatment of Data Outliers

Commented [RFAAP42]: This section revised June 2016 in response to NODs 1s.26, 1s.27, 3s.1, and 3s.2.

All data will be investigated to verify outliers. An outlier refers to a data point which is an inconsistently large or small value. The facility may resample (in an area near the initial sample) if an extreme value is noticed in the compliance dataset. Re-samples will occur during the compliance period of the initial soil sampling event as warranted. An outlier can be observed due to sampling, laboratory, transportation, or transcription errors. At the discretion of the Permittee, ~~To remove the possibility of including data with this type of error,~~ the historical background data should be screened for ~~each sample and constituent for~~ ~~the existence of~~ outliers (USEPA 1992 section 6.2) using the method described by Dixon (1953).

~~Radford AAP~~RFAAP may correct outliers of any data set under circumstances where such correction can be justified. Any elimination of an outlier must be properly documented and justified and approved by the Department. ~~This documentation and justification must be made available to VDEQ for review upon request.~~ ~~have prior approval from the VDEQ.~~

Commented [RFAAP43]: Revised June 2016 to be consistent with language provided in NOD 3s.4.

~~7.2.4~~II.C.7.2.4. Evaluation of Data Above Reporting Limits

Data that meets or exceeds the proposed Method Detection Limits (MDLs) presented in **Table II.C-1** will be considered a detected constituent. Data results below the MDL will be reported as non-detected. Event specific MDLs, RLs and Action Levels (ALs) for dioxin and furan constituents will be calculated and presented in a format similar to the example presented

in **Table II.C- 2.** Results below the MDLs will be reported as non-detected and will not be used in the calculation of the dioxin/furan TEFs in **Table II.C-2**.

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II.C.7.2.5. ~~7.2.5~~ Selection of Statistical Method

~~Radford AAP~~RFAAP shall ~~use~~ provide direct comparison of the analytical results to the proposed Action Levels on **Table II.C-1** ~~as the only method statistical evaluation~~.

Commented [RFAAP44]: Revised June 2016 in response to NOD 3s.3.

II.C.7.3. ~~7.3.6~~ **Verification Sampling**

The verification sample is considered as a part of the evaluation to confirm an exceedance of the proposed Action Levels. V~~All v~~erification samples must be collected at the earliest time possible ~~-~~(within 60 days of receipt of the laboratory data) or as approved by the VDEQ. The VDEQ will be informed in advance of any planned verification re-sampling.

Commented [RFAAP45]: Revised June 2016 in response to NOD 1s.28.

II.C.8. ~~7.4~~~~8.0~~ REPORTING REQUIREMENTS

The analytical results for each sampling event will be compiled, evaluated, and interpreted upon receipt from the analyzing laboratory to determine whether any soil contamination exists at the ~~OB Ground~~OBG above the designated Action Levels. The results of .the data evaluation will be summarized annually and kept in the operating record for the facility. The data will be submitted to the VDEQ annually in an Annual Soil Monitoring Report for the Unit.

If it is determined during the course of the SMP that there is evidence of soil contamination in excess of the designated Action Levels at any sampling point, RFAAP may demonstrate that a source other than the ~~OB Ground~~OBG is the cause of the contamination, or that the detection is an artifact caused by error in sampling, analysis, or evaluation. To make such a demonstration, ~~Radford AAP~~RFAAP shall:

- Notify the VDEQ in writing within seven days that they intend to make a demonstration.
- Within ~~90~~ 60 days of receipt of the validated data, submit a report to the VDEQ demonstrating that a source other than the ~~OB Ground~~OBG caused the contamination or that the contamination resulted from error in sampling, analysis, or evaluation.
- Within ~~9~~60 days of receipt of the validated data, submit a permit modification application to the VDEQ to make any appropriate changes to the SMP.
- Continue to monitor in accordance with SMP.

If evidence of contamination -in excess of the designated action levels is detected at any sampling point, and ~~Radford AAP~~RFAAP does *not* make a demonstration that a source other than the ~~OB Ground~~OBG is the cause of the contamination, ~~Radford AAP~~RFAAP shall:

- Notify the VDEQ in writing within seven (7) days. The notification must indicate which chemical parameters or hazardous constituents have shown evidence of contamination.
- ~~At the discretion of Radford AAP~~RFAAP~~, immediately~~ will sample at those sampling points for the constituents detected and confirm which constituents are present and at what concentration within 30 days of receipt of validated data. Sampling will also include a determination of horizontal extent by trending out in all four compass directions (north, south, east and west) at a distance as close as practicable to twenty (20) feet in each direction from the point of original detection. **Figure II.C-3** presents a typical array of confirmation samples to determine horizontal extent of impacts.
- Within ~~90~~ 60 days, if the contamination~~-~~ is confirmed, ~~Radford AAP~~RFAAP will submit a proposed interim measure corrective action work plan in accordance with **Section 8.0** of this plan.

If ~~Radford AAP~~RFAAP or the Director determines during the course of the SMP that the program no longer satisfies the requirements of the facility operating permit, ~~Radford~~

Commented [RFAAP46]: Revised June 2016 in response to NOD 1.2.

Commented [RFAAP47]: Revised June 2016 in response to NOD 1.2.

Commented [RFAAP48]: Revised June 2016 in response to NOD 1.2.

Commented [RFAAP49]: Revised timeline June 2016 based on comments received from DEQ in e-mail dated 05/06/2016.

Commented [RFAAP50]: Revised June 2016 in response to NOD 1.2.

Commented [RFAAP51]: Revised timeline June 2016 based on comments received from DEQ in e-mail dated 05/06/2016.

~~AAP~~RFAAP must submit a permit modification application in accordance with 40 CFR 270.42, to make appropriate changes to the program within 90 days. As stated in Section 3.3, RFAAP will re-evaluate the OBG Soil Monitoring Program every 3 years and at that time may request to modify the monitoring and sampling locations and/or constituent list in accordance with 40 CFR 270.42.

Commented [RFAAP52]: Revised June 2016 in response to NOD 1s.29.

~~89.0 INTERIM MEASURES~~

II.C.9. INTERIM MEASURES

Should the data indicate that an exceedance of the proposed Action Level of a constituent listed in **Table II.C-1**, an interim measure corrective action work plan will be submitted to the VDEQ within 90 days of the notice to VDEQ. Notification will be in accordance with **Section ~~7.4~~8.0** of this plan. Interim Measures that may be conducted at the ~~OB Ground~~OBG are described in the following sections.

~~8.1~~II.C.9.1. ~~9.1~~ Hot-Spot Evaluation ~~And~~ and Soil Removal

If a constituent is detected above the proposed Action Level, a hot spot determination will be conducted. If contamination~~-~~ is detected at concentrations that exceed the designated action levels, ~~Radford AAP~~RFAAP will collect a total of four samples as close as practicable to twenty (20) feet in all directions (north, south, east and west) of the original detection. The samples will be analyzed for those constituents that have exceeded the action levels. This action will ensure that the nature and extent of the exceedance will be delineated in all horizontal directions.

In addition to the sampling described above, a sampling grid will be established in a five-foot radius of the sample collection point. Four randomly selected sample points will be selected within the diameter of the grid. Each sample point will be sampled to a terminal depth of 24 inches below ground surface by advancing a pre-cleaned stainless steel auger. Samples will be collected every six-inches to the terminal depth of 24-inches. The auger will be decontaminated in accordance with **Section 4.3.1** between every six-inch interval. The aliquots from each six-inch interval will be composited with the same corresponding interval from each of the four borings. The aliquots will be homogenized in a pre-cleaned stainless steel bowl using a pre-cleaned stainless steel spoon or trowel (unless sampling for hexavalent chromium). The analyses from each six-inch interval will be evaluated by comparing the results to the Action Levels for the constituent.

If the Action Levels are exceeded in any given layer, a soil removal work plan will be prepared. The work plan will define the volume of soils to be removed by designating the horizontal and vertical extent of removal. The work plan will be submitted to the VDEQ for review and approval. Upon approval of the work plan, the soils will be excavated with a mechanical backhoe under the supervision of designated representative of ~~Radford AAP~~RFAAP. Soils will be placed in a DOT approved covered roll-off container and transported offsite for disposal at an approved facility for disposal and/or treatment. Upon completion of the excavation confirmatory samples will be collected to confirm complete removal of the contaminated media. Confirmatory samples will include four randomly selected aliquots from the base of the excavation and two from the sidewalls of the excavation to be composited for a single analysis.

The excavation will be immediately backfilled with soils to be collected from a designated borrow area within the ~~Radford AAP~~RFAAP facility, or prewashed and graded gravel. Soils or gravel will be re-graded to match existing contours. Soils will be seeded with natural vegetation that matches the existing ground cover of the site. The process of immediately

backfilling ~~that~~ the excavation will allow for normal operations to resume at the ~~OB Ground~~OBG. Should the confirmatory samples indicate that there are contaminated media in excess of the Action Levels beneath the backfilled material, the backfilled material will be removed and an additional volume of soils will be removed. Confirmatory samples will be collected from the secondary excavation as well. The secondary excavation will be backfilled immediately. The process of excavation and confirmation will proceed until the Action Levels are no longer exceeded or bedrock or groundwater is encountered. A complete report of the removal actions will be prepared and submitted to the VDEQ within 30-days of completion of the Interim Measures.

~~8.2 **Other In Situ/Ex Situ Physical and Chemical Remediation Strategies**~~

Commented [RFAAP53]: Originally added to provide an option instead of removal. However, removed February 2017 at DEQ request per NOD 1s.17, indicating that DEQ prefers soil removal over remediation.

~~Radford AAPRFAAP reserves the opportunity to submit to the VDEQ adequate documentation (pilot test results or bench studies) demonstrating the effectiveness of a remedial technology for the onsite treatment of a specific compound or suite of compounds that have been detected at concentrations that exceed the designated action levels for those compounds. The data submitted will provide a time frame for remediation as well as estimated costs. The remedial endpoint goal will be the designated action level. Radford AAPRFAAP agrees that the proposed timeframe for remediation must be equivalent to the hot-spot removal option.~~

TABLES

Table II.C-1 Identification of Constituents of Potential Concern
Table II.C-2 Example Presentation and Calculation of Dioxin/Furan Results
Table II.C-3 Sampling and Preservation Procedures
Table II.C-4 Summary of Background Data
Table II.C-5 Facility Wide Background Study

Commented [RFAAP54]: Tables added based on e-mail request received from DEQ on 05/06/2016

Identification of Constituents of Potential Concern
Open Burning Ground Soil Monitoring Program
Radford Facility Army Ammunition Plant
Modified: January 2017

Constituent	CASRN	Type of Constituent	In Waste?	Reported in Bang Box Database?	On GW List	To be Sampled?	SW-846 Method	Proposed RL mg/kg	Original Permit Action Level mg/kg (09/28/05)	Action Level mg/kg (As Revised rev 12/03/08)	Action Level mg/kg (As Revised rev 09/27/11)	Action Level mg/kg (As Revised rev 6/12/2015)	Updated Action Level mg/kg	Source of Updated Action Level
~~1,2-Dichloroethane~~	~~107-06-2~~	~~PIC~~		~~Yes~~		~~*Yes*~~	~~8260C~~	~~0.005~~	~~31~~	~~2.2~~	~~2.2~~	~~2.2~~	~~2.2~~	~~R3 RSL Ind~~
1,3,5-Trinitrobenzene	99-35-4	PIC		Yes		*Yes*	8330B	0.25	31000	27000	27000	27000	~~27000~~ 32000	R3 RSL Ind
2,4,6-Trinitrotoluene	118-96-7	ENER				*Yes*	8330B	0.25	95	79	79	79	~~79~~ 96	R3 RSL Ind
2-amino-4,6-dinitrotoluene	35572-78-2	ENER				*Yes*	8330B	0.25	2000	2000	2000	2000	~~2000~~ 2300	R3 RSL Ind
4-amino-2,6-dinitrotoluene	19406-51-0	ENER				*Yes*	8330B	0.25	2000	1900	1900	1900	~~1900~~ 2300	R3 RSL Ind
~~2,4-Dichlorophenol~~	~~120-83-2~~	ENER		~~Yes~~	~~*~~	~~*Yes*~~	~~8270D~~	~~0.33~~	~~3100~~	~~1800~~	~~1800~~	~~1800~~	~~1800~~	~~R3 RSL Ind~~
1,3-Dinitrobenzene	99-65-0	ENER				*Yes*	8330B	0.25	100	62	62	62	~~62~~ 820	R3 RSL Ind
2,4-Dinitrotoluene	121-14-2	ENER	Yes		Yes	*Yes*	8330B	0.25	2000	1200	5.5	5.5	~~5.5~~ 7.4	R3 RSL Ind
2,6-Dinitrotoluene	606-20-2	ENER		Yes	Yes	*Yes*	8330B	0.25	1000	620	620	1.2	~~1.2~~ 1.5	R3 RSL Ind
~~2-Chlorophenol~~	~~95-57-8~~	ENER		~~Yes~~	~~*~~	~~*Yes*~~	~~8270D~~	~~0.33~~	~~5100~~	~~5100~~	~~5100~~	~~5100~~	~~5100~~	~~R3 RSL Ind~~
~~3-Methylphenol~~	~~108-39-4~~	ENER		~~Yes~~		~~*Yes*~~	~~8270D~~	~~0.33~~	~~51000~~	~~31000~~	~~31000~~	~~31000~~	~~31000~~	~~R3 RSL Ind~~
~~4-Methylphenol~~	~~106-44-5~~	ENER		~~Yes~~		~~*Yes*~~	~~8270D~~	~~0.33~~	~~5100~~	~~3100~~	~~3100~~	~~62000~~	~~62000~~	~~R3 RSL Ind~~
2-Nitrotoluene (ortho)	88-72-2	ENER				*Yes*	8330B	0.25	12	13	13	13	~~13~~ 15	R3 RSL Ind
~~**3-Nitrotoluene (meta)**~~	~~99-08-1~~	ENER				~~*Yes*~~	~~8330B~~	~~0.25~~	~~20000~~	~~12000~~	~~62~~	~~62~~	~~62~~	~~R3 RSL Ind~~
4-Nitrotoluene (para)	99-99-0	ENER				*Yes*	8330B	0.25	170	110	110	110	~~110~~ 140	R3 RSL Ind
3,3-Dimethylbenzidine	119-93-7	ENER		Yes		*Yes*	8270D	1.6	--	0.16	0.16	0.16	~~0.16~~ 0.21	R3 RSL Ind
~~4-Nitrophenol~~	~~100-02-7~~	ENER		~~Yes~~		~~*Yes*~~	~~8270D~~	~~1.6~~	~~7~~	~~7~~	~~7~~	~~7~~	~~7~~	~~ECO Risk~~
~~Acetophenone~~	~~98-86-2~~	ENER		~~Yes~~		~~*Yes*~~	~~8270D~~	~~0.33~~	~~100000~~	~~100000~~	~~100000~~	~~100000~~	~~100000~~	~~R3 RSL Ind~~
Arsenic	7440-38-2	ENER	Yes		Yes	*Yes*	6010C	1	15.8	15.8	15.8	15.8	15.8	FWB
Barium	7440-39-3	ENER	Yes	Yes	Yes	*Yes*	6010C	20	72000	190000	190000	190000	~~190000~~ 220000	R3 RSL Ind
Benz(a)anthracene	56-55-3	ENER		Yes		*Yes*	8270D	0.33	3.9	2.1	2.1	2.1	~~2.1~~ 2.9	R3 RSL Ind
Benzene	71-43-2	ENER	Yes		Yes	*Yes*	8260C	0.005	52	5.6	5.4	5.4	~~5.4~~ 5.1	R3 RSL Ind
Benzo(a)pyrene	50-32-8	ENER		Yes		*Yes*	8270D	0.02	0.39	0.21	0.21	0.21	~~0.21~~ 0.29	R3 RSL Ind
Benzo(b)fluoranthene	205-99-2	ENER		Yes		*Yes*	8270D	0.33	3.9	2.1	2.1	2.1	~~2.1~~ 2.9	R3 RSL Ind
Benzo(k)fluoranthene	207-08-9	ENER		Yes		*Yes*	8270D	0.33	39	21	2.1	2.1	~~2.1~~ 2.9	R3 RSL Ind
Benzyl chloride	100-44-7	ENER		Yes		*Yes*	8260C	0.005	--	17	4.9	4.9	~~4.9~~ 4.8	R3 RSL Ind
bis(2-Ethylhexyl)phthalate	117-81-7	ENER		Yes		*Yes*	8270D	0.33	200	120	120	120	~~120~~ 160	R3 RSL Ind
Butylbenzylphthalate	85-68-7	ENER		Yes		*Yes*	8270D	0.33	200000	910	910	910	~~910~~ 1200	R3 RSL Ind
Cadmium	7440-43-9	ENER		Yes		*Yes*	6010C	0.5	510	810	800	800	~~800~~ 980	R3 RSL Ind
Carbon tetrachloride	56-23-5	ENER		Yes	Yes	*Yes*	8260C	0.005	22	1.3	3	3	~~3~~ 2.9	R3 RSL Ind
~~Chlorobenzene~~	~~108-90-7~~	ENER	~~Yes~~	~~Yes~~	~~Yes~~	~~*Yes*~~	~~8260C~~	~~0.005~~	~~20000~~	~~1500~~	~~1400~~	~~1400~~	~~1400~~	~~R3 RSL Ind~~
Chloroform	67-66-3	ENER		Yes		*Yes*	8260C	0.005	10000	1.5	1.5	1.5	~~1.5~~ 1.4	R3 RSL Ind
Chromium, Hexavalent	18540-29-9	ENER		Yes		*Yes*	7196A	1	NA	NA	5.6	5.6	~~5.6~~ 6.3	R3 RSL Ind
Chromium, Total	7740-47-3	ENER		Yes	Yes	*Yes*	6010C	1	3100	1400	NA	NA	NA	NA
Dibenz(a,h)anthracene	53-70-3	ENER		Yes		*Yes*	8270D	0.02	0.39	0.21	0.21	0.21	~~0.21~~ 0.29	R3 RSL Ind
Diethylphthalate	84-66-2	ENER	Yes			*Yes*	8270D	0.33	820000	490000	490000	490000	~~490000~~ 660000	R3 RSL Ind
Dimethyl phthalate	131-11-3	ENER		Yes		*Yes*	8270D	0.33	10000000	10000000	10000000	10000000	10000000	R3 RSL Ind*
Di-n-butyl phthalate	84-74-2	ENER		Yes	Yes	*Yes*	8270D	0.33	100000	62000	62000	62000	~~62000~~ 82000	R3 RSL Ind
Diphenylamine	122-39-4	ENER	Yes	Yes	Yes	*Yes*	8270D	1.6	26000	15000	15000	15000	~~15000~~ 21000	R3 RSL Ind
Ethanol	64-17-5	ENER	Yes				NCA							
Fluoranthene	206-44-0	ENER		Yes		*Yes*	8270D	0.33	41000	22000	22000	22000	~~22000~~ 30000	R3 RSL Ind
~~Hexachloroethane~~	~~67-72-1~~	ENER	~~Yes~~		~~Yes~~	~~*Yes*~~	~~8270D~~	~~0.33~~	~~200~~	~~120~~	~~120~~	~~43~~	~~43~~	~~R3 RSL Ind~~
HMX	2691-41-0	ENER				*Yes*	8330B	2.2	51000	49000	49000	49000	~~49000~~ 57000	R3 RSL Ind
Indeno(1,2,3-cd)pyrene	193-39-5	ENER		Yes		*Yes*	8270D	0.33	3.9	2.1	2.1	2.1	~~2.1~~ 2.9	R3 RSL Ind
Lead	7439-92-1	ENER		Yes	Yes	*Yes*	6010C	0.3	800	800	800	800	800	R3 RSL Ind
Mercury	7439-97-6	ENER	Yes		Yes	*Yes*	7471A	0.1	0.13	28	34	43	~~43~~ 40	R3 RSL Ind
Methyl bromide (Bromomethane)	74-83-9	ENER		Yes		*Yes*	8260C	0.005	15	35	32	32	~~32~~ 30	R3 RSL Ind
Methyl chloride (Chloromethane)	74-87-3	ENER	Yes	Yes	Yes	*Yes*	8260C	0.005	6	8.4	500	500	~~500~~ 460	R3 RSL Ind
Methylene chloride	75-09-2	ENER	Yes	Yes	Yes	*Yes*	8260C	0.005	380	54	53	960	~~960~~ 1000	R3 RSL Ind
Naphthalene	91-20-3	ENER		Yes		*Yes*	8270D	0.33	20000	20	18	18	~~18~~ 17	R3 RSL Ind
~~**Nitrobenzene**~~	~~98-95-3~~	ENER				~~*Yes*~~	~~8330B~~	~~0.25~~	~~510~~	~~280~~	~~24~~	~~24~~	~~24~~	~~R3 RSL Ind~~
Nitrogen dioxide (peroxide)	10102-44-0	ENER		Yes			NCA							
Nitroglycerin	55-63-0	ENER	Yes		Yes	**** Yes***	8330B	0.25	200	62	62	62	~~62~~ 82	R3 RSL Ind
Perchlorate	14797-73-0	ENER	Yes		Yes	***Yes***	314 or 6850	0.002			720	720	~~720~~ 820	R3 RSL Ind
~~Phenol~~	~~108-95-2~~	ENER	~~Yes~~		~~*~~	~~*Yes*~~	~~8270D~~	~~0.33~~	~~310000~~	~~180000~~	~~180000~~	~~180000~~	~~180000~~	~~R3 RSL Ind~~
RDX	121-82-4	ENER				*Yes*	8330B	1	26	24	24	24	~~24~~ 28	R3 RSL Ind
Silver	7440-22-4	ENER	Yes		Yes	*Yes*	6010C	1	5100	5100	5100	5100	~~5100~~ 5800	R3 RSL Ind
Selenium	7782-49-2	ENER				*Yes*	6010C	1	5100	5100	5100	5100	~~5100~~ 5800	R3 RSL Ind

Table II.C-1 (Continued): Page 2 of 2

Constituent	CASRN	Type of Constituent	In Waste?	Reported in Bang Box Database?	On GW List	To be Sampled?	Method SW-846	Proposed RL mg/kg	Original Permit Action Level mg/kg (09/28/05)	Action Level mg/kg (As Revised rev 12/03/08)	Action Level mg/kg (As Revised rev 09/27/11)	Updated Action Level mg/kg	Updated Action Level mg/kg	Source of Updated Action Level
Total Petroleum Hydrocarbons - DRO		Site Accelerant				***Yes***	8015C	20	11000	11000	11000	11000	11000	DEQ gd
~~Tetrachloroethylene~~	~~127-18-4~~	~~PIC~~		~~Yes~~		~~***Yes***~~	~~8260C~~	~~0.005~~	~~5.3~~	~~2.7~~	~~2.6~~	~~110~~	~~110~~	~~R3 RSL Ind~~
~~**Tetryl**~~	~~479-45-8~~	~~ENER~~				~~***Yes***~~	~~8330B~~	~~0.65~~	~~10000~~	~~2500~~	~~2500~~	~~1200~~	~~1200~~	~~R3 RSL Ind~~
~~Toluene~~	~~108-88-3~~	~~Both~~	~~Yes~~	~~Yes~~	~~Yes~~	~~***Yes***~~	~~8260C~~	~~0.005~~	~~200000~~	~~46000~~	~~45000~~	~~45000~~	~~45000~~	~~R3 RSL Ind~~
Trichloroethylene	79-01-6	PIC		Yes		***Yes***	8260C	0.005	7.2	14	14	6.4	~~6.4~~ 6	R3 RSL Ind
~~Vinyl chloride~~	~~75-01-4~~	~~PIC~~		~~Yes~~		~~***Yes***~~	~~8260C~~	~~0.005~~	4	~~1.7~~	~~1.7~~	~~1.7~~	~~1.7~~	~~R3 RSL Ind~~
~~Vinylidene chloride (1,1-Dichloroethene)~~	~~75-35-4~~	~~PIC~~		~~Yes~~		~~***Yes***~~	~~8260C~~	~~0.005~~	~~51000~~	~~1100~~	~~1100~~	~~1100~~	~~1100~~	~~R3 RSL Ind~~
Polychlorinated Dibenzo(p)dioxins and furans														
1,2,3,4,5,7,8,9-Octachlorodibenzo(p)dioxin (OCDD)	3268-87-9	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	39001-02-0	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,4,6,7,8-Heptachlorodibenzo(p)dioxin (HpCDD)	35822-46-9	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,4,7,8-Hexachlorodibenzo(p)dioxin (HxCDD)	39227-28-6	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,6,7,8-Hexachlorodibenzo(p)dioxin (HxCDD)	57653-85-7	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,7,8,9-Hexachlorodibenzo(p)dioxin (HxCDD)	19408-74-3	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,7,8-Pentachlorodibenzo(p)dioxin (PeCDD)	40321-76-4	PIC		Yes		***Yes***	8290A	See Note 5						
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	PIC		Yes		***Yes***	8290A	See Note 5						
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	PIC		Yes		***Yes***	8290A	See Note 5						
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	PIC		Yes		***Yes***	8290A	See Note 5						
2,3,7,8-Tetrachlorodibenzo(p)dioxin (TCDD)	1746-01-6	PIC		Yes		***Yes***	8290A	See Note 5						
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	51207-31-9	PIC		Yes		***Yes***	8290A	See Note 5						
2,3,7,8-TCDD Toxicity Equivalence Quotient(TEQ)									19 ng/kg	19 ng/kg	18 ng/kg	18 ng/kg	~~18~~ 22 ng/kg	R3 RSL Ind

NOTES:

1. Updated Action Level — AL changed as part of update of Region III Regional Screening Levels (RSL) (formerly known as RBCs) for Industrial Sites .
2. Type of Constituent — "Propellant Ingredient" = Ingredient in propellant compound.
   "PIC" Product of Incomplete Combustion": means that it was reported in the Bangbox Database (see Appendix A-2).
   "Both" Both PIC and Propellant Ingredient.
   "ENER" - Energetic on SW-846 Method 8330 parameter List.
3. In Waste — "Yes" - means it was reported in Radford AAP's waste characterization.
4. **BOLD** Constituent — Constituent not in 40 CFR 261 Appendix VIII List of Hazardous Constituents.
5. Dioxins — Reporting Limit and Action Level will be calculated for each sample and detection, respectively. See Table 2 for example reporting format.
6. NCA — Constituent is not analyzed by commercial laboratories.
7. Source of Updated Action Levels — **"R3 RSL Ind"**
   United States Environmental Protection Agency Regions 3, 6, and 9. (Accessed April 17, 2015). Regional Screening Levels for Chemical Contaminants at Superfund Sites. Current RSL table dated January 2015.
   "R3 RSL Ind*" - These constituents were removed from the September 12, 2008 RBC table. The previous AL (Region III RBC for Industrial Sites from October 2004) is listed.
   "DEQ gd" - Table 5-11 Soil Saturation Values, Page 5-69 of VDEQ Storage Tank Program Technical Manual, Fourth Edition, May 10, 2011.
   "FWB" - Facility Wide Background Study.
   "ECO RISK" - June 23, 2000 EPA memorandum Entitled *Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities and Inclusion of Stakeholders.*
   "NA" - Not applicable. See 9/27/2011 correspondence from DEQ to Alliant Techsystems, Inc, Approval of Class 3 Permit Modifications, Comment Response Summary, Comment 96.
8. RL and AL — "RL" is the laboratory reporting limit and is analogous to the Limit of Quantitation (LOQ). "AL" is the Action Level based on published risk based values.

~~9. Action Level adjusted~~ — ~~for 3,3-Dimethylbenzidine the Action-Level of 0.16 mg/kg is below the Proposed Reporting Level of 1.6 mg/kg. The Proposed Reporting Level in this case is set to the concentration at which the laboratoryconsiders most confident detecting this chemical. Therefore any result above the Action Level and below the Proposed Reporting Limit will be discussed with the VA DEQ to determine if additional evaluation is necessary.~~

10. Non-pad Sample Locations** (SB-1, SB-2, NB-1, NB-2 Berm-1, and Pond-1) — **Soil samples collected from non burn pad locations only require analysis for the following constituents: Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Bromomethane, Trichloroethene, Bis(2-Ethylexyl) phthalate, Diethyl phthalate, Dimethyl phthalate, Di-n-butyl phthalate, N-Nitrosodiphenylamine, Dioxins/furans, 2,4,6-Trinitrotoluene, 2-Amino-4, 6-dinitrotoluene, 4-Amino-2, 6-dinitrotoluene, HMX, Nitroglycerin and 2,4-Dinitrotoluene.**

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TABLE II.C–3
~~MODIFIED: SEPTEMBER 27, 2011~~MAY 2015.
SAMPLING AND PRESERVATION PROCEDURES

Commented [RFAAP55]: Revised June 2016 to reflect equipment blank correction. This information was never in the Permit but should have been summarized.

Parameter (Method)	Recommended Container[a]	Preservative	Maximum Holding Time	Min. Amount Required for Analysis
SOIL				
Metals (6010~~B~~, 6020, 7471~~0A~~)	G, 4-ounce. clear	**Cool (less than or equal to 6°C)**	6 months (28 days for mercury)	**6 grams**
Hexavalent chromium (7196)	G, 4-ounce. clear	**Cool (less than or equal to 6°C) Collect without stainless steel sampling device. HDPE recommended**	30 days to extraction/7 days (268 hours) from extraction to analysis,	**5 grams**
~~(WATER) Metals (6010, 6020, 7470)~~	~~P – 500 ml~~	~~**pH<2, HNO3**~~	~~6 months (28 days for mercury)~~	~~**60 ml (mercury) 100 ml. (other)**~~
Volatile Organics (8260~~B~~/5035)	**3) 40-ml vials, clear**	**Methanol and sodium bisulfate; Cool (less than or equal to 6°C), no headspace**	14 days	**30 grams**
Semi-volatile Organics (8270~~C~~)	G, 4-ounce clear	**Cool (less than or equal to 6°C)**	14 days until extraction; 40 days after extraction	**30 grams**
Nitroglycerine (8332)	G, 4-ounce clear	**Cool (less than or equal to 6°C)**	14 days until extraction; 40 days after extraction	**30 grams**
Explosives (8330~~A~~)	G, 4-ounce clear	**Cool (less than or equal to 6°C)**	14 days until extraction; 40 days after extraction	**30 grams**
Dioxins and Furans (8290~~A~~)	G, 4-ounce ~~clear~~ amber	**Cool (less than or equal to 6°C)**	None	**30 grams**
TPH – DRO (8015~~B~~)	G, 4-ounce clear	**Cool (less than or equal to 6°C)**	14 days ~~until extraction; 40 days after extraction~~	**30 grams**
Perchlorate	G, 4-ounce amber	**Cool (less than or equal to 6°C), collected with headspace**	28 days	**6 grams**
WATER (Equipment Blank, as needed)				
Metals (6010, 6020, 7470)	P – 500 ml	**pH<2, HNO3**	6 months (28 days for mercury)	**60 ml (mercury) 100 ml. (other)**
Volatile Organics	3- 40 ml vials, clear	**pH<2, HCl, Cool (less than or equal to 6°C)**	14 days	**40 mls**
Semivolatile Organics (8270)	AG, 2- 250 ml	**Cool (less than or equal to 6°C)**	7 days until extraction; 40 days after extraction	**250 ml**
Explosives/ Nitroglycerine (8330)	2 -1 L AG	**Cool (less than or equal to 6°C)**	7 days until extraction; 40 days after extraction	**1 L**

TABLE II.C-3 (CONTINUED)

SAMPLING AND PRESERVATION PROCEDURES

Commented [RFAAP56]: Revised June 2016 to reflect equipment blank correction. This information was never in the Permit but should have been summarized.

Dioxins and Furans (8290)	2-1L AG	**Cool (less than or equal to 6°C)**	None	**2-1L**
TPH – DRO (8015)	2 -1 L AG	**Cool (less than or equal to 6°C)**	7 days until extraction; 40 days after extraction	**1 L**
Perchlorate	250 ml P	**Cool (less than or equal to 6°C), collected with headspace; 0.2 micron filter – field filtered**	28 days	**250 ml**

Notes: All methods listed for soil unless noted.

[a] Container Types: G denotes Glass, HDPE Denotes High Density Polyethylene

1. Current method updates are represented with suffixes on each method (e.g., SW-846- Method 6020A). The laboratory performing the analysis must be VELAP accredited, where applicable for a current method update.

2. The laboratory performing the analysis must be VELAP accredited, where applicable, for the matrix, method and analyte.

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REMOVE PAGE AND INSERT TABLE II.C-5 (PAGE 1)

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FIGURES

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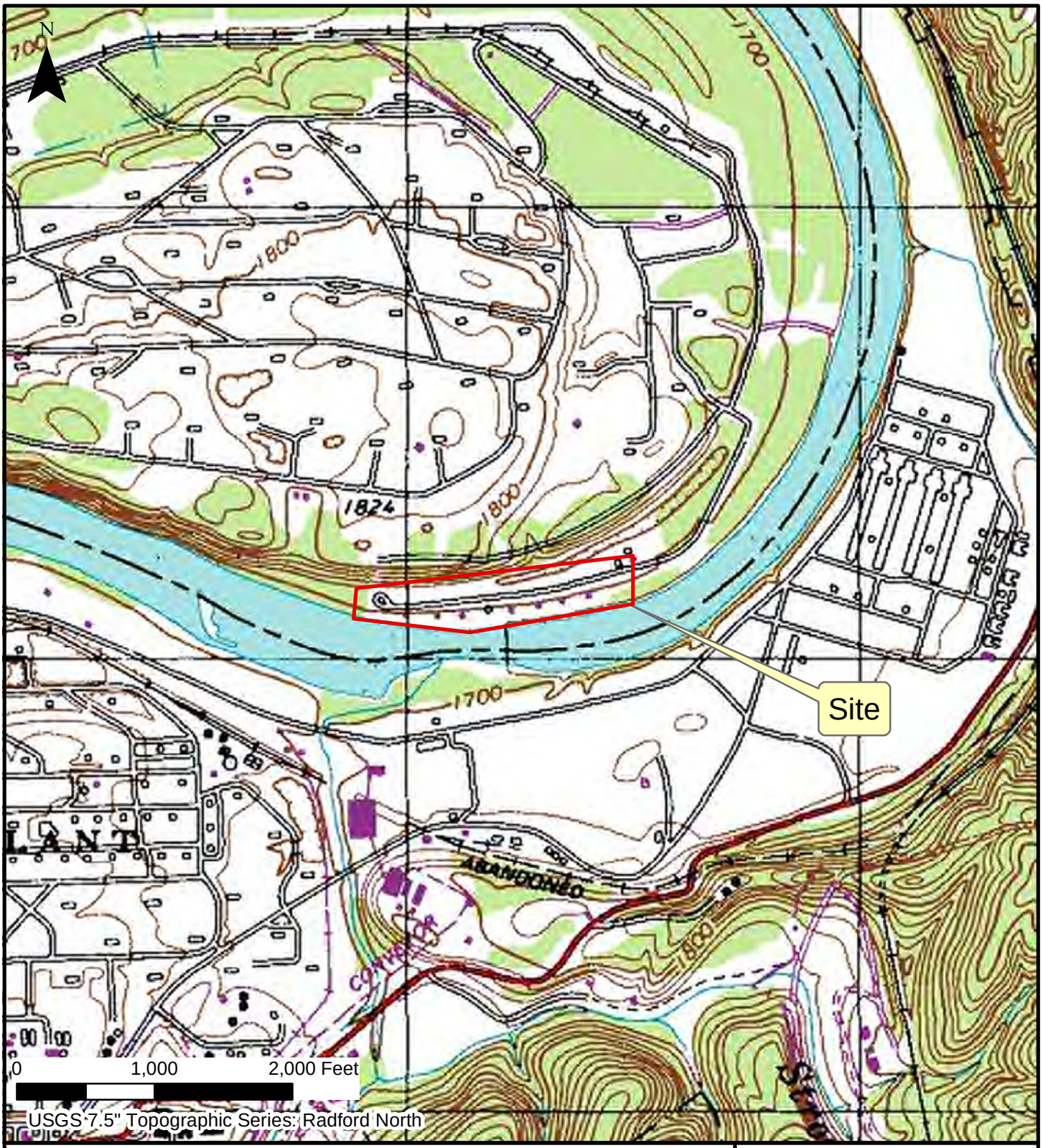
Figure II.C-1 Regional Site Location Map



OBG Site Location and Topography

Open Burning Ground (OBG), RFAAP, Radford, VA

SCALE: 1" = 1000'

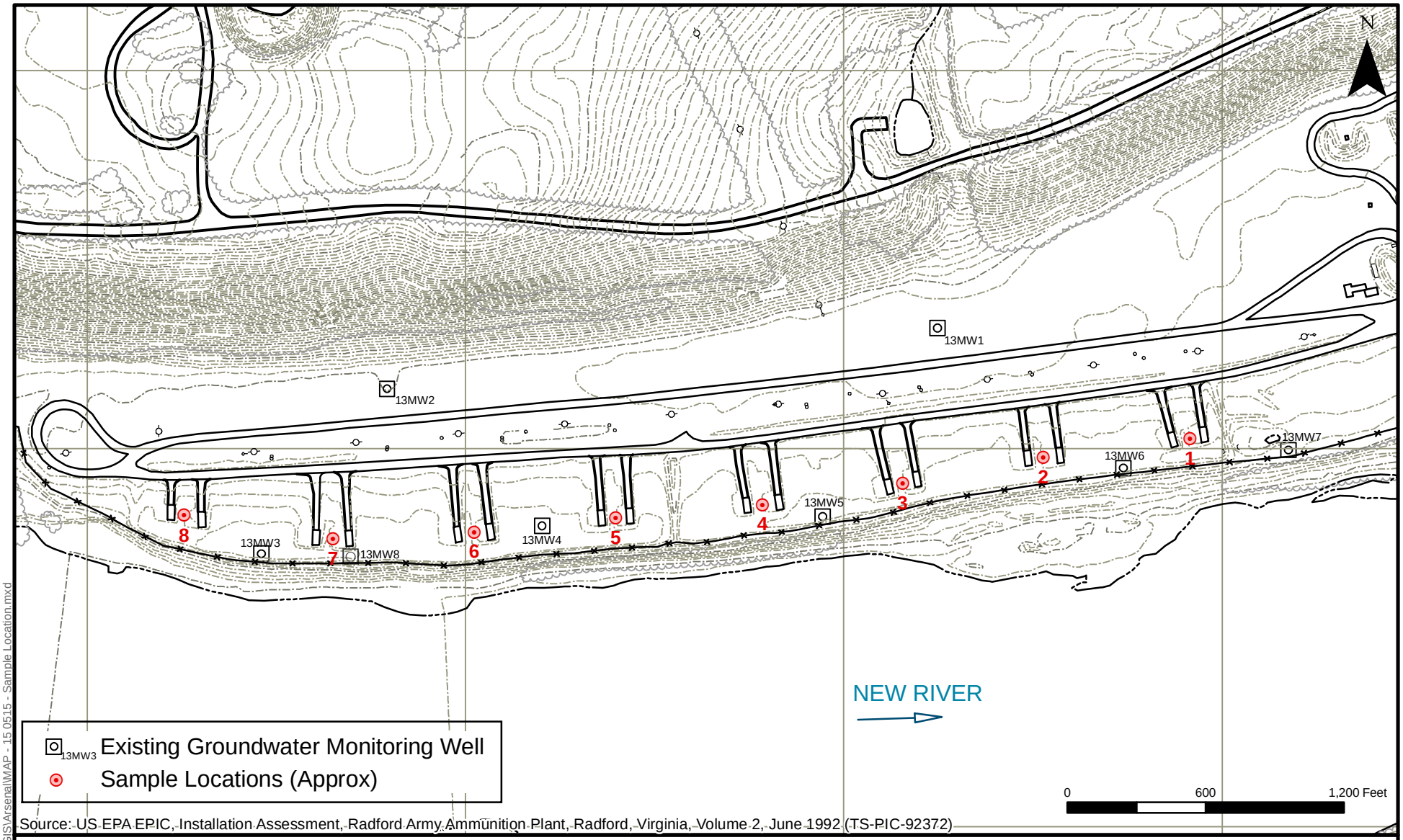
PLAN NO. B03204-142

Draper Aden Associates
Engineering ◆ Surveying ◆ Environmental Services
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291
Richmond, VA
Charlottesville, VA
Hampton Roads, VA
Coats, NC

DESIGNED KMW
DRAWN WMD
CHECKED JCF
DATE 5/14/15

FIGURE
II.C-2

Path: P:\B03\200\B03204\B03204-142\GIS\Arsenal\MAP - 15 0514 - Site Location.mxd



Source: US EPA EPIC, Installation Assessment, Radford Army Ammunition Plant, Radford, Virginia, Volume 2, June 1992 (TS-PIC-92372)

Site Layout and Proposed Sample Locations - Soil Monitoring Program

Open Burning Ground (OBG), RFAAP, Radford, VA

Draper Aden Associates
Engineering ◆ Surveying ◆ Environmental Services
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291
Richmond, VA
Charlottesville, VA
Hampton Roads, VA

DESIGNED KMW
DRAWN WMD
CHECKED JCF
DATE 5/15/15

SCALE: 1"= 600'

PLAN NO. B03204-142

FIGURE
II.C-3

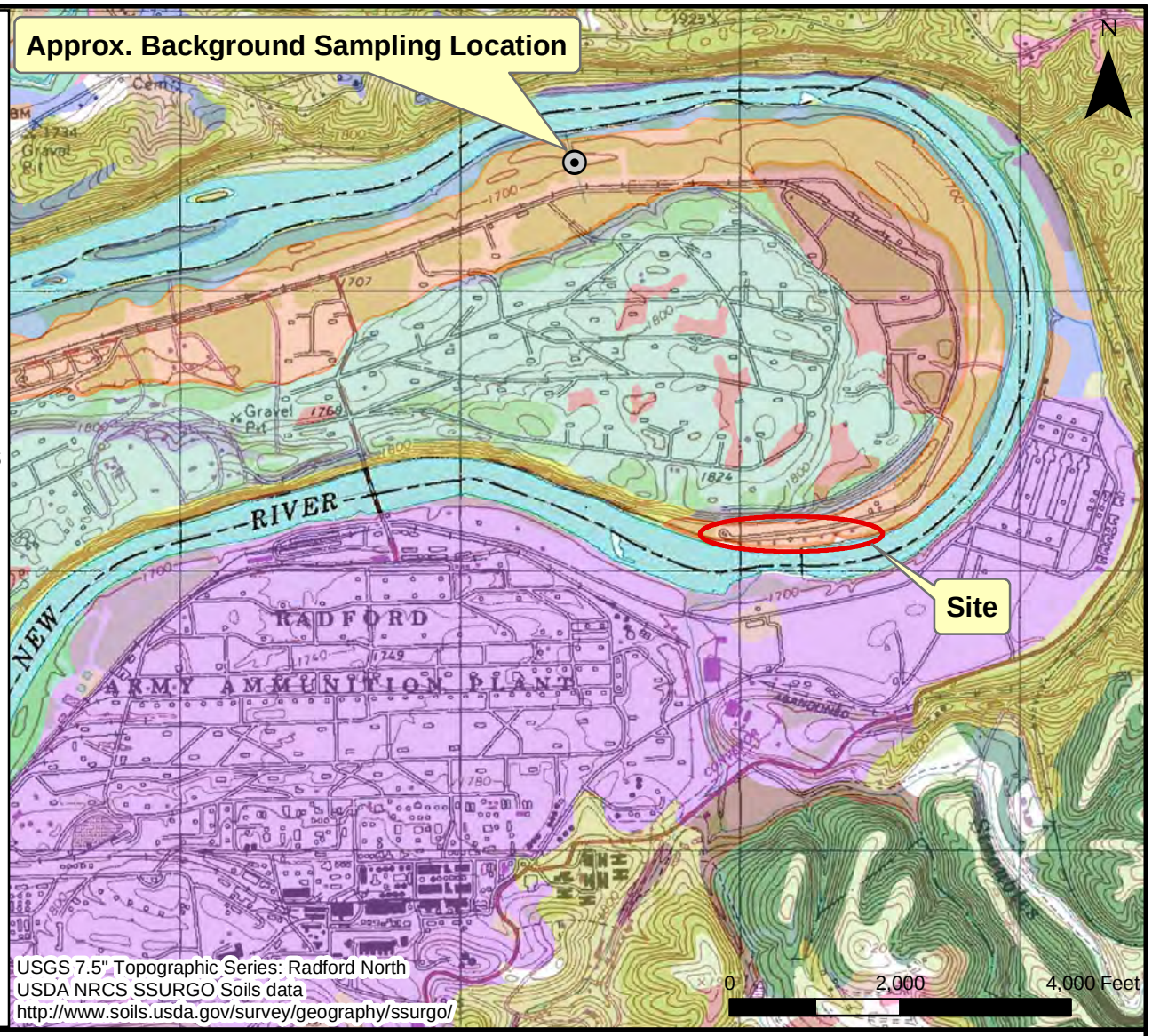
Path: P:\B03\200\B03204\B03204-142\GIS\Arsenal\MAP - 15 0515 - Sample Location.mxd

Legend

- Background Sampling Location

Soil Units

- Braddock Loam
- Carbo-Rock Outcrop Complex
- Cotaco Loam
- Fluvaquents
- Rock - Newbern-Carbo Complex
- Wheeling Sandy Loam
- Wurno-Newbern-Faywood Silt Loams
- Berks and Weikert Stony Soils
- Berks-Lowell-Rayne Complex
- Caneyville-Opequon-Rock Complex
- French soils
- Groseclose and Poplimento Soils
- Guernsey Silt Loam
- Hayter Soils
- McGary and Purdy Soils
- Ross Soils
- Udorthents and Urban land
- Unison and Braddock Soils
- Unison-Urban Land Complex
- Weaver soils



USGS 7.5" Topographic Series: Radford North
USDA NRCS SSURGO Soils data
http://www.soils.usda.gov/survey/geography/ssurgo/

Site Soils and Background Sampling Locations
Open Burning Ground (OBG), RFAAP, Radford, VA

Draper Aden Associates
Engineering • Surveying • Environmental Services
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291
Richmond, VA
Charlottesville, VA
Hampton Roads, VA

DESIGNED KMW
DRAWN WMD
CHECKED JCF
DATE 5/15/15

SCALE: 1" = 2000'

PLAN NO. B03204-142

FIGURE
II.C-4

Path: P:\B03\200\B03204\B03204-142\GIS\ArsenalMAP - 15 0515 - Soil Map.mxd

PHOTOGRAPH 1. **View towards the north of a typical soil swale between two pans. Soil samples will be collected within the swale. Note the edge of the pan track in upper left hand corner.**

PHOTOGRAPH 2. **View of the south of two pans comprising one pad.**

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Figure II.C-5 -
Photographs of Typical Sample Location Conditions
Radford Army Ammunition Plant Open Burning Ground
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APPENDIX II.C-A

EXAMPLE CHAIN-OF-CUSTODY FORM

ATTACHMENT II.F

CONTINGENCY PLAN

Commented [RFAAP1]: Suggested revisions added June 2015 as part of the RCRA permit renewal application for the RFAAP open burning ground

ATTACHMENT II.F – CONTINGENCY PLAN

Commented [RFAAP2]: Modified this plan to largely match the EWI permit application submitted in 2012.

TABLE OF CONTENTS

Commented [RFAAP3]: Due to the more stand alone nature of this attachment, we added a table of contents to the document.

II.F.1 INTRODUCTION AND GENERAL INFORMATION 34
II.F.1A PURPOSE 34
II.F.1B PLAN CONTENTS 34
II.F.2 FACILITY LOCATION, OPERATIONS, AND WASTES MANAGED 44
II.F.2A FACILITY LOCATION 55
II.F.2B FACILITY OPERATIONS 55
II.F.2C WASTES MANAGED 66
II.F.2D POTENTIAL EMERGENCY SITUATIONS 987
II.F.3 EMERGENCY COORDINATORS 187
II.F.4 IMPLEMENTATION 198
II.F.5 RELEASE PREVENTION MEASURES AND CONTROL PROCEDURES 1109
II.F.5A RFAAP CONTROL PROCEDURES 1109
II.F.5B PREVENTION OF RECURRENCE OR SPREAD OF FIRES, EXPLOSIONS OR RELEASES 1109
II.F.6 EMERGENCY RESPONSE PROCEDURES 11110
II.F.6A EMERGENCY COORDINATOR'S RESPONSIBILITIES 11110
II.F6B NOTIFICATIONS 11110
II.F.6C EMERGENCY EQUIPMENT AVAILABLE 21211
II.F.6D CONTAINMENT, COUNTERMEASURES, CLEAN-UP AND DISPOSAL 21311
II.F.6E DISPOSAL OF MISCELLANEOUS WASTE AND DEBRIS 11413
II.F.6F POST-EMERGENCY EQUIPMENT MAINTENANCE 11413
II.F.7 COORDINATION AGREEMENTS 11514
II.F8 EVACUATION PLAN 11614
II.F.9 REQUIRED REPORTS 11615
II.F.10 MODIFICATION OF PLAN 11715

LIST OF FIGURES

FIGURE II.F-1 - LOCATION OF THE RFAAP
FIGURE II.F-2 - LAYOUT OF BURNING GROUND STRUCTURES
FIGURE II.F-3 - LOCATION OF COMMUNICATION EQUIPMENT
FIGURE II.F-4 - EMERGENCY EQUIPMENT LOCATIONS
FIGURE II.F-5 - CONTINGENCY PLAN IMPLEMENTATION LOGIC DIAGRAM
FIGURE II.F-6 - AREA EVACUATION ROUTES

LIST OF TABLES

TABLE II.F-1 NOTIFICATION ACTION SUMMARY
TABLE II.F-2 EMERGENCY EQUIPMENT LOCATIONS AT RFAAP
TABLE II.F-3 EVALUATION CRITERIA FOR IMPLEMENTATION OF THE CONTINGENCY PLAN
TABLE II.F-4 SPILL RESPONSE MEASURES

~~The following text was excerpted from RFAAP's January 12, 2001 submittal excluding the incinerator. The original formatting and numbering scheme is retained in order to simplify~~

~~1.0~~~~II.E~~II.F.1 INTRODUCTION AND GENERAL INFORMATION

This Contingency Plan (Plan) has been prepared for the Open Burning Ground (OBG) units, at the Radford Army Ammunition Plant (RFAAP). This Plan has been compiled as a stand-alone document for the permitted treatment ~~and storage~~ area and has been structured to be consistent with other plans and procedures in use at the RFAAP.

~~II.E~~II.F.1a~~1.1~~ Purpose

In accordance with Subpart D of 40 CFR Part 264, this document describes the Contingency Plan that will be activated in the event of a fire, explosion, or release of hazardous waste or hazardous waste constituents~~, which~~ that could threaten human health or the environment. A current copy of the Plan will be maintained in the RFAAP ~~F~~facility ~~O~~operating ~~R~~record as well as in the Environmental Manager's files.

The overall objective of this Contingency ~~This~~ Plan is ~~designed~~ to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water. This plan defines the actions to be taken in the event of an emergency within the permitted treatment area. ~~address the requirements of Subpart D of 40 CFR Part 264. Management plans, Army installation procedures, and plant operating procedures exist outside the text of this Plan. The purpose of these other documents is to handle emergency situations that might occur at the RFAAP, but that may or may not be directly associated with hazardous waste management. Although these documents are not required under Subpart D of 40 CFR Part 264, and are not part of this Plan, a brief description of the contents of these documents and a listing of the established operating procedures applicable to RFAAP emergency and disaster situations are included in Table 1. Appendix A contains a copy of the table of contents for the RFAAP Disaster Control Plan (RFAAP-DCP) and the Plant Protection Plan.~~

~~II.E~~II.F.1b~~1.2~~ Plan Contents

This Contingency Plan contains pertinent information to be used during an emergency situation. The various sections and content of the plan are listed below.

- Section ~~II.E~~II.F.2 describes facility operations and the types of hazardous wastes managed at the ~~Open Burning Grounds~~OBG~~.~~;
- Section ~~II.E~~II.F.3 identifies the RFAAP Emergency Coordinator and alternates~~.~~;
- Section ~~II.E~~II.F.4 discusses Contingency Plan implementation~~.~~;
- Section ~~II.E~~II.F.5 presents a description of release prevention measures~~.~~;
- Section ~~II.E~~II.F.6 describes emergency response procedures~~.~~;
- Section ~~II.E~~II.F.7 describes coordination agreements between RFAAP and surrounding communities~~.~~;
- Section ~~II.E~~II.F.8 presents the permitted treatment ~~and storage~~ area evacuation plan~~.~~;
- Section ~~II.E~~II.F.9 outlines release-reporting requirements; and~~.~~

- Section ~~II.E~~II.F.10 includes requirements for Contingency Plan modifications.

~~II.E~~II.F.2~~.0~~ FACILITY LOCATION, OPERATIONS, AND WASTES MANAGED

This section provides background information that may be useful as part of an emergency situation. This information includes the location of the facility, operations performed at the facility, types of wastes managed, and potential emergency situations that could be encountered.

~~II.E~~II.F.2a~~.1~~ Facility Location

The RFAAP is located in southwest Virginia within Pulaski and Montgomery Counties as shown in Figure II.F-1. The RFAAP is located approximately ~~5~~ 4 miles north~~east~~ of the City of Radford, ~~10~~ 7 miles southwest of Blacksburg, 9 miles northwest of Christiansburg, and ~~47~~ 30 miles southwest of Roanoke. The main entrance to the RFAAP is located on Virginia Route 114 between the Towns of Christiansburg and Radford. The RFAAP address is as follows:

Radford Army Ammunition Plant
Route 114
P.O. Box 1
Radford, Virginia 24141-0100

The RFAAP encompasses approximately 4,104 acres. The New River separates Pulaski and Montgomery counties and also divides the RFAAP into two portions commonly known as the Horseshoe Area and the Main Manufacturing Area. These two areas and the approximate boundary of the RFAAP are shown on Figure II.F-1.

The ~~OB Ground~~OBG is located in the southeast section of the Horseshoe Area on the northern bank of the New River as shown in Figure II.F-1 and is used for the open burning of ~~waste propellant~~energetic wastes ~~. Propellant wastes~~ that cannot be safely treated in the RFAAP's hazardous waste ~~I~~incinerators. ~~(metal particles, rocks, and similar debris in the waste may damage the grinder system) are treated at the OB Ground.~~ Figure II.F-2 shows the ~~OB Ground~~OBG boundary and the locations of the actual structures.

~~II.E~~II.F.2b~~.2~~ Facility Operations

General operations performed at the RFAAP and at the permitted treatment and storage area are described in the following sections.

~~2.2.1~~i) RFAAP Operations

RFAAP is a government-owned, contractor-operated (GOCO) industrial installation responsible to the U.S. Army ~~Joint Munitions Command at Rock Island Arsenal whose~~. The RFAAP's mission is to manufacture propellants, explosives, and chemical materials as assigned. ~~The Alliant Ammunition and Powder Company, L.L.C. (Alliant) currently is the operator of the facility under a Facility Use contract.~~ As a GOCO operation, RFAAP has both Government and Contractor organizations. For the purpose of this permit application, the facility consists of all contiguous portions of the RFAAP ~~under the control of the either the U.S. Army or Alliant (Permittees)~~. The facility specifically includes both the Horseshoe Area and the Main Manufacturing area. Wastes from onsite activities (including those of both the operating contractor and tenants) are managed in the permitted storage and treatment area. Additionally, wastes from the nearby New River Unit (NRU) may be handled at the site in limited situations.

The facility was first constructed in 1940 and began operations producing smokeless powder (single base, double base, and triple base propellants) in 1941. Since that time various processes/products have been added to the facility including production of cast propellants, trinitrotoluene (TNT), commercial propellants, and load, assemble and pack facilities. Specific

operations vary based upon contracted capacity and products from the Department of Defense and U.S. allies.

ii)~~2.2.2~~ ~~OB Ground~~OBG Operations

Operations included in the permitted treatment area ~~as part of the OB Ground~~ include the propellant waste treatment operations at the ~~burning ground~~OBG. The following equipment included in this operation ~~transfer and treatment, and equipment as follows~~is:

- Burning Pans and Covers
- Remote Ignition System

Specific operations that are performed at the ~~OB Ground~~OBG are listed below.

1. Waste materials are transported from production areas in ~~<~~ less than 20 gallon containers to the ~~OB Ground~~OBG. The waste is then loaded into the burning pans.

2. The burning pans are prepared for ignition by spreading the waste out and adding diesel ~~diesel fuel~~ and materials as necessary to support combustion (pallets, cardboard, *etc.*) ~~if necessary~~.

3. The burning pans are remotely ignited.

4. Ash from the burning pans is collected and staged on-site pending sample analysis and ~~disposal in a properly~~ transferred to an offsite permitted disposal facility.

~~2.3~~ ~~II.E~~II.F.2c Wastes Managed

The hazardous wastes that are managed ~~(treated and stored)~~ at the permitted facility include waste ~~propellants~~ energetic materials and spill "cleanup" residues generated at the facility or the nearby NRU. These wastes ~~which~~ are hazardous due to their i~~n~~gnitability (D001) or reactivity (D003). Additionally, some of the wastes may exhibit the toxicity characteristic for certain metals and/or 2,4-dinitrotoluene. A detailed description of the wastes is provided in the ~~Only hazardous wastes identified in this Permit's~~ Waste Analysis Plan in Attachment II.B of this Permit. In summary, however, these include wastes that exhibit the following hazardous characteristic(s):

i. Reactivity (hazardous waste number D003) as specified in 9 VAC 20-60-261, incorporating 40 CFR 261.23 by reference; or

ii. Toxicity, as specified in 9 VAC 20-60-261, incorporating 40 CFR 261.24 by reference, for one or more of the following contaminants;

a) Arsenic (hazardous waste number D004);
b) Barium (hazardous waste number D005);
c) Cadmium (hazardous waste number D006);

d) Chromium (hazardous waste number D007);
e) Lead (hazardous waste number D008);
f) Mercury (hazardous waste number D009);
g) Selenium (hazardous waste number D010);
h) Silver (hazardous waste number D011); and
i) 2,4-Dinitrotoluene (hazardous waste number D030).

iii. Ignitability (hazardous waste number D001) as specified in 9 VAC 20-60-261, incorporating 40 CFR 261.21 by reference.

Under no circumstances will the managed wastes include any of the following:

i. Radioactive wastes, or mixed radioactive and hazardous wastes;

ii. Wastes that are listed pursuant to 9 VA 20-60-261, incorporating 40 CFR 261.31, 32, and 33, by reference, will be managed at the permitted treatment area.

iii. Any material contaminated with or suspected of being contaminated with military warfare agents accepted for thermal treatment at the OB unit. Examples of such chemical warfare agents are:

Choking agents
Nerve agents
Blood agents
Blister agents
Incapacitating agents
Vomiting compounds
Tear producing compounds
Herbicides

iv. Smoke and incendiary devices, as these materials are not suitable for treatment at the OBG for a variety of reasons.

~~will be treated the OB Ground. These wastes include the following:~~

~~1. Wastes which exhibit only the following hazardous characteristic(s):~~

~~a. Reactivity (hazardous waste number D003) as specified in 9 VAC 20-60-261; 40 CFR Part 261.23;~~
~~b. Reactivity (hazardous waste number D003) as specified in 9 VAC 20-60-261; 40 CFR 261.23 and the characteristic of toxicity, as specified in 9 VAC 20-60-261; 40 CFR 261.24, for one of the following constituents:~~

~~i. Lead (hazardous waste number D008);~~

~~ii. 2,4-Dinitrotoluene (hazardous waste number D030); and/or~~

~~iii. Barium (hazardous waste number D005)~~

~~e. Ignitability (hazardous waste number D001) as specified in 9 VAC 20-60-261; 40 CFR 261.21. Ignitable wastes are limited to clean up residue of propellant ingredients. Ignitable wastes are mixed with sawdust and are not a liquid when brought to the permitted treatment and storage area.~~

~~2. Wastes which are not listed pursuant to 9 VAC 20-60-261; 40 CFR 261.31, 32, and 33; and~~

~~3. Wastes which are one of the following (as identified in the Waste Analysis Plan):~~

~~a. Off-specification propellants and propellant intermediates, generated at the facility;~~
~~b. Load, assemble and pack waste, consisting of energetic materials from assembling cartridges;~~
~~c. Specialty product wastes containing propellant with nitrocellulose, nitrate esters, nitroguanidine, solid explosives, and one of the following combinations of additional materials:~~
~~i. 40 CFR 261 Appendix VIII constituents (D003)~~
~~ii. 40 CFR 261 Appendix VIII constituents, chlorides and/or perchlorates (D003)~~
~~iii. 40 CFR 261 Appendix VIII constituents and/or metals (D003, D004-D010)~~
~~d. Other miscellaneous waste, described in Module II, Attachment II.B, Appendix II.B-1, Table I, as one of the following:~~
~~i. Ignitable and reactive liquids in sawdust (D001, D003)~~
~~ii. Off-specification dinitrotoluene, trinitrotoluene, or Isotriol~~

i)~~2.3.1~~ Composition of Waste

The composition of the wastes ~~propellant mixtures fed~~ burned at the~~to~~ ~~OB Ground~~OBG varies over time due to changes in the production schedule at the RFAAP. Generally, these wastes include miscellaneous energetic waste materials that cannot be otherwise treated at the onsite hazardous waste incinerator. The wastes may be hazardous due to the ignitability, reactivity, or toxicity characteristics. ~~Off-specification propellants and propellant intermediates, dinitrotoluene (including production intermediates), trinitrotoluene, isotriol, load, assemble and pack waste, specialty product waste and other miscellaneous wastes are the categories of wastes which may be treated at the OB Ground. These categories are segregated into 20 distinct waste groups, as listed in Table 2; all wastes with the exception of Groups 2,3, and the two liquid waste groups (Groups 5 and 6) containing triethylene glycol and diethylene glycol, may be treated at the OB Ground. No liquid wastes are treated at the OB Ground.~~Of those wastes identified in the Waste Analysis Plan, all except those from Groups 2, 3, 5, and 6 may be treated at the ~~OB Ground~~OBG. No liquid wastes may be treated.

These waste streams are processed as described in Sections 2.2.2 and 2.2.3 and are handled in accordance with the Waste Analysis Plan. There are no wastes managed in the facility that are incompatible with ~~the waste propellants (reactive waste)~~one another.

ii)~~2.3.2~~ Identification and Quantity of Waste

~~Hazardous wastes treated at the OB Ground consist primarily of off-specification/waste propellants as described above.~~ The specific identification of wastes to be ~~stored and~~ treated ~~at~~ in the permitted ~~storage and treatment~~ area~~(s)~~ is recorded on an internal manifest form that accompanies the waste from the generation area. ~~Consequently, the identity of any released material can be identified.~~This permits easy identification of any material that is realeased.

Wastes brought to the ~~OB Ground~~OBG are treated (burned) the same day as received; there is no long-term storage of materials at the ~~OB ground~~OBG. The largest quantity of materials that could be treated at one time at the ~~OB ground~~OBGs is 8,000 pounds of energetic waste, spread in 1,000-pound increments across eight burning pans. The resulting ash from the burning pans is collected after each burn and staged on-site in a less than 90 day storage area pending sample analysis ~~and disposal in a properly permitted disposal facility~~. The ash is managed as hazardous waste.

~~II.E~~II.F.2d ~~.4~~ Potential Emergency Situations

There are several ~~S~~situations at the ~~OB Ground~~OBG that would require implementation of the Contingency Plan. The most common scenarios would includes ~~include~~ releases from a fire or an explosion of reactive wastes during processing or handling. In addition, if the flood protection plan failed to be implemented properly, releases may be possible during flooding scenarios.

The most serious situation at ~~OB Ground~~OBG would be an explosion, as such an incident would pose an immediate danger to facility personnel and could allow for the release of a significant quantity of material to the environment. A non-explosive release of waste at the ~~OB Ground~~OBG presents less of an immediate danger to personnel and may not always require implementation of the Contingency Plan, as these types of releases may not have a potential to have offsite impacts.

~~II.E~~II.F.3~~.0~~ EMERGENCY COORDINATORS

The primary Emergency Coordinator (EC) for all environmental emergencies is the on-call representative from the Environmental Department. Additionally, the facility/~~I~~incident Site Commander (~~EC/~~ISC) will provide coordination of emergency response such as fire protection, medical attention, *etc.* ~~*at* the facility is the Plant Protection Specialist on duty.~~ The EC~~/ISC~~ has the authority to determine and implement ~~the Disaster Control Plan, RFAAP Hazardous Material Emergency Response Plan, and Plant Protection Plan as well as~~ this Contingency Plan ~~if deemed necessary~~and commit the necessary resources to do so. The EC will receive assistance in these duties from the ISC where appropriate.

The facility has an on-site Fire Department and Hazardous Materials Emergency Response Team. Environmental emergencies are primarily communicated to and handled by the Environmental Manager and the Environmental ~~Engineering~~ Staff in accordance with applicable regulations. The Environmental Manager coordinates all pollution control and remediation activities including monitoring, containment, control, countermeasures, clean-up, and disposal activities. ~~The Environmental Manager and the EC/ISC also have the authority to commit all necessary resources to carry out emergency response under this plan.~~

Other facility employees are designated as alternate EC~~/ICSs~~ and are qualified to act as EC in event the primary EC is unavailable. A (primary or alternate) ~~emergency coordinator (~~EC~~)~~ will be available or on call at all times. The facility personnel who are designated as ECs are listed in Table ~~II.E~~II.F-1~~3~~ (the Notification Action Summary sheet). The alternate ECs are called on ~~in the order listed~~ to act as the EC in the event of an emergency in the order listed in the table.

Table ~~II.E~~II.F-1~~3~~ also provides contact information ~~lists the names, addresses, and phone numbers (office and home) of~~for the ~~emergency coordinators~~ ECs and alternate ECs. Additional contact information for these parties (home addresses and phone numbers, *etc.*) are protected for security reasons. This information is maintained by the security department and human resources department and can be utilized to contact ECs and alternate ECs if necessary. Each of the ~~All of these~~ persons identified on Table ~~II.E~~II.F-1 are qualified by experience and training to act as ~~Emergency Coordinator~~the EC. All of these persons hold management positions at the facility, ~~and~~ have been trained to respond to emergencies dealing with hazardous waste management, and have extensive experience in the propellant manufacturing environment.

~~II.E~~II.F.4~~.0~~ IMPLEMENTATION

The Contingency Plan will be implemented whenever there is a fire, explosion, or release of hazardous waste or hazardous waste constituents~~, which~~ that could threaten human health or the environment. The EC will be responsible for evaluation of any situation to determine if the Contingency Plan will be implemented.

It shall be the duty of all facility personnel to follow the direction of the EC when the decision has been made to implement the Contingency Plan.

~~4.1 Implementation at the OB Ground~~

The person observing an emergency situation at the ~~OB Ground~~OBG will most likely be someone other than the EC. That person is to take the following actions to involve the EC as soon as possible:

1. Ensure his/her personal safety.

2. Telephone, radio, or otherwise notify the Security Dispatcher and the Foreman of any observed releases (e.g., spills, fires, or explosions) ~~at the OB Ground~~ and report: his/her name, location, and nature and extent of the release. All operators carry an intrinsically safe cellular phone and/or radio with them at all times. Unassigned radios ~~The alarms (radio and telephone)~~ are located on-site at the trailer and bunker (Figure ~~2~~II.F-3). The Security Dispatcher will immediately notify the EC.

3. Remain available to assist the EC with information about initial observations of the incident.

~~4. The EC will determine whether the Contingency Plan should be implemented.~~

In addition, the facility has installed and operates a mass notification system at the RFAAP. This system provides plant-wide notification of emergencies and signifies both emergent situations and all clear signals as they are available.

II.EII.F.5.0 RELEASE PREVENTION MEASURES AND CONTROL PROCEDURES

RFAAP has general facility-wide control procedures to minimize the potential for fires, explosions, and chemical releases as part of overall facility operations. Additional measures have been implemented at the OB GroundOBG to prevent and/or control the propagation of such incidents.

II.EII.F.5a5.1 RFAAP Control Procedures

The RFAAP is designed so that process, raw material storage and product storage facilities present a minimal threat of fire, explosion or material release. These process and storage operations are not subject to RCRA regulation. However, in the course of normal operation and maintenance, hazardous wastes are generated. Because safeguards exist for the non-RCRA regulated processing operations, this also protects against hazards once the waste is generated in the plant.

Procedures for operator response in the event of an emergency are dictated by standard protocols and are provided for fires, electrical storms, floods, and other unusual conditions. In addition, procedures are in place to help prevent routine operations from creating emergency situations. This include procedures that limit the time period in which highly reactive materials (*e.g.*, unstable Class 1.1 materials) must be burned, procedures that direct waste storage safety, powder van safety, and general housekeeping and cleaning.

All emergencies that result in activation of this Contingency Plan will be managed by the EC, with assistance from the onsite fire department and security services as necessary.

In the event of a The facility has provisions for response to fires, explosions or spills involving hazardous waste, as follows: Tthe EC will notify the on-site supervisor area foreman to direct personnel to contain, absorb, package, or redirect spilled materials as deemed necessary to protect human health or the environment. For this purpose, the plant maintains an adequate supply of hand and motorized tools and clean, empty containers for recovering waste propellants and other hazardous wastes.

The EC has the authority to direct, through the on-site plant fire chief, trained fire crews to contain and control fires and cool affected areas to prevent further spread of further hazard. This direction shall be coordinated through the onsite plant fire chief and the onsite fire department. Initial response for all out of control pan fires or other fires at the burning ground will be performed by the fire department, who is trained in managing fires from reactive materials. Personnel safety during these events is of utmost importance and the procedures therefore limit personnel entry into the fire zone unless absolutely necessary. If outside assistance becomes necessary, such assistance will be coordinated by the EC.

II.EII.F.5b.2 Prevention of Recurrence or Spread of Fires, Explosions or Releases

Numerous precautions are taken at the OB GroundOBG in order to reduce the likelihood that fires, explosions, and releases or other unsafe conditions occur. These precautions are incorporated into the standard operating procedures for the area and include procedures for responding to general response to fires at the OB GroundOBG. Area personnel are instructed via

this procedure to evacuate the area immediately to their assigned emergency assembly point and report the incident to the Fire Department. The assembly point for the OBG is the OBG office.

In addition to the fire response procedures, additional procedures are provided to help prevent fires and unsafe conditions from occurring. The primary mechanism for prevention of fires, explosions, and/or releases is the proper training of OBG personnel in energetic safety and area procedures. In addition, written procedures are provided that address the safe management of moving the waste from storage to the OBG and special instructions for the burning of specific propellants that may be more likely to cause fires or other emergency situations (*e.g*, Class 1.1 materials).

Physical safeguards for fires, explosions and/or accidental releases are also provided by the design and layout of the OBG itself. As shown in Figure II.F-7, the actual burning ground pans are located in areas free of vegetation. The pads on which each pan is located is kept free of combustible materials and vegetation and the pads are elevated from the nearby ground. The area immediately surrounding the pads is also kept free of vegetation, limiting the chance of vegetation igniting due to unplanned material ejection. Trees are kept trimmed, and the grass is mowed as required.

Should there be a fire, explosion, or release of hazardous materials at the ~~OB Ground~~OBG, the EC and other environmental and operational personnel will review the incident after response and clean-up activities are completed. Based on this review, the cause will be determined, if possible, facility operating procedures or design will be revised as necessary, and other corrective actions will be taken in order to help prevent a reoccurrence. The Contingency Plan will also be revised as necessary ~~in order~~ to improve facility response to future incidents.

II.EII.F.6.0 EMERGENCY RESPONSE PROCEDURES

This section outlines procedures to be followed during an emergency. Information on the EC responsibilities, the required notifications, control cleanup, and mitigation procedures is presented. situation including the following information:

- The responsibilities of the EC;
- Notification procedures for facility personnel and regulatory agencies; and
- Various procedures for responding to and controlling an emergency situation.

II.EII.F.6a.1 Emergency Coordinator's Responsibilities

When the decision has been made to implement the Contingency Plan, the ECEmergency Coordinator's responsibilities will include, but will not be limited to, the following:

1. Identifying hazardous materials and assessing hazards;
2. Accounting of for facility personnel;
23. Implementingation of internal notifications;
34. Coordinationng of first-aid activities;
45. Activation Activating of the Evacuation Plan, if required; and
56. Notification Notifying of appropriate State and local authorities (coordinated notification requirements with the Environmental Department);
7. Coordinating the storage, treatment, and disposal of released material; and
8. Providing post-emergency management.

II.EII.F.6b.2 Notifications

Procedures for the notification of RFAAP personnel and appropriate federal, state and local agencies are included in this section. The Notification Action Summary is provided in Table II.EII.F-13 of this Contingency Plan. Should the EC be offsite at the time of the emergency, these notifications shall be made by the designated alternate EC or another onsite designee.

i)6.2.1 Internal RFAAP Notifications

Internal communication systems (telephone, or two-way radios, or the plant alarm system) will be used to notify RFAAP personnel. The appropriate notifications will be made, the necessary alarms will be activated, and the EC will be notified in an effort to implement the Contingency Plan as outlined in Section II.EII.F-4.0.

ii)~~6.2.2~~ Notification of Federal, State, and Local Agencies

Commented [RFAAP4]: Modifications were made to this section to address RCRA concerns only. Other notification requirements outside those in the RCRA regulations have been removed.

The Environmental Manager (or a designated alternate) will notify appropriate state and ~~l~~local agencies as outlined in this plan and as listed below.

~~***Release Greater Than Reportable Quantity:*** State and federal regulations require immediate notification whenever there is a release of a hazardous substance greater than a reportable quantity as listed in 40 CFR 302.4. The list on the following page are the substances that are at RFAAP that have an RQ. Not all of the substances listed are at the open burning ground but are on site.~~ In the event that a release occurs that could threaten human health or the environment outside the facility, the EC shall report his/her findings as follows pursuant to 40 CFR 264.56(d). Accordingly, the EC shall notify:

- The National Response Center at (800) 424-8802;
- The Virginia Department of Environmental Quality at (540) 562-6814 or (540) 562-6700;

~~**CHEMICALS AND SUBSTANCES**~~			
~~CHEMICAL~~	~~**Reportable Quantity (lbs.)**~~	~~**Chemical**~~	~~**Reportable Quantity (lbs.)**~~
~~Acetone~~	~~5,000 lbs (755 gal)~~	~~**Nitric acid (any percentage)**~~	~~**1,000 lbs (80 gal @ 100% conc.)**~~
~~**Ammonia (anhydrous)**~~	~~**100 lbs**~~	~~Nitroglycerin (NG)~~	~~10 lbs (<1 gal)~~
~~**Chlorine**~~	~~**10 lbs**~~	~~Petroleum products (oils, fuels, used or waste products)~~	~~150 lbs (25 gallons to land)~~
~~Dibutyl phthalate (DBP)~~	~~10 lbs (1 gal)~~	~~Petroleum products (oils, fuels, used or waste products)~~	~~Visible sheen on outfall or river~~
~~Diethyl phthalate (DEP)~~	~~1,000 lbs (100 gal)~~	~~Phosphoric acid~~	~~5,000 lbs (329 gal @100% conc.)~~
~~Ethyl ether~~	~~100 lbs (17 gal)~~	~~Sodium hydrosulfide~~	~~5,000 lbs~~
~~2,4-dinitrotoluene (DNT)~~	~~10 lbs~~	~~Sodium hydroxide (any solution)~~	~~1,000 lbs (100 gal @20% caustic)~~
~~Lead~~	~~10 lbs~~	~~**Sulfur dioxide**~~	~~**500 lbs**~~
~~Mercury~~	~~1 lb (1.3 ounces)~~	~~**Sulfuric acid (any percentage)**~~	~~**1,000 lbs (66 gal @ 100% conc.)**~~
~~**Mixed acids (any percentage)**~~	~~**1,000 lbs (80 gal)**~~	~~Toluene~~	~~1,000 lbs (138 gal)~~
~~OTHER HAZARDOUS SUBSTANCES, WASTES, OR AIR EMISSIONS~~			
~~Sludge from Bioplant~~	~~10 lbs~~	~~Wastewater with a pH of ≤ 2.0 or pH ≥ 12.5~~	~~100 lbs (12 gal)~~
~~Sludge from NG Pre-Treatment Plants~~	~~10 lbs~~	~~DNT Contaminated Wastewater~~	~~225 lbs (27 gallons)~~
~~Waste propellant~~	~~100 lbs~~	~~Visible air emissions for > 1 hour~~	~~—~~
~~Ash from Propellant and Contaminated Waste Burning Grounds and Incinerator~~	~~10 lbs~~	~~Any other material identified as hazardous waste~~	~~—~~

~~Note: Chemicals in bold print are "OSHA Extremely Hazardous Substances" and require special consideration of health effects in emergency response efforts.~~

1. The National Response Center (800-424-8802) must be notified of any release greater than a reportable quantity in accordance with Section 103 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and as listed in 40 CFR Part 302.

2. The Director of the Virginia Department of Environmental Quality must be notified within 24 hours of any release of hazardous waste in a quantity greater than the Reportable Quantity.

Release That Threatens Off-Site Impacts: Pursuant to 40 CFR 264.56(d), ifIn the event that a release occurs that could threaten human health or the environment outside the facility, the Emergency Coordinator determines that the facility has had a release, fire, or explosion, which could threaten human health or the environment outside the facility, hethe EC shall report his/her findings as follows pursuant to 40 CFR 264.56(d). Accordingly,:

1. If his assessment indicates that evacuation of local areas may be advisable, he shall immediately notify appropriate local authorities. He shall be available to help appropriate officials decide whether local areas should be evacuated; and

2. He shall immediately notify the local government official designated as the on-scene coordinator for that area, and the State Emergency Response Team of the Virginia Department of Emergency Management at 800/468-8892.

3. the EC shall notify:
The National Response Center at (800) 424-8802;
The Virginia Department of Environmental Quality at (540) 562-6814 or (540) 562-6700;
- The local emergency planning committee offices as follows:
  - The Montgomery Country Local Emergency Planning Committee at (540) 382-2951 if the emergency is within Montgomery County; or
  - The Pulaski County Emergency Management Coordinator at (540) 980-7705 if the emergency is within Pulaski County.

This report will include the following information pursuant to 40 CFR 264.56(d)(2):

- The name and telephone number of the reporter;
- The name and address of the facility;
- The time and type of incident (*e.g.*, release, fire);
- The name and quantity of material(s) involved, to the extent known;
- The extent of injuries, if any; and
- The possible hazards to human health, or the environment, outside the facility.

Additionally, as required by 40 CFR 264.56(d)(1), if the EC determines that an evacuation of local areas may be advisable, he/she shall immediately notify appropriate local authorities. The EC shall be available to help appropriate officials decide whether local areas should be evacuated.

In addition to these required notifications, RFAAP will note in the operating record the time, date, and details of any incident that requires implementing the Contingency Plan. Within

15 days after the incident, RFAAP will submit a written report on the incident to the Regional Administrator pursuant to 40 CFR 256(h)(2)(i). This report will include:

- The name, address, and telephone number of the owner and operator;
- The name, address, and telephone number of the facility;
- The date, time, and type of incident (*e.g.*, fire, explosion);
- The name and quantity of material(s) involved;
- The extent of injuries, if any;
- An assessment of actual or potential hazards to human health or the environment, where this is applicable; and
- The estimated quantity and disposition of recovered material that resulted from the incident.

~~A release that poses an immediate or imminent threat to public health and requires notification of the National Response Center must also be reported to the Department of Environmental Quality, Department of Emergency Management, and the Local Emergency Planning Committee's Office.~~

~~In the event that an emergency situation occurs that requires notification of outside agencies, the following information shall be reported:~~

~~1. Name and telephone number of notifier;~~
~~2. Name and address of facility;~~
~~3. Date, T~~time ~~and type of incident;~~
~~4. Name and quantity of material(s) involved to the extent known;~~
~~5. The extent of injuries, if any; and~~
~~6. The possible hazards to human health or the environment outside the facility.~~

~~II.E~~II.F.6c~~.3~~ Emergency Equipment Available

The emergency equipment available and "on-call" for use at the unit ~~is listed in MOP 4-27-2. This MOP list, and information obtained from the safety manager and the fire chief at RFAAP,~~ is summarized in Table ~~II.E~~II.F-2~~6~~ and Figure ~~II.E~~II.F-4~~3~~. The numbers (1-12) in Table ~~II.E~~II.F-2~~6~~ indicate the different physical locations and Figure ~~II.E~~II.F-4~~3~~ shows these locations within the facility.

In addition to the equipment listed in Table ~~6II.E~~II.F-2, other fire, personnel protection, and cleaning equipment is available as follows. Fire protection equipment includes portable fire extinguishers, a mobile carbon dioxide extinguishing system, and fire hydrants near the hazardous waste facilities and at various locations within the plant. Additional spill cleanup equipment is located in the Roads and Grounds Building (Building 7217).

~~II.E~~II.F.6~~.4~~d Containment, Countermeasures, Clean-Up and Disposal

General response measures that will be implemented during an emergency situation at the ~~OG Ground~~OBG are presented below.

1. ***Ensure Personal Safety, Sound Alarm and Notify Emergency Coordinator*:** Upon identification of a fire, explosion, or other release personnel shall en~~u~~sure

their personal safety and then activate the alarm system and notify the EC. The alarm system consists of radio and telephone. Both forms of alarm are accessible at the ~~OB Ground~~OBG. The alarms will be used to contact the Security Dispatcher, which is staffed 24 hours a day, 7 days a week.

2. ***Evacuation*:** Personnel will evacuate the area as outlined in the Evacuation Plan in Section ~~II.E~~II.F-8~~.0~~ and as directed by the EC.

3. ***Identify the Material(s) Involved*:** The specific identification of wastes will be determined from the internal manifest forms, which identify the materials that are sent to ~~the Incinerator and to~~ the ~~OB Ground~~OBG. Copies of the manifests are carried in the transport vehicles carrying the waste. Upon delivery to the treatment facility, the manifests are transferred from the transport vehicles and kept at the ~~Incinerator Control Room or at the OB Ground~~OBG Trailer~~, depending on the waste destination. In addition, copies of the manifests are kept at the operational office for each accumulation area from which the waste is generated.~~

~~Each waste transport vehicle also utilizes a hazard classification placard system to allow firefighting forces to quickly and easily determine the methods by which any emergency situations involving the waste materials should be handled. A description of the hazard classification placard system is included in Appendix B.~~

4. ***Assessment*:** Upon arrival at the scene the EC (or the designated alternate) will take control of the affected area including all resources necessary to deal with the emergency. The EC will maintain this authority and control until the emergency has been eliminated and cleanup is complete.

After taking control of the affected area, the EC will determine the source, extent and nature of the involved hazardous waste and assess any primary and secondary hazards. Waste generation, source and analytical data are to be used to make this determination. These records shall be kept on-site. The evaluation criteria used ~~by the EC~~ to determine if the Contingency Plan is to be implemented are presented in Table ~~II.E~~II.F-3~~4~~. A logic diagram representing the evaluation process is shown as Figure ~~II.E~~II.F-5~~4~~.

5. ***Alert Local Authorities for Assistance*:** Should the situation require resources beyond those available at the RFAAP, local fire, police, and/or medical support will be requested as described in Section ~~II.E~~II.F-7~~.0~~.

6. ***Implement Spill Response Measures*:** Spill response measures will be implemented as outlined in Table ~~II.E~~II.F-4~~5~~ using spill response equipment available at the facility as listed in Table ~~6~~ ~~II.E~~II.F-2 and materials provided by supporting communities as needed. Response measures include evaluation of safety issues, containment of the release, regulatory notifications, waste treatment, and monitoring. Response measure will be performed by the RFAAP Fire Department and Emergency Response Team under the direction of the EC with assistance from other local agencies as needed.

7. ***Storage Accumulation Storage* and Treatment of Released Material:** If a spill or leak occurs in the grinder building, the released material (an aqueous waste propellant slurry) will be contained in the secondary containment system. The slurry will drain to a sump from which it is pumped to the catch tank. If waste propellant slurry hazardous waste is released to the ground such as may occur due to a failure in the slurry feed line, applicable spill response measures outlined in Table II.EII.F-45 will be followed. Recovered energetic waste propellant will be treated at the open burning groundOBG, if appropriate.

Ash from fires will be treated similar to incinerator ash. The ash will be analyzed for reactivity, TCLP toxicity, and other constituents as specified in the Waste Analysis Plan in Attachment II.B of this Permit. If the ash fails for either or both characteristics, or is a listed hazardous waste, it will be taken to a RCRA permitted facility. If it does not failis not determined to be a hazardous waste, it will be disposed in an appropriately permitted solid waste landfill, if such disposal is in accordance with that permit.

As RFAAP has no permitted storage areas for hazardous waste containers (all hazardous waste storage is classified as < 90-day accumulation areas), no hazardous waste containers will be stored onsite past the 90-day accumulation period. The containerized waste will either be treated onsite as described above or packaged, labeled, and shipped for offsite disposal.

8. ***Incompatible Wastes*:** There are no wastes managed in the facility permitted area that are incompatible with the waste propellants (reactive waste)one another. Therefore, the danger of the mixing of incompatible wastes during cleanup procedures is very unlikely.

II.EII.F.6.5e Disposal of Miscellaneous Waste and Debris

Wastes generated as part of a response action will be collected and contained. Those materials that cannot be treated in the incinerator or the open burning area will be characterized and disposed of off-site in accordance with state and federal laws. Such wastes may include but is are not limited to the following:

- Personal protective equipment;
- Plastic sheeting used for decontamination or containment;
- Absorbent materials; and
- Soil and/or water.

II.EII.F.6.6f Post-Emergency Equipment Maintenance

Post-emergency provisions are designed to prevent recurrence, to clean up and dispose of residuals, to decontaminate equipment, and to provide for personnel debriefing.

The ~~Emergency Coordinator~~ EC will take all necessary steps to ensure that a secondary release, fire or explosion does not occur after the initial incident. Procedures that will be carried out in the affected area include:

1. Inspection for any leaks or cracks in pipes, valves, tanks, and incinerators;
2. Inspection for excess heat generation at the incident area; and
3. Isolation of residual waste materials.

All waste energetics ~~propellant~~ and other cleanup residues will be tested for RCRA characteristics and other parameters as necessary to meet waste profiling requirements. The material will then be transported to a RCRA permitted facility should ~~they~~ it be determined to be a hazardous waste. If the residues are determined to be non-hazardous, they will be disposed in a permitted solid waste landfill.

All equipment used during the cleanup will be decontaminated on-site and readied for future use. Site personnel will remove and properly dispose of contaminated clothing as necessary. Fire extinguishers will be recharged, personnel protective equipment will be replaced and tools will be restocked. Before operations are resumed, all safety equipment will be inspected.

~~II.E~~II.F.7~~.0~~ COORDINATION AGREEMENTS

Mutual assistance agreements have been made with the ~~following~~ communities identified in Table 1 of Appendix ~~II.E~~II.F-1.~~: Dublin, Fairlawn, Radford, Christiansburg, Riner, Longshop/McCoy, and Blacksburg located near the facility.~~ Copies of the Mutual Assistance Agreements and Supplemental Agreements are ~~included in Appendix C~~maintained onsite in the facility operating record. These mutual assistance agreements pertain to the local fire departments. Furthermore, there is close cooperation between local ~~county~~ law enforcement officials and ~~-~~RFAAP Security personnel for traffic control in the plant area if a significant disaster should occur.

Facility staff will contact selected local and regional entities and authorities that may be involved in an emergency situation according to the anticipated needs at the plant. Personnel from these organizations may be asked to support RFAAP personnel in response to fires, explosions, or chemical releases if RFAAP personnel cannot adequately address the situation internally. Personnel from these agencies will act under the direction of the EC and will be directed and escorted by plant personnel.

Arrangements with local hospitals have also been made through ~~verbal~~ agreements between RFAAP and surrounding medical facilities. Table 2 in Appendix ~~II.E~~II.F-1 identifies those agreements that are in places. Copies of these agreements are maintained onsite in the facility operating record. ~~Immediate support is available at New River Valley Medical Center (15 minutes traveling time) and the Montgomery County Community Hospital in Blacksburg (12 minutes traveling time). Helicopter service is available upon request from the New River Valley Medical Center.~~ In addition, the RFAAP medical staff ~~nurses are~~ is familiar with the properties of the hazardous wastes handled at the facility and the types of injuries or illnesses ~~which~~ that could result from fires, explosions or releases at the facility, and ~~. There is a reference book, Medical Directives for Occupational Health Nurses, for the local nurses to follow in addition to their experience in anticipation of the RFAAP doctor's arrival or aid from a local hospital. To supplement the aforementioned resources,~~ RFAAP firemen are state-certified emergency medical technicians.

Due to RFAAP's in-house fire department, medical staff, and security force, and the unique wastes to be dealt with, the facility EC will act as the primary authority during emergency situations. RFAAP security personnel are responsible for escorting local fire department and emergency response teams to any emergency site within the plant. Emergency units from ~~off-plant~~offsite will not be allowed to respond inside RFAAP without an escort. For incidents in the horseshoe area, units from Dublin, Fairlawn, Blacksburg, Riner, Longshop/McCoy, or Radford ~~will~~ may be asked to assemble at Gate 10 or the main gate on Route 114. For incidents in the Main Plant Area and larger incidents in the ~~horseshoe~~ Horseshoe ~~area~~Area, units from Radford, Christiansburg and Blacksburg may ~~will~~ be asked to assemble at the Main Gate on Route 114. Entry to the manufacturing area will usually be through Gate 1.

II.EII.F.8.0 EVACUATION PLANS

8.1 OB Ground Evacuation Plan

The OB GroundOBG is located in the southeast section of the Horseshoe Area on the northern bank of the New River. This area is an isolated location as shown on Figure II.EII.F-1. The New River acts as a protective barrier on the southern exposure of this area. Approximately 75 to 100 feet north of the OB GroundOBG, the ground surface slopes steeply upward, with an elevation change of approximately 50 to 100 feet. Thus, if an emergency situation should develop at this area, evacuation of the entire facility is not likely to be necessary. The OB GroundOBG operating personnel should be the only persons immediately endangered during an emergency situation at the facilityOB GroundOBG.

Evacuation of any personnel in the immediate area of the OB GroundOBG will occur in the event of the fires or explosions. Two signals are used to notify area personnel. The loud voice system is activated first followed by the system that sends out phone calls, text and emails. The area supervision immediately receives the notification(s) and contacts the OBG area to take corrective action as directed depending on the emergency situation. Should the operating personnel encounter an unusual condition, the operation shall be stopped immediately and supervision notified for corrective action. The evacuation routes from the OB GroundOBG are shown in Figure II.EII.F-56.

II.EII.F.9.0 REQUIRED REPORTS

Reporting requirements for emergency situations to regulatory agencies and to the U.S. Army are presented in this section.

9.1 Incident Reports

Pursuant to 9 VAC 20-60-264; 40 CFR 264.56(ii), the time, date, and details of any incident, which that requires implementation of the Contingency Plan, will be noted in the facility operating record. In addition, within 15 days after the incident, a written report will be submitted to the Director of the Virginia Department of Environmental Quality. The report will include:

1. Name, address and telephone number of the owner or operator;
2. Name, address and telephone number of the facility;
3. Date, time and type of incident;
4. Name and quantity of material(s) involved;
5. The extent of injuries, if any;
6. An assessment of actual or potential hazards to human health or the environment, where this is applicable;
7. Estimated quantity and disposition of recovered material that resulted from the incident; and,
8. Such other information specifically requested by the Director, which that is reasonably necessary and relevant to the purpose of an operating record.

Pursuant to 9 VAC 20-60-264; 40 CFR 264.196 (d), for any tank system or secondary containment, any release to the environment, except as provided in item 1 below, will be reported to the Department within 24 hours of its detection. If the release has been reported pursuant to 40 CFR Part 302 (see Section 6.2 of this Contingency Plan), that report will satisfy this requirement.

1. A leak or spill of hazardous waste is exempted from the reporting requirements of section Section II.EII.F-9.0 of this Contingency Plan, if it is:

   a. Less than or equal to a quantity of one pound, and
   b. Immediately contained and clean-up.

2. Within 30 days of detection of a release to the environment, a report containing the following information shall be submitted to the Department:

   a. Likely route of migration of the release;
   b. Characteristics of the surrounding soil (soil composition, geology, hydrogeology, climate);
   c. Results of any monitoring or sampling conducted in connection with the release (if available). If sampling or monitoring data relating to the release are not available within 30 days, this data shall be submitted to the Department as soon as they become available;

~~d. Proximity to downgradient drinking water, surface water, and populated areas; and~~

~~e. Description of response actions taken or planned.~~

~~9.2 U.S. Army Material Command Notification~~

~~RFAAP also follows U.S. Army Joint Munitions Command at Rock Island Arsenal notification procedures. If a release occurs, a report similar to the one required by Federal and State agencies is submitted to the U.S. Army Material Command. The reported information required by 40 CFR 264.56(j) and delineated above shall also be incorporated into the facility's permanent operating record.~~

~~RFAAP will notify the Director and other appropriate Commonwealth and local authorities that:~~

~~1. Cleanup procedures have been completed; and~~

~~2. All emergency equipment listed in the Contingency Plan is cleaned and fit for its intended use prior to resuming operations in the affected area(s) of the facility.~~

II.EII.F.10.0 MODIFICATION OF PLAN

Pursuant to 9 VAC 20-60-264; 40 CFR 264.54, this Contingency Plan is subject to review and amendment, if:

- a. The plan fails in an emergency;
- b. The facility permit is revised;
- c. The facility changes in design, construction, operation, maintenance, or other circumstances; in a way that materially increases the potential for fires, explosions, or releases of hazardous waste constituents; or changes alters the response necessary in any emergency response;
- d. The list of emergency coordinators changes; or
- e. The list of emergency equipment changes.

When the contingency plan is amended for any reason the Permittees will request a permit modification pursuant to 40 CFR 270.42.

FIGURES

Remove this page and insert the following:

Figure ~~II.E~~II.F-1 - Location of the RFAAP
Figure ~~II.E~~II.F-2 - ~~Area~~ Layout of Burning Ground Structures~~Map~~
Figure ~~II.E~~II.F-3 - Location of ~~OBG Structures~~Communication Equipment
Figure ~~II.E~~II.F-4 - Emergency Equipment Locations
Figure ~~II.E~~II.F-5 - Contingency Plan Implementation Logic Diagram
Figure ~~II.E~~II.F-6 - Area Evacuation Routes

~~**Insert Figures 1, 4, 5, 6, 8**~~ ~~from 12 Jan 01 submittal~~

Figure II.F-7. Open Burning Ground Aerial View (October 2006)

TABLES

Commented [RFAAP5]: Many of the changes shown in the following tables were made to be consistent with the post-closure care permit and the EWI permit application

~~TABLE 1~~
~~EMERGENCY PROCEDURES~~

~~RFAAP Disaster Control Plan (RFAAP-DCP) provides plans for:~~

~~1) Equipment and/or facility damage~~
~~2) Oil and hazardous substance control~~
~~3) Chemical, nuclear or radiological accidents~~
~~4) Emergency situation reporting~~
~~5) Search and rescue operations~~
~~6) Crisis emergency/relocation plan~~
~~7) Communications-electronics~~

~~Spill Prevention, Control and Countermeasure (SPCC) Plan and Installation Spill Contingency Plan (ISCP) for spills other than hazardous waste described in the Part B permit.~~

~~SPCC provides:~~

~~1) The location and capacity of tanks containing process materials and wastes~~
~~2) A description of equipment and/or operation~~
~~3) Spill potential information (types of failure, description of flow, maximum loss anticipated, detection methods, time to reach river)~~

~~ISCP is concerned with the recognition, reporting, containment and notification procedures in the event of leaks and spills.~~

~~Fire Prevention and Protection Program Describes:~~

~~1) Employee and Fire Department personnel responsibilities for fire prevention and protection~~
~~2) Inspection and use of equipment and supplies~~
~~3) Fire Department training program~~
~~4) Building evacuation procedures~~
~~5) Annual Fire Prevention and Protection Program~~
~~6) Prefire plan and other fire plans~~

~~RFAAP Hazardous Material Emergency Response Plan provides:~~

~~1) Emergency response notification requirements~~
~~2) Training requirements~~
~~3) Medical surveillance~~
~~4) HAZCOM MSDS information~~
~~5) List of hazardous materials at RFAAP~~
~~6) PPE selection criteria~~
~~7) Available material and equipment~~

~~8) Emergency response procedure~~
~~9) Incident command structure and response~~
~~10) Emergency response guidelines (per chemical basis)~~

~~**TABLE 1**~~
~~**EMERGENCY PROCEDURES (Continued)**~~

~~**Oil Discharge Contingency Plan provides:**~~

~~**1) Regulated petroleum tank information**~~
~~**2) Emergency notification requirements**~~
~~**3) Worst case discharge information**~~
~~**4) Disaster plan strategies**~~
~~**5) I.D. of natural responses at risk or facilities**~~
~~**6) Oil discharge drills**~~
~~**7) Facility staffing, equipment and material levels and inventories**~~
~~**8) Training requirements**~~
~~**9) Inspection procedures**~~
~~**10) Facility security**~~

~~**Plant Protection Plan (PPP)**~~

~~**Outlines plant protection/security procedures including the security of explosives, intrusion detection systems, protective communications and key and lock control.**~~

~~**Procedures**~~

~~**4-27-2:Maintenance Responsibilities During Disaster and Major Emergencies**~~

~~**Applicable Plant Operating Procedure: Protective Clothing and Equipment**~~

~~**Attachment II.H of this Permit: Flood Proofing/Protection Plans and Specifications and 100-Year Response Procedures**~~

~~**4-15-53: Clean-up and Decontamination of NG/Nitrate Ester and Other Hazardous Spills**~~

~~**4-3-2: Area General Waste Propellant Incinerator Facility**~~

~~TABLE 2~~
~~WASTE GROUPS BURNED AT OB GROUNDS~~
~~Radford Army Ammunition Plant~~

~~Group No.~~	~~Description~~	~~Defining Characteristics~~
~~1~~	~~Miscellaneous Waste~~	~~Ignitable and reactive Liquids and Sawdust D001, D003~~
~~2~~	~~Miscellaneous Waste~~	~~Propellant Laboratory Waste D003, D008, D030, D004~~
~~3~~	~~Miscellaneous Waste~~	~~Pit Cotton (Waste Nitocellulose) Solid Waste~~
~~4~~	~~Miscellaneous Waste~~	~~Off specification Dinitrotoluene D030~~
~~5~~	~~Liquid Waste (Not at OBG)~~	~~Water Containing Triethlyene Glycol Solid Waste~~
~~6~~	~~Liquid Waste (Not at OBG)~~	~~Water Containing Diethylene Glycol Solid Waste~~
~~7~~	~~Single Base Propellants~~	~~Propellant with Nitrocellulose and Lead D003, D008~~
~~8~~	~~Single Base Propellants~~	~~Propellant with Nitrocellulose D003~~
~~9~~	~~Single Base Propellants~~	~~Propellant with Nitrocellulose and Dinitrotoluene D003, D030~~
~~10~~	~~Double Base Propellants~~	~~Propellant with Nitrocellulose and Nitrate Esters D003~~
~~11~~	~~Double Base Propellants~~	~~Propellant with Nitrocellulose, Nitrate Esters and Perchlorate salts D003~~
~~12~~	~~Double Base Propellants~~	~~Propellant with Nitrocellulose, Nitrate Esters and Lead, D003, D008~~
~~13~~	~~Double base Propellants~~	~~Propellant with Nitrocellulose, Nitrate Esters and Solid Explosives D003~~
~~14~~	~~Triple base Propellants~~	~~Propellant with Nitrocellulose, Nitrate Esters and Nitroguanidine D003~~
~~15~~	~~Load, Assemble, & Pack Waste~~	~~Energetic materials from manufacturing cartridges D003~~
~~16~~	~~Single Base Propellants~~	~~Propellant with Nitrocellulose, Dinitrotoluene and Lead~~

		~~D003, D008~~
~~17~~	~~Specialty Products Waste~~	~~Propellant with Nitrocellulose, Nitrate Esters, Nitroguanidine, Solid Explosives, or Appendix 3.6 Constituents D003~~
~~18~~	~~Specialty Products Waste~~	~~Propellant with Nitrocellulose, Nitrate Esters, Nitroguanidine, Solid Explosives, and Appendix 3.6 Constituents, Chlorides or Perchlorates D003~~
~~19~~	~~Specialty Products Waste~~	~~Propellant with Nitrocellulose, Nitrate Esters, Nitroguanidine, Solid Explosives, and Appendix 3.6 Constituents or Metals D003, D004-D010~~

TABLE ~~II.E~~II.F-1~~3~~
NOTIFICATION ACTION SUMMARY

ON-SITE ~~NOTIFICATION~~Emergency Coordinators:

Contacts to be made include:

Emergency Coordinator	Office Phone	Home Phone	Home Address
Plant Security	540-639-7323	NA	NA
Plant Fire	Ext 16	NA	NA
Environmental Emergency On-Call Representative **(Primary EC)**	540-230-8970	NA	NA
Safety On-Call Representative **(Alternate EC)**	540-505-8585	NA	NA
Environmental Manager – **(Alternate EC)**	Security will Contact~~Ext 8658 Cell 540-257-3752~~ [1]	Available if necessary from security and human resources [1]	
Environmental Lead Engineer – Hazardous Waste **(Alternate EC)**	Security will Contact [1]~~Ext 7668 Pager 540-953-6781~~	Available if necessary from security and human resources [1]	
Safety Manager **Alternate EC)**	Security will Contact [1]~~Ext 8781 Cell 540-239-6562~~	Available if necessary from security and human resources [1]	

[1] ~~Names and addresses of personnel identified in the table above are protected for security reasons, as required by company policy and site National security measures. This information is maintained onsite by the security and human resource departments and readily available onsite if initial attempts to contact personnel via the on-call numbers listed above are unsuccessful or additional personnel are required.~~ In order to enhance the protection of defense services and defense articles and protect the unauthorized export of defense information under the International Traffic in Arms Regulations (ITAR), promulgated in Title 22 Code of Federal Regulations (CFR) Parts 120 through 130, the actual contact information of individual persons or contractors in the employ of RFAAP have been withheld from this Permit. This information is readily available for review and inspection at the facility upon request. The relevant data is also readily available to plant security and supervision to respond to an emergency.

ON-SITE Notifications

In addition to the notifications listed above, the EC or a designated representative should provide notification of all major emergencies to the environmental and operations management team.

OFF-SITE Notifications

To be made by the Environmental Manager or a designated representative as needed:

1. Virginia Department of Environmental Quality Blue Ridge Regional Office (540) 562-6700
2. National Response Center (for releases above an RQ) (800) 424-8802
3. Virginia Department of Emergency Management (800) 468-8892
4. Montgomery County Local Emergency Planning Committee (LEPC) (540) 382-2951
5. Pulaski County Local Emergency Planning Committee (LEPC) (540) 980-7705
6. Emergency Service Resources (Fire, Ambulance, Police) 911
7. Chemtrec (800) 424-9300

~~Emergency Coordination~~	~~Office Phone #~~	~~Home Phone #~~	~~Home Address~~
~~Administrative Contracting Officer~~	~~540-639-8647~~		
~~J. M. Slaughter Safety Specialist~~	~~540-639-8731~~	~~540-980-4621~~	~~Rt. 1, Box 393 Pulaski, VA 24301~~
~~D. M. Hurley Safety Specialist~~	~~540-639-8313~~	~~540-382-3698~~	~~350 Pepper Street, Crestview #305G Christiansburg, VA 24073~~
~~P. K. McMillian Safety Specialist~~	~~540-639-8671~~	~~540-755-3577~~	~~Box 388 Cana, VA 24317~~
~~T. E. Lawley Security Manager~~	~~540-639-7119~~	~~540-552-7995~~	~~2804 Farmview Dr. Blacksburg, VA 24060~~
~~J. J. Redder Environmental Engineer~~	~~540-639-7536~~	~~540-951-3064~~	~~P. O. Box 10925 Blacksburg, VA 24060~~
~~C. A. Williams Hazard Analysis Supervisor~~	~~540-639-7225~~	~~540-726-2835~~	~~304 W. Westview Narrows, VA 24124~~
~~R. A. Bond Acid Area Manager~~	~~540-639-7393~~	~~540-639-7488~~	~~1234 Shady Grove Road Indian Valley, VA 24105-3047~~

~~**TABLE 3**~~
~~**NOTIFICATION ACTION SUMMARY (Continued)**~~

~~**OFF-SITE NOTIFICATION**~~

~~**To be made by the Environmental Supervisor or staff (or his designated representative).**~~

~~1. **Administrative Contracting Officer, RFAAP 540-639-8482 or 8611**~~

~~2. **Departmemt of Environmental Quality Water Division 540-562-6700 (days)**~~

~~3. **Department of Environmental Quality Waste Division 540-562-6700**~~

~~4. **National Response Center 1-800-424-8802**~~

~~5. **Virginia Department of Emergency Management (VDEM) 1-800-468-8892**~~

~~6. **U. S. Environmental Protection Agency 215-814-5000**~~

~~7. **CHEMTREC (if needed) 1-800-424-9300**~~

~~8. **Montgomery County Sheriff (Local Emergency Planning Committee) 540-382-2951**~~

~~9. **Blacksburg Fire Dept./Hospital Ambulance (if needed) Emergency 911**~~

~~10. **New River Valley Medical Center Ambulance Service (if needed) Emergency 911**~~

~~**12. Department of Environmental Quality Waste Division 540-562-6872 (Aziz Farahmand)**~~

~~TABLE 4~~
~~EVALUATION CRITERIA FOR IMPLEMENTATION OF CONTINGENCY PLAN~~

~~Fire and/or Explosion~~

- ~~Fires causes the release of toxic fumes~~

- ~~The fire could spread, thereby, possibly igniting materials in other locations on-site or off-site, or could cause heat-induced leaks or explosions~~

- ~~The use of fire suppressant could result in contaminated runoff~~

- ~~Explosion has or could:~~

~~Result in danger from flying fragments or shock waves~~

~~Ignite other hazardous waste at the facility~~

~~Release toxic materials~~

- ~~Fire or explosion endangers human health or the environment for any other reason~~

~~Spills or Material Releases~~

- ~~A spill could release toxic or explosive liquids, thus causing a fire or explosion hazard~~

- ~~A spill could result in off-site or on-site soil contamination and/or ground or surface water contamination~~

- ~~A spill constitutes a release of a "reportable quantity" of a hazardous substance under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)~~

- ~~A spill endangers human health or the environment for any other reason~~

~~**TABLE 5**~~
~~**SPILL RESPONSE MEASURES**~~

~~**The spill response program will be coordinated by the Emergency Coordinator. Guidelines are provided concerning safety, containment, evaluation, notification, treatment and monitoring as related to each spill incident.**~~

~~**1. Safety**~~

~~**a. Evaluate the hazard of the spilled chemical to personnel which may be involved in clean up, treatment and monitoring operations.**~~

~~**b. Assure proper clothing and protective equipment is available and used by personnel involved in the spill response.**~~

~~**2. Containment**~~

~~**a. Establish the expected flow path of the spilled material.**~~

~~**b. Locate the nearest proposed damming site.**~~

~~**c. Erect a dam – notify Roads and Grounds regarding construction of dam.**~~

~~**3. Evaluation of Spill Extent**~~

~~**a. Obtain pH meter readings at site if chemical spilled was an acid or base.**~~

~~**b. Confirm stoppage of leak at source.**~~

~~**4. Initial Notification**~~

~~**a. Delegated to the Emergency Coordinator**~~

~~**b. Notify appropriate agencies (see Notification Action Summary).**~~

~~**5. Treatment**~~

~~**a. Straw or other absorbent materials will be supplied to entrap hazardous wastes which are spilled. Sites/locations within the plant containing straw and other entrapment materials are controlled by Roads and Grounds.**~~

~~TABLE 5~~
~~SPILL RESPONSE MEASURES (Continued)~~

~~6. Monitoring Program~~

~~Upon receiving notification of an accidental loss to the industrial sewer or surface streams, personnel will obtain grab samples at intervals and from the points described by the Emergency Coordinator.~~

~~a. In-Plant Sites~~

~~1. Suggested sampling sites will be determined based on the location of the spill~~

~~2. Samples will be collected at intervals/.locations designated.~~

~~b. New River Sites~~

~~Sampling at the New River sites will be performed on a staggered basis since the river flow approximates one mile per hour. Sampling will be performed.~~

~~7. Final Treatment~~

~~a. Determine disposition of impounded material depending on type and quantity of spill. Ensure EPA and DEQ concur with disposition.~~

~~b. Provide monitoring for duration of disposition.~~

~~Explosion fragments and materials and possible propellant-contaminated materials and soils will be analyzed using SW846 Method 8332 for explosives and 8330 for nitroglycerine. If the analyses indicate that the materials are reactive, they will be handled as hazardous waste. Hazardous soils and residual reactive wastes will be treated at the OB Ground or sent off-site for disposal. If the analyses indicate that the materials are non-reactive, they will be disposed of as solid waste.~~

TABLE ~~II.E~~II.F-2~~6~~
EMERGENCY EQUIPMENT LOCATIONS AT RFAAP

Location No. on Figure 5	Location Description	Equipment Available
1	Bldg. 1034, Electric Shop	Raincoats, rubber gloves, respirators
2	Bldg. 1039	Self-contained breathing apparatus (2)
3	Roads and grounds	Respirators, goggles, air fed respirators, safety belts, shoe cleats, air compressors (250 and 700 CFM ratings), portable pumps (50, 100 and 700 GPM capacities), cranes, bulldozers, movers, graders, tow tractors, portable electric generators, backhoes, front-end loaders, portable tankers, absorbent pads, booms, cloths
5	Bldg. 1908	Absorbent material / booms
6	Bldg. 350, Fire Department	Ladder truck, engine, utility truck, brush truck, ATV's, command vehicle, and ambulance.
~~6~~	~~Bldg. 1999~~	~~Farm wagon with spill control materials~~
7	Bldg. ~~222~~350~~, Fire Department~~	HAZMAT trailer with response gear, special operations trailer, and 2boats.~~1 ladder truck, 1 engine, 1 utility truck, 1 tanker, 1 brush truck, 1 HAZMAT trailer with response gear, 3 boats with trailers~~
~~8~~	~~Bldg. 4018~~	~~Boats, motors, hoses, nozzles and other supply equipment~~

TABLE 6II.EII.F-2
EMERGENCY EQUIPMENT AT RFAAP (Continued)

9	Bldg. 201, Main Laboratory	nitroglycerine Nitroglycerine remover
10	Bldgs. 440 and 441 (incinerators)	Halon 1211 Model 1300 Hal, type ABC fire extinguishersFire extinguishers
11	Bldg. 442	Telephone access
12	Bldg. 4601-7	Telephone access and spill cleanup equipment

TABLE ~~II.E~~II.F-3
EVALUATION CRITERIA FOR IMPLEMENTATION OF THE CONTINGENCY PLAN

Commented [RFAAP6]: Modified to be consistent with the EWI application on post-closure care permit

In accordance with the Contingency Plan Implementation Logic Diagram (Figure ~~II.E~~II.F-5), the following are examples of when the contingency plan would need to be implemented:

For a fire and/or explosion:

- If the fire causes a release of toxic fumes that go off plant or impacts personnel
- If the fire could spread (is not contained), thereby possibly igniting materials in other locations on-site or off-site, or could cause heat induced leaks or explosions
- If the use of fire suppressant could result in contaminated runoff that cannot be contained.
- If an explosion has or could:
  - Result in damage from flying fragments or shock waves
  - Ignite other hazardous waste at the facility
  - Release toxic materials that could cause harm to human health or the environment or cannot be contained.
- Or if a fire or explosion endangers human health or the environment for any other reason.

For spills or material releases

- If a spill endangers human health or the environment.

TABLE ~~II.E~~II.F-4
SPILL RESPONSE MEASURES

Commented [RFAAP7]: Modified to be consistent with the EWI application on post-closure care permit

The spill response program will be coordinated by the Emergency Coordinator or designated representative. Guidelines are provided concerning safety, containment, evaluation, notification, treatment and monitoring as related to each spill incident.

1. Safety

    a. Evaluate the hazard of the spilled chemical to personnel that may be involved in containment, clean up, treatment and monitoring operations.

    b. Assure proper clothing and protective equipment is available and used by personnel involved in the spill response.

2. Containment

    a. Establish the expected flow path of the spilled material.

    b. Locate the nearest proposed damming site.

    c. Erect a dam –- notify Roads and Grounds regarding construction of dam.

3. Evaluation of Spill Extent

    a. Obtain pH readings at site if chemical spilled was an acid or base.

    b. Confirm stoppage of leak at source.

4. Initial Notification

    a. Delegated to the Emergency Coordinator

    b. Notify appropriate agencies (see Notification Action Summary)

5. Treatment

a. Straw or other absorbers will be supplied to entrap hazardous wastes that are spilled. Sites/locations within the plant containing straw and other entrapment materials are controlled by Roads and Grounds.

6. Monitor Program

Upon receiving notification of an accidental loss to the industrial sewer or surface streams, personnel will obtain grab samples at specified locations and time intervals as determined by the Emergency Coordinator.

a. In-Plant Sites

i. Suggested sampling sites will be determined based on the location of the spill

ii. Samples will be collected at internal locations as designated.

b. New River Site

i. Sampling at the New River site will be performed on a staggered basis since the river flow approximates one mile per hour. Sampling will be performed by the operator at Building 4330.

7. Final Treatment

a. Determine disposition of impounded material depending on type and quantity of spill. Ensure EPA and DEQ concur with disposition.

b. Provide monitoring for duration of disposition.

Explosion fragments and materials as well as contaminated soils will be decontaminated in either the decontamination oven or the decontamination incinerator on-site at ~~Radford AAP~~RFAAP provided they are not TCLP toxic or reactive. The decontaminated materials will then be disposed of in a permitted landfill or as decontaminated scrap.

~~Appendix A~~

~~Table of Contents~~
~~RFAAP Disaster Control Plan and~~
~~RFAAP Plant Protection Plan~~

~~RFAAP DISASTER CONTROL PLAN~~
~~TABLE OF CONTENTS~~

~~PAGE~~
~~Letter of Promulgation i~~
~~Distribution List ii~~
~~Title Page iii~~
~~Change Record iv~~
~~Table of Contents v~~
~~Basic Plan 1~~
~~Annex A (Definitions) A-1~~
~~**Annex B (Disaster Control Planning and Operations) B-1**~~
~~Appendix I (Actions to be Followed by the Affected Department) B-I-1~~
~~Tab A (Facsimile of Disaster Passes) B-I-A-1~~
~~Tab B (Facsimile of Disaster Resp. Cards) B-I-B-1~~
~~Tab C (Disaster Plan Form No. 1) B-I-C-1~~
~~Appendix II (Actions to be Followed by the Fire Department) B-II-1~~
~~Appendix III (Actions to be Followed by Security Police Department) B-III-1~~
~~Tab A (Disaster Check Sheet) B-III-A-1~~
~~Appendix IV (Actions to be Followed by Safety Department) B-IV-1~~
~~Appendix V (Actions to be Followed by Telephone Operator) B-V-1~~
~~Appendix VI (Actions to be Followed by Medical Department) B-VI-1~~
~~Tab A (Disaster Plan Form No. 2) B-VI-A-1~~
~~Appendix VII (Actions to be Followed by Security Department) B-VII-1~~
~~Tab A (Off-Plant Police Call List) B-VII-A-1~~
~~Tab B (Mutual Aid Call List) B-VII-B-1~~
~~Appendix VIII (Actions to be Followed by Industrial Relations Department) B-VIII-1~~
~~Tab A (Disaster Plan Form No. 3) B-VIII-A-1~~
~~Appendix IX (Actions to be Followed by Plant Maintenance Headquarters and AAC 446 Transportation Radio Dispatcher) B-IX-1~~
~~Appendix X (Actions to be Followed by Vice President and General Manager) B-X-1~~
~~Appendix XI (Actions to be Followed by the Commanding Officer) B-XI-1~~
~~Appendix XII (Actions to be Followed by the Public Affairs Officer) B-XII-1~~
~~Tab A (Standard Distribution for Press Releases) B-XII-A-1~~
~~Tab B (Extended Distribution for Press Releases) B-XII-B-1~~
~~Appendix XIII (Actions to be Followed by Main Power House Personnel, Bldg. 440) B-XIII-1~~
~~Annex C (Chemical and Accident and Incident Control) C-1~~
~~Annex D (Nuclear Accident/Incident Control) D-1~~
~~Annex E (Radiological Accident/Incident Control) E-1~~

~~Annex F (Financial Management) F-1~~
~~Annex G (Oil and Hazardous Substance Pollution Contingency Plan) G-1~~
~~Appendix I (Spill Prevention Control and Countermeasures Plan) G-I-1~~
~~Annex H (Reporting) H-1~~
~~Appendix I (Commander's Emergency Situation Report [EMREP])(RCS AMCPA-105) H-I-1~~
~~Annex I (Search and Rescue Operations) I-1~~
~~Annex J (References) J-1~~
~~Annex K Deleted~~
~~Annex L Deleted~~
~~Annex M (Crisis Emergency/Relocation Plan) M-1 & M-2~~
~~Annex N (Communications – Electronics) N-1 & N-2~~

~~Appendix B~~

~~Hazard Classification Placard System~~

~~Insert App. B —~~ ~~from 12 Jan 01 submittal~~

APPENDIX ~~C~~~~II.E~~II.F-1

~~EXAMPLE~~ MUTUAL ASSISTANCE AGREEMENTS

~~Insert App. C —~~ ~~from 12 Jan 01 submittal~~

TABLE 1
MUTUAL ASSISTANCE AGREEMENTS WITH LOCAL MUNICIPALITIES

ENTITY	DATE OF AGREEMENT	SERVICES INCLUDED
Twin Community Volunteer Fire Department	August 2, 2011	Firefighting equipment and personnel
City of Radford	July 11, 2011	Firefighting equipment and personnel
Fairlawn Volunteer Fire Company	July 11, 2011	Firefighting equipment and personnel
Riner Volunteer Fire Company	June 30, 2011	Firefighting equipment and personnel
Riner Volunteer Rescue Squad	June 30, 2011	Emergency medical services
Town of Dublin	November 18, 2010	Firefighting equipment and personnel
Pulaski County Board of Supervisors	January 22, 2007	FCC licensed radio frequencies for communication
Town of Christiansburg	October 4, 2006	Firefighting equipment and personnel
Community of Riner	August 31, 2006	Firefighting equipment and personnel
Federal Bureau of Investigation, Richmond Division	June 9, 2003	Law enforcement for major disruptions or special threats
Town of Blacksburg	October 8, 2002	Firefighting equipment and personnel
Town of Pulaski	2002	Firefighting equipment and personnel
Community of Long Shop/McCoy	September 10, 2002	Firefighting equipment and personnel
United States Army Research, Development, and Acquisition Information Services Activity	June 26, 1992	Force-Protection Support Responsibilities

Copies of each of the mutual aid agreements referenced above are maintained onsite and are readily available for inspection and review if requested.

TABLE 2
MUTUAL ASSISTANCE AGREEMENTS WITH LOCAL MEDICAL FACILITIES

ENTITY	DATE OF AGREEMENT	SERVICES INCLUDED
LewisGale Hospital Montgomery	August 18, 2011	Emergency medical services
Carilion New River Valley Medical Center	July 14, 2011	Emergency medical services
LewisGale Hospital Pulaski	July 7, 2011	Emergency medical services
Pulaski Community Hospital	September 14, 2010	Emergency medical services

ATTACHMENT II.I

100-YEAR FLOODPLAIN PROTECTION PLAN

Commented [RFAAP1]: Suggested revisions added June 2015 as part of the RCRA permit renewal application for the RFAAP open burning ground

Commented [RFAAP2]: Revised this plan to mimic changes made to the EWI flood plan and to reflect the addition of stormwater management improvements that were made after permit issuance.

ATTACHMENT II.I – 100-YEAR FLOODPLAIN PROTECTION PLAN

II.I.1. Floodplain Standard

The ~~OB Ground~~open burning ground (OBG) is located within the 100-year floodplain. Figure II.I-1 provides a depiction of the 100-year floodplain elevations relative to the OBG. The source of data for this determination is the National Flood Insurance Program, Flood Insurance Rate Map, ~~Community Panel Number 510099 0025 A, October 17, 1978~~dated November 7, 2011.

Pursuant to 40 CFR § 264.18, any facility located within a 100-year ~~As the facility is within the 100-year~~ floodplain~~,~~ must be designed, constructed, operated, and maintained to prevent washout of waste by a 100-year flood unless ~~a major consideration in the design of this program was to comply with the requirements set forth in 40 CFR 264.18 (b) pertaining to floodplains, as follows:~~

~~*Floodplains*. (1) A facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout or any hazardous waste by a 100-year flood, *unless*~~ the owner or operator can demonstrate to the Regional Administrator's satisfaction that~~:~~:

(i) ~~For Waste:~~ Procedures are in effect ~~which~~ that will ~~cause~~ permit the waste to be removed safely~~, before flood waters can reach the facility,~~ to a location where the wastes will not be vulnerable to flood waters before flood waters can reach the facility;

(ii) ~~For Soil: The analysis of soil samples and subsequent provisions for remediation will, in effect, serve as the procedures which will cause the contaminated soil to be removed safely, before flood waters can reach the facility, to a location where the wastes will not be vulnerable to flood waters.~~No adverse effects on human health or the environment will result if washout does occur.

These requirements are satisfied through a combination of measures, including administrative practices that are contained in the facility-wide flood protection plan and OBG-specific flood response procedures, and engineering controls that are reflected in the OBG stormwater management design. In addition, soil monitoring is conducted in accordance with the procedures described in Section II.I.4 and the Soil Monitoring Program in Attachment II.C to ensure that no adverse impacts have occurred in the area surrounding the OBG due to flooding or other events.

II.I.2 Facility-Wide Flood Protection Measures

Commented [RFAAP3]: Expanded this discussion to include information on flood protection measures that are in place for the entire facility and that help demonstrate compliance with the above requirements

RFAAP has instituted a facility-wide flood protection plan to ensure protection of facility operations and managed materials in the event that flooding conditions are expected. The Flood Plan for RFAAP is located in Management Manual No. 2-1.9, titled "Flood Watch" (or current update). The procedure discusses safety precautions, flood watch procedures, reporting, flood levels and buildings affected by high waters.

Utilities personnel are responsible for monitoring the river elevations at the River Bridge. When flooding appears imminent, readings are taken at the River Bridge at a minimum of once per hour. At an elevation of 1,695 feet at the River Bridge (five feet below flood stage at the bridge), or if conditions warrant, a Utilities Division representative shall collect information from local sources to help evaluate the flooding potential. This information will be updated hourly provided the river level is rising and/or is in flood stage.

The time the flood waters will take to reach the facility varies depending on the amount of discharge at Claytor Dam. It is estimated that a flood crest starting at Claytor Dam will reach the facility in approximately 2 to 3 hours.

Utilities personnel shall request the Security Police Dispatcher to notify key personnel in the instance of the following events:

- The Claytor Lake dam gates are opened 20 feet or more;
- The water level reaches an elevation of 1,697 feet at the River Bridge; or
- Flooding conditions are predicted.

The Environmental Department shall coordinate the removal of waste materials from potentially impacted locations (such as the OBG), as well as any corrective action and cleanup activities that are necessary. Engineering is responsible for estimating damages to physical facilities and equipment.

II.I.~~2~~3 Open Burning Ground Flood Protection Measures

Commented [RFAAP4]: Expanded this discussion to include information on flood protection measures that are in place for the OBG and that help demonstrate compliance with the above requirements

In the event that the New River height at the River Bridge reaches 1,695 ft mean sea level (MSL) (five feet below flood stage at the bridge), RFAAP will institute the flood protection plan for the OBG. When this plan is activated, RFAAP will take action to prevent harm to human health and the environment due to the washout of the hazardous waste management area. The below provides a summary of the actions that will be taken. Each of the below tasks will be prioritized based on the rate of rise in the river levels and other factors. However, the utmost priority in a flooding situation will remain the safety of personnel working in the area.

Three potential scenarios exist with flood response at the open burning ground:

1. An immediate evacuation is not required and the pans have not been loaded for a burn.

2. An immediate evacuation is not required and the pans have been loaded for a burn.
3. An immediate evaluation is required to protect the safety of area personnel.

Dedicated and trained personnel are available to carry out the necessary activities to respond to each of these scenarios. The sections below provide a description of the procedures that will followed under each scenario. In general, ample time exists between flood notification and the arrival of flood waters at the facility to remove or process all hazardous wastes at the OBG (*i.e.*, immediate evacuation of the area should not be required upon initial notice of flooding potential). However, if at any time during the first two scenarios, should the situation change and conditions become dangerous for personnel, any or all of the procedures detailed herein may be abandoned, an emergency shutdown will be performed, and the area will be evacuated.

Immediate Evacuation Not Required, Pans Have Not Been Loaded

Provided that an immediate evacuation of the area is not warranted and the area has not set up for a burn, all ash residue will be removed from the pans and placed in drums per normal procedures. If less than 24 hours has elapsed since the last burn, supervision will inspect the pans and determine the proper method for safe handling of the materials. Two options are available for cooling the material in the pans:

1. For small hot spots, the operators will apply small amounts of water as necessary to extinguish the hot spots.
2. For larger hot spots or entire pans with hot residue, ~~This may include having~~ the Fire Department will thoroughly wet the contents of the pans to extinguish the materials~~any hot spots or some other reasonable means to temper the residues~~.

After removal, the containerized ash will be moved to an appropriate storage building outside the region threatened by the flood waters if time allows.

Immediate Evacuation Not Required, Pans Have ~~Not~~ Been Loaded

In the event that an immediate evacuation of the area is not warranted and the area has already set up for a burn, the burn will commence due to safety concerns. After an hour, the pans will be inspected for flames. If the burn is already completed, the fire department will be called to cool the pans with water and the ash/water will be removed into drums per normal procedures. If the burn is not complete after an hour, the pans will be inspected each hour until the area must be evacuated. If time does not allow for the pans to be emptied of ash, they will be covered and left in place. Any subsequent discharge of hazardous ash residue to the environment will be reported consistent with the procedures provided in the Contingency Plan (Attachment II.F).

Immediate Evacuation Required

In the event that an immediate evacuation is warranted, the open burning ground will be left in its current status, all electronics will be secured, and paper files will be removed (if possible). If pans have been loaded with material at the time that evacuation is ordered and time is not available for removal of materials, or if removal of materials from the pans is not possible due to personnel safety concerns (*e.g.*, Class 1.1 explosives are in the pans or diesel has already been applied to the energetic material), the material will be abandoned in place.

Even though there is no recent history of abandonment due to flooding, the most likely situations that would trigger such a response would be one in which the discharge of the Little River approximately one-half mile below the Claytor Lake dam resulted in flash flooding or in the case of a major and rapid snow melt. In such a situation, the Contingency Plan will be implemented and an immediate incident report will be filed with the appropriate environmental agencies as specified in the Contingency Plan (Attachment II.F).

~~When this plan is activated, any containerized waste that has not been placed on the pans will be returned to the facility hazardous waste accumulation area, which is above the 100-year flood elevation.~~

~~If the pans have already been loaded when the flood protection plan is implemented, area supervision will review available flood forecast data and decide how to proceed. If the river is not expected to reach flood stage within two hours and weather conditions are favorable, the pans will be ignited and burned per standard procedure. Residues will then be removed from the pans and area as described below. If the flood stage prediction provides less than two hours, then the pans will be safely unloaded if feasible. If diesel has already been applied to the pans or if the waste in the pans is considered a Class 1.1 explosive, supervision will evaluate the risks to human health and the environment and will proceed in a manner that will most effectively mitigate these risks.~~

~~If the pans have already been ignited when the flood protection plan is implemented, the pans will be allowed to burn for at least one hour. Upon completion of the burn, the residues will be removed as described below.~~

~~Any residues remaining in the pans from a prior burn will be swept up and containerized following standard procedures. If less than 24 hours has elapsed since the last burn, supervision will inspect the pans and determine the proper method for safe handling of the materials. This may include having the Fire Department thoroughly wet the contents of the pans to extinguish any hot spots or some other reasonable means to temper the residues. After removal, Tthe containerized ash will be moved to an area outside the projected impact zone.~~

Table III.I-1 provides a summary of locations, activities, and timing required to enact this plan after the New River reaches a height of 1,695 ft MSL at the River Bridge. As demonstrated in the table, ample time exists between flood notification and the arrival of flood waters at the facility to implement the flood plan activities.

II.I.~~3~~4 Protection of Human Health in the Event of Washout

Commented [RFAAP5]: Added this to satisfy requirement (ii) above

In addition to removing the waste from the OBG when flooding is expected, RFAAP has instituted a soil monitoring program (SMP) to ensure that the soils in the OBG, if washed downstream during a flood, will not have adverse affects on human health and the environment.

The ~~the above measures the following procedures will be conducted routinely at RFAAP in accordance with the Soil Monitoring Plan (~~SMP~~)~~ for the OBG is provided in Module II, Attachment II.C of this permit. ~~.~~ This plan describes the methods by which monitoring locations are selected, the procedures by which samples are collected and analyzed, and the actions required in the event that any constituent is detected above the action levels described therein. Institution of this plan ensures recognition of contaminated areas and immediate treatment and/or removal of any contaminated soils.

Commented [RFAAP6]: Removed this text and added a simple reference to the SMP for this detail. Having duplicative information in two separate sections of the permit introduces the possibility for conflicting requirements and/or descriptions. Simple reference to the SMP should be sufficient.

~~If a constituent is detected above the proposed Action Level, a hot spot determination will be conducted. If contamination is detected at concentrations that exceed the designated action levels, RFAAP will collect a total of four samples as close as practicable to 20 feet in all directions (north, south, east and west) of the original detection. The samples will be analyzed for those constituents that have exceeded the action levels. This action will ensure that the nature and extent of the exceedance will be delineated in all horizontal directions.~~

~~In addition to the sampling described above, a sampling grid will be established in a five feet radius of the sample collection point. Four randomly selected sample points will be selected within the diameter of the grid. Each sample point will be sampled to a terminal depth of 24 inches below ground surface by advancing a pre-cleaned stainless steel auger. Samples will be collected every six inches to the terminal depth of 24 inches. The auger will be decontaminated in accordance with **Section 4.3.1 of the SMP** between every six inch interval. The aliquots from each six inch interval will be composited with the same corresponding interval from each of the four borings. The aliquots will be homogenized in a pre-cleaned stainless steel bowl using a pre-cleaned stainless steel spoon or trowel. The analyses from each six inch interval will be evaluated by comparing the results to the Action Levels for the constituent.~~

~~If the Action Levels are exceeded in any given layer, a soil removal work plan will be prepared. The work plan will define the volume of soils to be removed by designating the horizontal and vertical extent of removal. The work plan will be~~

~~submitted to the VDEQ for review and approval. Upon approval of the work plan, the soils will be excavated with a mechanical backhoe under the supervision of designated representative of RFAAP. Soils will be placed in a DOT approved covered roll-off container and transported offsite for disposal at an approved facility for disposal and/or treatment. Upon completion of the excavation confirmatory samples will be collected to confirm complete removal of the contaminated media. Confirmatory samples will include four randomly selected aliquots from the base of the excavation and two from the sidewalls of the excavation to be composited for a single analysis.~~

~~The excavation will be immediately backfilled with soils to be collected from a designated borrow area within the Radford AAP facility, or prewashed and graded gravel. Soils or gravel will be re-graded to match existing contours. Soils will be seeded with natural vegetation that matches the existing ground cover of the site. The process of immediately backfilling that excavation will allow for normal operations to resume at the OB Ground. Should the confirmatory samples indicate that there are contaminated media in excess of the Action Levels beneath the backfilled material, the backfilled material will be removed and an additional volume of soils will be removed. Confirmatory samples will be collected from the secondary excavation as well. The secondary excavation will be backfilled immediately. The process of excavation and confirmation will proceed until the Action Levels are no longer exceeded or bedrock or groundwater is encountered. A complete report of the removal actions will be prepared and submitted to the VDEQ within 30 days of completion of the Interim Measures.~~

II.I.~~3~~5 Stormwater Design Considerations

Commented [RFAAP7]: Added this description of the stormwater management design that was implemented after the last permit, as it does help extend the response time to a flooding scenario

40 CFR § 264.273 requires that facilities incorporate measures into their facility design to properly control run-on and run-off from the treatment unit in the event of a 24-hour, 25-year storm. While this design measure does not ensure protection of the facility during a 100-year flooding event, it does help to mitigate the effects from the storm and extend the period of time during which wastes can be moved prior to flood waters overcoming the site.

In accordance with these requirements, RFAAP has designed features into the OBG site that help satisfy the requirements for run-on and run-off control. Included in this design is a system for diverting run-on around the OBG site and directing run-off away from the OBG site. This system includes:

- Four drainage areas, designed to manage~~d~~ over 87.5 cubic feet per second (cfs) of stormwater discharge.
- A containment berm (Berm A) along the southern boundary, a trench drain and a culvert that are designed to mitigate water flow into the site and contain and direct run-off from the site. Water traveling in the trench drain between the toe of Berm A and the burning pans is directed through the culvert into a sediment basin outside of Berm A to the northeast of the site. Stormwater is

then discharged from the basin through a principal spillway and out to the New River through RFAAP Outfall #17.

- A diversion berm (Berm B) that runs the length of the site along the northern boundary, a drainage swale, ditch, and two culverts that prevent flow from two of the drainage areas from encroaching onto the OBG site and discharge the stormwater out to the New River through RFAAP Outfall #12.

An overview of these features is provided in Figure II.1-2.

Figures

INSERT THE FOLLOWING FIGURES:

FIGURE II.I-1 - FLOOD MAP
~~FIGURE II.I-2 - STORMWATER MANAGEMENT DESIGN (2 PAGES)~~

FIGURE II.I-2 - STORMWATER MANAGEMENT DESIGN (PAGE 1 of 2)

FIGURE II.I-2 - STORMWATER MANAGEMENT DESIGN (PAGE 2 of 2)

TABLE II.I-1

REMOVING WASTE IN THE EVENT OF FLOODING

Type of ~~Waste~~ Material	Location to which waste will be moved	Procedures and equipment to be used	Personnel ~~to be Used~~Required	Time required for waste movement
Solid waste propellant in containers	Facility Hazardous Waste Accumulation Area	Move wastes to the Explosive Hold House per standard procedures using powder vans	Trained storage and treatment area personnel	Loading: 20 minutes (max, 47 cans) Transport: 10 minutes (5500 feet) Unloading: 20 minutes Total: 50 minutes
Solid waste propellant loaded into pans	Facility Hazardous Waste Accumulation Area	Initiate burn or remove wastes as directed by supervision. (See discussion for decision matrix). Move wastes and/or residues to the accumulation area using powder vans following standard procedures	Trained storage and treatment area personnel	Burning: 1 hour Removing residue: 30 minutes Transport: 10 minutes (5500 feet) Unloading: 20 minutes Total: 2 hours
Ash residue in pans	Facility Hazardous Waste Accumulation Area	Transport waste to accumulation area using powder vans following standard procedures	Trained storage and treatment area personnel	Approximately 40 minutes (based on transporting 30 drums in two trips between the OBG and the holding area)

Commented [RFAAP1]: Suggested revisions added June 2015 as part of the RCRA permit renewal application for the RFAAP open burning ground

MODULE IV
DETECTION MONITORING

IV.A. HIGHLIGHTS

Commented [RFAAP2]: This section updated for consistency with other modules

The Open Burn Ground (OBG) at the Radford Facility Army Ammunition Plant (RFAAP) is a waste propellant open burning ground. The OBG is located on the southeastern end of the Horseshoe Area on the flood plain of the New River and consists of eight above-ground burning assemblies.

Groundwater monitoring has been conducted at the OBG since 1992. The OBG was in Interim Status, and groundwater monitoring activities were conducted quarterly in accordance with the requirements of 40 CFR 265. In October 1999, the "Groundwater Quality Assessment Report" for the OBG was submitted to the Virginia Department of Environmental Quality (DEQ/Department). A groundwater monitoring list was included in the report. The monitoring list consisted of a subset of the constituents listed in 40 CFR 264 Appendix IX that previously had been detected in the groundwater and/or that would be reasonably expected to be in or derived from the waste burned at OBG.

In September 2005, DEQ issued the original *Permit for the Treatment of Hazardous Waste by Open Burning* (Permit) for the OBG (effective on October 28, 2005). However, beginning in Fourth Quarter 2003, quarterly groundwater monitoring was conducted in accordance with the "Detection Groundwater Monitoring Program for the Open Burning Ground", dated September 2003, in anticipation of receipt of the Permit.

Exceedances of established background values for carbon tetrachloride and perchlorate during the Fourth Quarter 2005 Detection monitoring event prompted the need to develop a Compliance Monitoring program in accordance with the requirements of the Permit. As a result, during First Quarter 2006, all wells were sampled for the full Appendix IX constituent list and the hazardous constituents detected formed the basis for the Compliance Monitoring List for the OBG Unit.

The Permittee submitted a revised Compliance Monitoring Plan with proposed Groundwater Protection Standards (GPSs) to the Department and the first semiannual groundwater Compliance Monitoring event for 2007 was conducted

in accordance with the revised Compliance Monitoring Plan during Second Quarter 2007.

During semiannual groundwater Compliance Monitoring, concentrations of at least two constituents, perchlorate and carbon tetrachloride, exceeded their respective GPSs at one or more downgradient well(s). As a result, according to 40 CFR 264.91(a)(2), the Permittee implemented a Corrective Action Program (CAP) under 40 CFR 264.100.

Permit Module VII – *Corrective Action and Groundwater Monitoring Program*, was approved by the DEQ in the Class 3 Hazardous Waste Permit Modification dated September 27, 2011. This module was revised on Feb 22, 2012, November 9, 2013, June 12, 2014 and with this permit module.

Currently, groundwater is conducted semiannually in accordance with the Corrective Action and Groundwater Monitoring Program.

This permit module, Module IV – Detection Monitoring, presents requirements of the Detection Monitoring Program and includes the Sampling and Analyis Plan (SAP) for the facility which is incorporated by reference in ~~other~~ the Compliance Monitoring and Corrective Action Monitoring permit modules.

IV.B. DETECTION MONITORING REQUIREMENTS

IV.B.1. The Detection Monitoring Program requires semiannual monitoring of a background well and at downgradient ~~point of compliance~~ wells detailed below. Static groundwater elevation will be measured at all wells specified in **Permit Section IV.B.1.a**.during each sampling event.

a. Groundwater beneath the ~~OB/OD~~ OBG shall be monitored with one background groundwater monitoring well and ~~five~~ three downgradient point of compliance wells located as specified on the map presented in **Figure IV-1**. Monitoring well 13MW-2 is the background well for the ~~OB/OD~~ OBG and monitoring wells 13MW-3, 13MW-4, ~~13MW-5, 13MW-6,~~ and 13MW-7 are the point of compliance wells.

b. In addition to the wells specified in Permit Condition IV.B.1.a., wells 13MW5, 13MW6 and 13MW-8 will serve as ~~a~~ plume monitoring wells

Commented [RFAAP3]: Revised for clarification

Commented [RFAAP4]: Changes to this and the following section are made to reclassify wells 13MW5 and 13MW6 as plume monitoring wells.

Commented [RFAAP5]: Dashes removed from well nomenclature throughout document for consistency with maps.

downgradient of the unit to determine whether continued migration of constituents of concern has occurred.

c. Well 13MW-1 will be used as a piezometer to measure static groundwater elevations during each sampling event.

IV.B.2. The compliance point wells and background well will be sampled in accordance with the Sampling and Analysis Plan **(Attachment IV.A)** and the following schedule:

~~a.~~ The background well and downgradient point of compliance and plume monitoring wells specified in **Permit Section IV.B.1.** will be sampled at least semiannually for the constituents listed in **Attachment IV.B**. Samples for each constituent will be collected using the methods specified in **Attachment IV.A** and analyses shall be obtained using the EPA SW-846 Methods specified in **Attachment IV.B**. Additionally, the laboratory must be accredited for the analytical method, matrix and target analyte by the Virginia Environmental Laboratory Accreditation Program (VELAP).

a.

b. Alternate ~~SW-846~~ methods may be approved by the Director, provided the request is in writi**ng and submitted 30 da**ys prior to the sampling event. Proposed alternate methods must achie**ve the same Lim**it of ~~Quanititation~~Quantitation (or lower) as the specified method and meet the **requirement of Attachment IV.A Section III.C**. In addition, the performing laboratory mus**t have VELAP ac**creditation for the alternative method, matrix and analyte.

IV.C. WELL LOCATION, INSTALLATION AND CONSTRUCTION

The Permittee shall maintain the groundwater monitoring system as specified below:

IV.C.1. The Permittee shall maintain groundwater monitoring wells 13MW1, 13MW2, 13MW3, 13MW4, 13MW5, 13MW6, 13MW7, and 13M-8 at the locations specified on the map presented in **Figure IV-1**. If additional monitoring wells are required they shall be installed and sampled in accordance with the requirements of 40 CFR 264.97.

a. Boring logs for monitoring wells 13MW1, 13MW2, 13MW3, 13MW4, 13MW5, 13MW6, 13MW7, and 13MW8 are included as **Attachment IV.A, Appendix 8**.

b. Monitoring well design and construction details for monitoring wells 13MW1, 13MW2, 13MW3, 13MW4, 13MW5, 13MW6, 13MW7, and 13MW8 are included as **Attachment IV.A, Appendix 8**.

IV.C.2. All groundwater monitoring wells required by this permit shall be maintained in conformance with the following:

a. The groundwater monitoring system must yield samples in the background well that represent the quality of the background groundwater unaffected by leakage from any regulated unit, and from downgradient wells that yield samples representative of the quality of groundwater passing the compliance point.

b. The number and location of monitoring wells must be sufficient to identify and define all logical release pathways from the regulated unit to the uppermost aquifer based on site specific hydrogeologic characterization.

IV.C.3. The Permittee shall maintain the monitoring wells identified in **Permit Section IV.C.1.** of the Permit in accordance with the plans and specifications presented in **Attachment IV.A, Appendix 8**.

IV.C.4. The Director must approve the addition or removal of all monitoring wells prior to installation or decommissioning.

a. All wells deleted from the monitoring program shall be plugged and abandoned in accordance with **Attachment IV.A, Appendix 7**. Well plugging methods and abandonment certification shall be submitted to the Director within thirty (30) days from the date the wells are removed from the monitoring program.

b. All monitoring wells added to the existing groundwater monitoring system described in **Permit Section IV.C.1.** must be constructed in accordance with the requirements of EPA's *RCRA Groundwater Monitoring Technical Enforcement Guidance Document* (TEGD) and approved by the Department (**Attachment IV.A, Appendix 5**).

IV.D. INDICATOR PARAMETERS AND MONITORING CONSTITUENTS

IV.D.1. The Permittee shall monitor all wells as described in **Permit Section IV.C.1** for all parameters and constituents specified in **Attachment IV.B**.

IV.D.2. Background groundwater concentrations for parameters and constituents ~~shall be~~ established ~~the first year~~ subsequent to Permit issuance.~~ Existing data may be used to establish background concentrations provided it is of sufficient quality. Established background values for parameters and constituents will be~~ are listed in **Attachment IV.C.**

Commented [RFAAP6]: Updated to note that BKGs have been established

.

IV.D.3. For those parameters and constituents in **Attachment IV.B** for which no accurate background values are established at the time the Permit is issued (or for constituents added to the monitoring program during the life of the Permit), the Permittee shall establish accurate background values in accordance with the procedures in **Attachment IV.A, Appendix 6**.

a. Background groundwater quality for a new monitoring parameter or constituent shall be based on data from quarterly sampling of 13MW2

obtained over the course of ~~for~~ one year. Existing data may be used to establish background concentrations provided it is of sufficient quality with approval from DEQ.

Commented [RFAAP7]: Revised June 2016 in response to NOD 2s.1.

Commented [RFAAP8]: Revised Feburary 2016 in response to informal 9/6/2016 DEQ comment

IV.E. SAMPLING AND ANALYSIS PROCEDURES

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in **Permit Sections IV.C.**:

IV.E.1. Groundwater monitoring samples shall be collected using the techniques described in **Attachment IV.A**.

IV.E.2. Samples shall be preserved, packed, and shipped off-site for analysis in

accordance with the procedures specified in **Attachment IV.A**.

IV.E.3. Samples shall be analyzed in accordance with the procedures specified in **Attachment IV.A** using the methods prescribed in **Attachment IV.B**. Additionally, the laboratory must ~~be accredited for the analytical method, matrix and target analyte (where applicable) by the Virginia Environmental Laboratory Accreditation Program.~~have current VELAP accreditation for the analytical method, matrix and target analyte.

Commented [RFAAP9]: Revised February 2017 in response to NOD 2S.2, deleting "where applicable"

IV.E.4. Samples shall be tracked and controlled using the ~~chain-of-custody~~COC procedures specified in **Attachment IV.A**.

IV.E.5. The Permittee must determine the concentration of hazardous constituents and parameters listed in **Attachment IV.B** in the groundwater at the compliance point at least semiannually.

IV.F. ELEVATION OF THE GROUNDWATER SURFACE

IV.F.1. The Permittee shall determine the groundwater surface elevation at each monitoring well (13MW1, 13MW2, 13MW3, 13MW4, 13MW5, 13MW6, 13MW7, and 13MW8) each time groundwater is sampled in accordance with **Attachment IV.A**.

IV.F.2. The Permittee shall report the surveyed elevation of any additional or replacement

monitoring well(s) when installed with as-built drawings. The total depth of wells and the elevation of the following shall be recorded: top of the casing, ground surface and/or apron elevation, and the top of the protective casing.

IV.G. STATISTICAL PROCEDURES

IV.G.1. When evaluating the monitoring results in accordance with **Permit Section IV.H.**, the Permittee shall use the procedures in **Attachment IV.A, Appendix 6**.

a. If the appropriate statistical test (specified in **Attachment IV.A, Appendix 6** and/or approved by the Director) indicates that the difference between the established background (or upgradient well concentration) and the downgradient well concentration is significant, the Permittee may resample within thirty (30) days of receipt of original laboratory data, not to exceed sixty days (60) from the date of original sample collection.

b. If the second round of analyses specified in **Permit Section IV.H.1.a.** indicates that the difference is significant, the Permittee shall conclude that a statistically significant change has occurred.

IV.H. MONITORING PROGRAM AND DATA EVALUATION

The Permittee shall determine groundwater quality as follows:

IV.H.1. The Permittee shall collect, preserve, and analyze groundwater samples pursuant to **Permit Section IV.E**.

IV.H.2. For each hazardous constituent identified in **Permit Section IV.D.**, the Permittee shall determine whether there is statistically significant evidence of an increased contamination impact for any parameter or chemical constituent each time the concentration of hazardous constituents is monitored in groundwater at the compliance point**.** In determining whether such an increase has occurred, the Permittee shall compare the groundwater quality at each monitoring well specified in **Permit Section IV.B.** of the Permit, to the background concentration for that constituent, in accordance with the procedures specified in **Attachment IV.A, Appendix 6,** if appropriate. These determinations shall be made each time groundwater monitoring occurs.

IV.H.3. The Permittee shall determine the groundwater flow rate and direction in the

uppermost aquifer at least annually.

IV.H.4. The Permittee shall perform the statistical evaluation required by **Permit Section IV. G**. within 30 days from the date the final analytical results are available from the laboratory performing the analyses.

IV.H.5. Pursuant to **Permit Section IV.G.**, if the Permittee determines there is a statistically significant increase ~~evidence of increased contamination~~ above the concentration limits specified in **Attachment IV.C** for the constituents specified in **Permit Section IV.D.** (indicating that the background concentration is being exceeded), at any monitoring well at the point of compliance, the Permittee shall:

a. Notify the Department in writing within seven (7) days of the determination. The notification must ~~include~~ specify what parameters or constituents have shown evidence of a statistically significant increase ~~evidence of impact contamination;~~

b. Immediately sample the groundwater in all monitoring wells for the constituents listed in Appendix IX of CFR 40 Part 264.

c. For any Appendix IX constituents detected, the Permittee may resample within thirty (30) days from the date of the final laboratory report and repeat the analysis for those constituents that are present above the laboratory detection limit. ~~detected.~~ If the results of the second analysis confirm the initial results, the detected Appendix IX constituents will form the basis for Compliance Monitoring.

Commented [RFAAP10]: Revised for clarity

d. If the second analysis (**Permit Section IV.H.5.c.**) confirms the presence of constituents not included in the Detection Monitoring program or if the Permittee chooses not to resample, the Permittee shall establish the background values for each additional ~~Appendix IX to~~ 40 CFR Part 264 Appendix IX constituent found in the groundwater pursuant to **Permit Sections IV.D.2 and IV.D.3.**

e. Within ninety (90) days, the permittee shall submit to the Director a Permit modification request to establish a Compliance Monitoring Program [40 CFR 264.98(h)]. The application must include the following:

i. An identification of the concentration of each ~~Appendix IX to~~ CFR 40 Part 264 Appendix IX constituent found in the groundwater at each monitoring

well at the compliance point.

ii. Proposed changes to the groundwater monitoring system necessary to meet the requirements of compliance monitoring as described in 40 CFR 264.99.

iii. Proposed changes to the monitoring frequency, sampling and analysis procedures, or methods or statistical procedures used at the facility necessary to meet the requirements of compliance monitoring as described in 40 CFR 264.99.

iv. For each hazardous constituent detected found at the compliance point, a proposed concentration limit, or a notice of intent to seek an alternate concentration limit for a hazardous constituent.

IV.H.6. If the Permittee determines, pursuant to **Permit Condition IV.H.5**., that there is a statistically significant increase above the background concentration for the constituents specified in **Attachment IV.B**, the Permittee may make a demonstration that the exceedence was due to sources other than a regulated unit or errors in sampling, analysis, evaluation, or natural variation in the groundwater.

a. The Permittee must notify the Director in writing, within seven (7) days, that a demonstration will be made.

b. The Permittee must submit a report to the Director within ninety (90) days that demonstrates that a source other than a regulated unit caused the exceedence or that the exceedence was a result of an error in sampling, analysis, or evaluation.

c. The Permittee must submit to the Director within 90 days an application for a permit modification to make any appropriate changes in the Detection Monitoring Program at the facility.

d. The Permittee must continue to monitor in accordance with the Detection Monitoring Program established under 40 CFR 264.98.

IV.I. REPORTING AND RECORDKEEPING

IV.I.1. The Permittee shall enter all monitoring, testing, and analytical data obtained

pursuant to **Permit Section IV.H.** in the operating record. The data must include all computations, calculated means, variances, and results of statistical tests and must be submitted to the Director, at least annually, no later than March 1 of each year.

IV.I.2. The Permittee shall submit the analytical results (**Permit Section IV.H.**), whenever there is a change in flow rate or direction, or evidence of a statistically significant evidence of increase increased contamination in one or more of the hazardous constituents being monitored, or at least annually with the annual groundwater report.

Commented [RFAAP11]: Updated for consistency and clarity

IV.I.3. The Permittee shall annually submit by March 1 potentiometric contour maps depicting groundwater flow paths and the supporting groundwater elevation data to determine whether the requirements for locating the monitoring network continue to be satisfied. If the evaluation determines the existing monitoring wells no longer satisfy the requirements of 40 CFR 264.97(a), the Permittee shall immediately submit a permit modification request to the Director to bring the monitoring system back into compliance.

IV.J. ASSURANCE OF DETECTION

The Permittee shall demonstrate to the Director that groundwater monitoring measures necessary to achieve compliance with the monitoring requirements under 40 CFR 264.92 are taken during the term of the Permit.

IV.K. REQUESTS FOR PERMIT MODIFICATION

IV.K.1. If the Permittee or the Director determines the Groundwater Detection Monitoring Program no longer satisfies the requirements of 40 CFR 264.98, then the Permittee shall submit to the Director an application for a permit modification to make any appropriate changes to the program in accordance with 40 CFR 264.98(h).

ATTACHMENT IV.A

GROUNDWATER MONITORING PROGRAM SAMPLING AND ANALYSIS PLAN

ATTACHMENT IV.A

GROUNDWATER MONITORING PROGRAM
SAMPLING AND ANALYSIS PLAN

TABLE OF CONTENTS

I. SAMPLING
- A. INTRODUCTION
- B. SAMPLING FREQUENCY
- C. FIELD METHODS
- D. FIELD QA/QC PROGRAM
- D. SAMPLE HANDLING AND CHAIN-OF-CUSTODY (COC)
- E. FIELD LOGBOOK

II. LABORATORY ANALYSIS
- A. INTRODUCTION
- B. LABORATORY QA/QC

III. DATA EVALUATION
- A. ANALYTICAL DATA REVIEW
- B. STATISTICAL EVALUATION
- C. DATA QUALITY OBJECTIVE

IV. RECORD KEEPING AND REPORTING
- A. INTRODUCTION
- B. GROUNDWATER MONITORING RESULTS
- C. ANNUAL REPORT

APPENDIX 1. GROUNDWATER LOG EXAMPLE
APPENDIX 2. CALCULATION OF PURGE VOLUME
APPENDIX 3. EXAMPLE ~~CHAIN OF CUSTODY~~ COC FORM
APPENDIX 4. RECOMMENDED SAMPLE CONTAINERS AND PRESERVATIVES
APPENDIX 5. MONITORING WELL CONSTRUCTION DIAGRAM
APPENDIX 6. STATISTICAL PROCEDURES
APPENDIX 7. MONITORING WELL ABANDONMENT PROCEDURES
APPENDIX 8. BORING LOGS AND WELL CONSTRUCTION DIAGRAMS
APPENDIX 9. INVESTIGATIVE DERIVED WASTE POLICY

RADFORD FACILITY ARMY AMMUNITION PLANT ~~OB/OD~~OBG, SAMPLING AND ANALYSIS PLAN

I. SAMPLING

I.A. INTRODUCTION

~~Federal regulations at~~ 40 CFR§270.14(c)(5), 270.14(c)(6)(iv), and 270.14(c)(7)(vi) require a description of the sampling, analysis, and statistical comparison procedures proposed for evaluating groundwater monitoring data. In addition, 40CFR ~~§§~~264.97(d) and 264.97(e) outline minimum procedures and techniques for groundwater monitoring programs implemented pursuant to 40 CFR Part 264 Subpart F. These regulations require that groundwater monitoring programs include measurement, sampling, and analytical methods that accurately assess groundwater quality, and that provide early detection of hazardous constituents released to groundwater.

Groundwater beneath the ~~OB/OD~~OBG unit will be monitored with the one background monitoring well, and the ~~five~~ six downgradient ~~point of compliance wells, and one downgradient plume~~ monitoring wells discussed below and located as specified on the map presented in **Figure IV-1**. Monitoring well 13MW-2 is the background well. Monitoring wells 13MW-3, 13MW-4, ~~13MW-5, 13MW-6,~~ and 13MW-7 are the point of compliance wells for the unit. Monitoring wells 13MW5, 13MW6, and 13MW-8 ~~is~~ are the plume monitoring wells for the unit. In addition, well 13MW-1 will be used as a piezometer to measure static groundwater elevations during each sampling event. 13MW1 may also be used as another source for background concentration data following approval from the Department.

Commented [RFAAP12]: Changes made herein to reclassify wells 13MW5 and 13MW6 as plume monitoring wells

Commented [RFAAP13]: Revised for clarity

Commented [RFAAP14]: Revised Febuary 2017, adding necessary approval from DEQ pursuant to NOD 2s.2 and providing consistency with other sections

The ~~Radford Facility Army Ammunition Plant~~RFAAP Sampling and Analysis Plan (S&AP) is an essential part of the Detection Monitoring Program in that it stipulates the field sampling, laboratory analysis, and annual reporting methods to be utilized throughout the post-closure period. The S&AP addresses the Detection Monitoring Program requirements prescribed in the ~~VHWMR,~~ 9 VAC 20-60, 40 CFR ~~§~~ 264.98 and as described in ~~the Operating Permit.~~this RCRA Permit.

I.B. SAMPLING FREQUENCY

Groundwater samples will be collected and analyzed semiannually at each point of compliance well and plume monitoring well for all the constituents listed in **Attachment IV.B. Attachment IV.B** lists the parameters, constituents, and test methods required for the Detection Monitoring Program. The Permittee may resample for any statistically significant detection within 30 days to confirm or refute the detection.

I.C. FIELD METHODS

The following activities should be performed prior to collecting ground-water samples for analysis:

- Measurement of static water level elevation;
- Detection and sampling of immiscible layers; and
- Well purging.

I.C.1. Measurement of Static Water Level Elevations:

Prior to purging each well, ~~both~~ the static water level ~~(SWL)~~ (and ~~the d~~depth to ~~the~~ the bottom of ~~the~~ each well~~s~~ not equipped with dedicated pumps) ~~shall~~ will be measured to ±0.01 foot. Well measurements will be made using an electronic water level probe, referenced to a predetermined mark at the top of the well casing. The elevation of the top of the well casing (with locking cap removed) will be established to an elevation ±0.01 foot, in relation to the existing landfill datum, which will be established from a National Geodetic Vertical Datum.

Commented [RFAAP15]: Revised to be consistent with language in Post-Closure Care Permit for HWMUs 5 and 16.

The static water level measuring device used will be constructed of inert materials and will be thoroughly decontaminated prior to each use to prevent cross contamination from one well to another. The meter will be decontaminated by washing with non-phosphate detergent and rinsing three times with deionized water prior to air-drying. Decontamination fluid will be containerized and disposed of in an on-site wastewater treatment system if available or a publicly owned treatment facility with approval. Sampling members will wear clean gloves during sampling and shall change gloves between sampling each well at a minimum.

Commented [RFAAP16]: Moved from Section I.C.2

The static ~~ground water~~ groundwater surface elevations obtained prior to each sampling event shall be used to create potentiometric maps to determine whether the requirements for locating the monitoring wells continues to be satisfied. If the potentiometric maps reveal that the depths, location, or number of wells is insufficient to monitor hazardous waste constituents migrating from the waste management area, new well locations and depths will be submitted to the Department for their approval and subsequent installation and monitoring. Any new wells will be installed prior to the next regularly scheduled groundwater sampling event.

Background wells and wells where constituents have not historically been ~~noted~~ detected will be measured first, followed by wells where constituents have been noted to help prevent cross-contamination. All measurements for each well will

be recorded in the Groundwater Log. Measurements that do not correlate with the previous trends will be verified in the field with different measurement technology, if necessary.

I.C.2. Calculation of Static Water Volume:

The static water level and the total depth (obtained from well construction logs for wells equipped with dedicated pumps or measured in wells not equipped with dedicated pumps) will be used to calculate the volume of stagnant water in the well. For wells not equipped with dedicated pumps, measurement of the total depth will ~~and~~ provide a check on the integrity of the well (e.g., identify siltation problems), as well as characterize changes in hydraulic conditions that may occur over time.

For wells equipped with dedicated pumps, the pump shall be pulled and the total well depth and sediment thickness shall be calculated if the data from turbidity measurements and field parameters collected during the course of purging and sampling indicate that silt has accumulated in ~~any~~ the well.~~, the pump shall be pulled and the total well depth and sediment thickness shall be calculated.~~ Corrective measures shall be taken prior to the next sampling event, if necessary.

~~The static water level measuring device used will be constructed of inert materials and thoroughly decontaminated prior to each use to prevent cross contamination from one well to another. The meter will be decontaminated by washing with non-phosphate detergent and rinsing three times with deionized water prior to air-drying. Decontamination fluid will be containerized and disposed of in an on-site wastewater treatment system if available or a publicly owned treatment facility with approval. Sampling members will wear clean gloves during sampling and shall change gloves between sampling each well at a minimum.~~

I.C.3. Immiscible Layers:

Each well shall be tested for the presence of immiscible fluids prior to well evacuation and sample collection. The procedures for testing for immiscible fluid layers are as follows:

1. Air in the wellhead will be screened for organic vapors using a photo ionization detector or other appropriate device.

2. An electronic interface probe or other appropriate device capable of detecting light and dense immiscible fluids will be lowered into the well to determine the existence of any immiscible layers.

3. If immiscible layers are detected, immiscible phases will be collected prior to any purging activities.

I.C.4. Well Purging

Commented [RFAAP17]: Revised for clarity and to be consistent with language in Post-Closure Care Permit for HWMUs 5 and 16.

The volume of stagnant water in each well will be determined prior to well evacuation based on the static water level, well depth, well diameter, filter pack length, and borehole diameter. Three volumes of the pore space of the screen filter pack and three volumes of the well casing will be purged prior to sampling if possible. The volume of stagnant water to be purged shall be calculated according to the formulae presented in Appendix 2 of this Attachment or the volume purged shall be sufficient when pH, temperature, and conductivity have stabilized. Purge volume calculations will be recorded in the Groundwater Log shown in Appendix 1 of this Attachment.

a. If the wells prove to be low yield, wells will be evacuated to dryness once and will be purged at a rate ~~which~~ that will not cause recharge water to be excessively agitated. Dry and low recharge rates will be noted in the field observations.

b. All purge water will be containerized and disposed of in an on-site wastewater treatment system if available or a publicly owned treatment facility with approval.

When micropurging techniques are utilized, EPA guidance shall be followed (EPA/540/S-95/504). Dedicated bladder pumps shall be placed with their input at the midway point of the screened interval. Flow rates should be low enough to minimize drawdown ~~to~~ of the system. Water quality indicator parameters are used to determine purging needs. In-line flow cells are used to continuously monitor pH, specific conductance, temperature, etc. Purging is considered complete when indicator parameters have stabilized. Water levels and pumping rates will be monitored and recorded in addition to any adjustments.

The s~~S~~tabilization parameters of pH, temperature, ~~and~~ conductivity, dissolved oxygen, and oxidation/reduction potential will be measured at the start and end of sampling as a check on the stability of the water sampled~~s~~ over time. A minimum of four (4) replicate measurements of ~~pH and specific conductivity~~ the stabilization parameters will be recorded in the Groundwater Log shown in Attachment 1 for each groundwater sample. In addition to the start and end measurements, additional measurements will be taken every three minutes. All purging equipment that has been or will be in contact with ~~ground water~~ groundwater should be decontaminated prior to use (See Section I.C.6.). Decontamination water should be stored in appropriate containers and disposed of per I.C.4.b.

I.C.5. Groundwater Sampling Equipment:

The Department prefers that all sampling equipment be dedicated to a particular well. The following recommendations apply to the selection of sampling equipment:

- Sampling equipment should be chosen based on the analytes of interest and the characteristics and depth of the saturated zone from which the sample is withdrawn. For example, the choice of sampling equipment should reflect consideration of the potential for light non-aqueous phase liquid (LNAPL)~~s~~ and dense non-aqueous phase liquid (DNAPL) constituent~~s~~.

- Sampling equipment should be constructed of inert material. Sample collection equipment should not alter analyte concentrations, cause loss of analytes via sorption, or cause gain of analytes via desorption, degradation, or corrosion.

- Sampling equipment should be designed such that Viton®, Tygon®, silicone, or neoprene components do not come into contact with the groundwater sample.

- Sampling equipment should cause minimal sample agitation and should be selected to reduce and/or ~~/~~eliminate sample contact with the atmosphere during sample transfer. Sampling equipment should not allow volatilization or aeration of samples to the extent that analyte concentrations are altered.

- Dedicated bladder pumps should be placed with the pump-intake located in the middle or slightly above the middle of the screened interval.

I.C.6. Decontamination:

When dedicated equipment is not used for sampling (or well purging) or when dedicated equipment is stored outside of the well, it will be thoroughly decontaminated between wells by disassembling and washing with (non-phosphate) detergent, thoroughly rinsed with de-ionized water, and air dryed. All equipment coming in contact with media suspected of being contaminated will be decontaminated before it contacts a media ~~which~~ that is likely to be less contaminated or uncontaminated.

All non-dedicated ~~ground water~~ groundwater sampling equipment will be cleaned over a decontamination pad after each use in the following manner:

- Rinse with tap water.
- Wash with a non-phosphate laboratory detergent and tap water.
- Rinse with distilled water
- Wash with laboratory-grade methanol or isopropanol
- Triple rinse with de-ionized, distilled water
- Allow to air dry.

If the equipment is not to be used again immediately, it should be packaged and properly stored to protect it from dust and dirt. Equipment may be wrapped in aluminum foil (shiny side on the outside) and placed in a plastic bag. A label should be affixed to the outside wrapping summarizing the decontamination procedure and stating the date of decontamination. Decontaminated sampling equipment should not be placed on the ground or on other contaminated surfaces prior to insertion in the well.

The decontamination pad will be lined with polyethylene sheeting and sloped to promote drainage towards one corner into an in-ground container. This will facilitate removal of any potentially contaminated decontamination fluids. All decontamination water that is generated during sampling activities will be collected in containers and will be subsequently emptied into the Biological Wastewater Treatment Plant at ~~Radford AAP~~RFAAP. Disposable items will be disposed of as solid waste in an approved, permitted landfill.

I.C.7. Groundwater Sample Collection

Monitoring well sampling should always progress from a well that is the least ~~contaminated~~ contaminated to the well that is the most ~~contaminated~~contaminated, to minimize the potential for cross-contamination of samples that may result from inadequate decontamination of sampling equipment. Samples should be collected and containerized according to the volatility of the target analytes. The preferred collection order for some of the more common groundwater analytes is as follows:

- Volatile organics and total organic halogens
- Dissolved gases~~, and~~ total organic carbon and dissolved organic carbon
- Semi-Volatile Organics
- Pesticides/herbicides
- PCBs
- Metals and cyanide
- Perchlorate
- Total Phenols
- Major water quality cations and anions (sulfate, chloride, etc.)
- Nitrate

A sample collecting bottle kit should be prepared from the sample parameter list in accordance with approved sample analysis methods (see Appendix 4). The sample kit should be stored in clean coolers for transport to the site. To preserve sample intergrity, all samples should be collected in precleaned containers, preserved when required, and stored at the appropriate temperature. The containers shall be shipped with caps that are securely fastened. Samples shall be transferred directly from the sampling device to the sample containers.

The following recommendations apply to the use and operation of groundwater sampling equipment:

- Check valves should be designed and inspected to ensure that fouling problems do not reduce delivery capabilities or result in aeration of samples.

- Sampling equipment should never be dropped into the well, as this will cause degassing of the water upon impact.

- Contents of the sampling device should be transferred to sample

containers in a controlled manner that will minimize sample agitation and aeration.

- Decontaminated sampling equipment should not be allowed to come into contact with the ground or other contaminated surfaces prior to insertion into the well.
- Groundwater samples should be collected as soon as possible after the well is purged. Water that has remained in the well casing for more than about 2 hours has had the opportunity to exchange gases with the atmosphere and to interact with the well casing material.
- The rate at which a well is sampled should not exceed the rate at which the well was purged. Low sampling rates, approximately 0.1 L/min, are suggested. Pumps should be operated at rates less than 0.1 L/min when collecting samples for volatile organics analysis.
- Pump lines should be cleared at a rate of 0.1 L/min or less before collecting samples for volatiles analysis so that the samples collected will not be from the period of time when the pump was operating more rapidly.
- Pumps should be operated in a continuous, non-pulsating manner so that they do not produce samples that are aerated in the return tube or upon discharge.
- When sampling wells that contain LNAPLs, a stilling tube should be inserted in the well. Groundwater samples should be collected from the screened interval of the well below the base of the tube.
- Groundwater samples collected for analysis for organic constituents or parameters should not be filtered in the field.
- Sample collection must be accomplished prior to a flow-through cell, and subsequent to stabilization of indicator field parameters.

I.D. FIELD AND LABORATORY QA/QC PROGRAM

All laboratories performing groundwater analysis shall be VELAP accredited for ~~Additionally, the laboratory must be accredited for~~ the analytical method, matrix

Commented [RFAAP18]: This section revised for clarity and to reference new VELAP requirements

Commented [RFAAP19]: Revised June 2016 in response to NOD 1s.36

and target analyte ~~by the Virginia Environmental Laboratory Accreditation Program.~~.

Field Quality Assurance/Quality Control (QA/QC) requires the routine collection and analysis of ~~blanks~~ QC samples to verify that the sample collection and handling process has not affected data~~the~~ quality of the project samples. Both field and laboratory QC samples should be prepared during the sampling event. QC samples may include: ~~It is recommended that the following samples be analyzed with each batch of samples (a batch may not exceed 20 samples):~~

Field QC Samples:

- ~~One~~ F~~f~~ield duplicate (one blind field duplicate per event/all target constituents);
- E~~One e~~quipment rinsate Blank (required only when non-disposable and non-dedicated equipment is being used);
- Trip Blank (see comment below)

Laboratory QC Samples:

- ~~•~~
- ~~One m~~Matrix spike (MS) sample ~~(when appropriate for the method)~~; and
- ~~One d~~Sample duplicate ~~sample~~ (either a ~~matrix~~ sample duplicate or a matrix spike duplicate (MSD)) as appropriate to the analytical method; typically a MS/MSD/ sample duplicate is required with each sampling batch or 20 samples.

A trip blank should be ~~prepared~~ prepared by the laboratory and analyzed when samples are being analyzed for volatile organic analytes. A trip blank should be submitted with samples each day that samples are collected. Project MS/MSD/Sample duplicate should be collected from locations that are known or suspected to be impacted, where practical. The collection of additional sample volume is required for project specific laboratory QC samples noted above.

I.D.1. ~~All field QC~~ The field duplicate sample and the equipment rinseate blank ~~samples~~ should be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The concentrations of any contaminants found in blank samples should not be used to correct the groundwater data. ~~The contaminant c~~Target analyte concentrations in blanks should be documented, and if the concentrations are more than an order of

magnitude greater than the field sample results, the Permittee should resample the ~~ground-water~~groundwater. Other QA/QC practices such as sampling equipment calibration, equipment decontamination procedures, and ~~chain-of-custody~~ COC procedures are discussed in other sections of this Attachment.

I.D.2. Laboratory QA/QC Program

The permitte's laboratory should provide for the use of control samples. The Permittee should use appropriate statistical procedures to monitor and document performance and to implement an effective program to resolve testing problems (e.g., instrument maintenance, operator training). Data from control samples (e.g., spiked samples, duplicates, and blanks) should be used as a measure of performance or as an indicator of potential sources of cross-contamination. All QC data should be submitted to the Department with the groundwater monitoring sample results.

I.D.3. At a minimum, all field instruments should be calibrated at the beginning of each use and in accordance with the frequency suggested by the manufacturer. Field instruments should be calibrated using at least two calibration standards spanning the range of results anticipated during the sampling event. For example, if groundwater pH is expected to be near pH 7, the two standards used to calibrate the pH meter should be pH 4 and pH 10, respectively.

I.E. SAMPLE HANDLING AND CHAIN-OF-CUSTODY~~CUSTODY~~ (COC)

Sample handling will be strictly controlled to prevent sample contamination. ~~Chain-of-Custody~~ COC control for all samples will consist of the following:

1. Labels will be placed on individual sample containers while sampling indicating the sampler's name, date and time of sample collection, place of collection, and preservation method used for the sample.

2. A custody seal should be placed on the shipping container or on the individual sample bottles. Custody seals provide prevention or easy detection of sample tampering. The custody seal should bear the signature of the collector and the date signed. The custody seal can be placed on the front and back of a cooler, around the opening of a polyethylene overpack bag or on the lid of each sample container.

3. No sample should be brought back to the laboratory for preservation. It is recommended that two polyethylene overpack bags be used in shipping. The first will contain the sample bottles, the second the ice needed to keep the samples at ≤ 6 degrees ~~Celcius~~Celsius (C). A temperature history of the samples should be maintained as a ~~quality control~~ QC measure. Upon receipt of the shipment, the laboratory should record the temperature on the chain-of-custody record. The method holding time is defined by the analytical method and listed in Appendix 4. Holding time refers to the period t~~hat begins when the sample is collected from the well and ends with its~~ from sample collection to sample extraction and/or analysis.

4. A ~~chain-of-custody~~ COC record should be completed and should accompany every sample shipment. The ~~chain-of-custody~~ COC record should contain enough copies so that each person possessing the shipment receives his/her own and should be designed to allow the Permittee to reconstruct how and under what circumstances a sample was collected, including any problems encountered. An example of a ~~chain-of-custody~~COC form that includes the necessary information is included as Appendix 3.

~~4~~5. Samples will be packaged and labeled for shipment in compliance with current U.S. Department of Transportation regulations. All samples will be shipped priority/overnight via commercial carrier or hand delivered to the lab.

~~5~~6. Samples will arrive at the laboratory via the overnight delivery service or hand delivery. Upon delivery to the laboratory, the ice chests will be checked for intact custody seals and the samples will be unpacked and the information on the accompanying ~~chain of custody~~COC records will be examined. If the samples shipped match those described on the ~~chain-of-custody~~COC form, the laboratory sample coordinator will sign the form and assume responsibility for the samples. If problems are found with the sample shipment, the laboratory sample custodian will sign the form and record the problems in the "remarks" section.

7~~6~~. Any missing samples, missing sample tags, broken sample bottles, or unpreserved samples will be noted on the ~~chain-of-custody~~ COC record. If there are problems with individual samples, the sample custodian will inform the laboratory coordinator of such problems. The laboratory custodian will then contact the Permittee to determine a viable solution to the problem.

8~~7~~. All information relevant to the sample will be secured at the end of each business day. All samples will be stored in a designated sample storage refrigerator, access to which will be limited to laboratory employees.

I.F. FIELD LOGBOOK

Field technician(s) will keep an up-to-date field logbook documenting information pertaining to field activities. Appendix 1 of this Attachment provides an example of a Groundwater Log that includes the necessary information that must be completed for each monitoring well sampled.

II. LABORATORY ANALYSIS

Commented [RFAAP20]: This section revised for clarity

II.A. INTRODUCTION

The groundwater parameters and constituents to be analyzed include organic and inorganic constituents ~~which~~ that have been used at the facility or have been routinely detected in the facility's waste, sludge, and/or groundwater (**Attachment IV.B**). **Attachment IV.B** also lists analytical methods that must be used in the analysis of groundwater samples. All analyses must be conducted by a laboratory that is VELAP accredited for the ~~Additionally, the laboratory must be accredited~~

~~for the~~ analytical method, matrix and target analyte. ~~by the Virginia Environmental Laboratory Accreditation Program.~~

Commented [RFAAP21]: Revised Febuary 2017 per NOD 1s.36, removing the words "where applicable"

Laboratory methods will be selected to yield reporting limits (Limit of quantitation, or LOQ) values that are equal to or below human health-based standards for the target analytes, where practical. The human health-based standards are established as: follows:

- Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act;
- Alternate Concentration Limits (ACLs) whenever MCLs are not available; or
- EPA Region III Tap Water Risk Based Screening Levels (RSLs) when MCLs or ACLs are not available.

ACLs are calculated by the Risk Exposure and Analysis Modeling System (REAMS) using a residential groundwater ingestion-modeling scenario by DEQ. If an ACL or EPA Region III Tap Water RSL for a specific constituent is less than the lowest LOQ listed in SW-846 for that constituent, then an appropriate, DEQ approved, LOQ should be used.

II.B. LABORATORY QA/QC

~~QA/QC procedures will be used at all times. The laboratory shall assure the accuracy and precision of all analytical determinations.~~.

The analytical laboratory must develop, implement and maintain a quality system program to generate data of known and documented quality based on national performance standards adopted under the National Environmental Laboratory Accreditation Program (NELAP). Analytical laboratories producing compliance data must be accredited under 1VAC30-46, also called the Virginia Environmental Laboratory Accreditation Program (VELAP). VELAP accreditation under 1VAC30-46 incorporates TNI (The NELAC Institute) standards and its quality system requirements. The QA/QC plan for each VELAP accredited laboratory can be provided for review, if requested.

Commented [RFAAP22]: Revised this section June 2016 in response to NOD 1s.35.

Commented [RFAAP23]: Revised Febuary 2017 per NOD 1s.35

~~II.B.1. Internal quality control:~~
~~Internal quality control checks shall be undertaken regularly to assess the precision and accuracy of analytical procedures. Internal quality control checks shall include use of calibration standards, standard references, duplicates and spiked/fortified samples.~~

~~II.B.2. Calibration:~~
~~Calibration standards shall be verified against standard reference from an outside source. Calibration curves shall be comprised of a minimum of one blank and three standards. Samples shall be diluted if necessary to ensure analytical measurements fall on the linear portion of the calibration curve.~~

~~II.B.3. Duplicate samples:~~
~~Duplicate samples shall be processed at an average frequency of ten percent to assess the precision of testing methods, and standard references shall be processed monthly to assess accuracy of analytical procedures. Spiked/fortified samples shall be carried through all stages of sample preparation and measurement to validate the accuracy of analysis. During the course of analysis, quality control data and sample data shall be reviewed to identify questionable data.~~

III. DATA EVALUATION

III.A. ANALYTICAL DATA REVIEW AND VALIDATION~~W~~

To assess data quality, t~~T~~he Permittee and/or its representative will review and validate the analytical data in accordance with ~~on data quality objectives and to ensure that the laboratory followed proper analytical protocols. The data review will be performed in general accordance with~~ the following United States EPA guidance documents:

- *Test Methods for Evaluating Solid Wastes - Physical and Chemical Methods*, USEPA SW-846, 3rd edition - Final Update I, II/IIA and III), as updated;
- *USEPA National Functional Guidelines for Superfund Organic Methods Data Review*, August 2014, where applicable and as updated.
- *USEPA National Functional Guidelines for Inorganic Superfund Data Review, August 2014*, where applicable and as updated.
- ~~*Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses*, April 1993, and~~
- ~~*Region III Modifications to National Functional Guidelines for Organic Data Review Multi-Media, Multi-Concentration*, September 1994.~~

Commented [RFAAP24]: Revised June 2016 to reflect current guidance.

III.B. STATISTICAL EVALUATION

Statistical evaluations will be performed in general accordance with Appendix 6 to **Attachment IV.A**.

III.C. DATA QUALITY OBJECTIVE

~~High-quality data collection implies data of sufficient accuracy, precision, and completeness (i.e., ratio of valid analytical results to the minimum sample number called for in the permit) to meet the program objectives.~~ It is the Permittee's responsibility to report sufficient valid analytical results for each monitoring event. Reported data will be, at a minimum, ~~be~~ of such quality to immediately detect a release from the regulated unit. ~~Laboratory methods will be selected to~~

Commented [RFAAP25]: This section moved to IIA

~~yield reporting limits (Limit of quantitation, or LOQ) values that are equal to or below human health-based standards for the target analytes, where practical. The human health-based standards are established as:~~ follows:

~~Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act; Alternate Concentration Limits (ACLs) whenever MCLs are not available; or as EPA Region III Tap Water Risk Based Screening Levels (RSLs) when MCLs or ACLs are not available.~~

~~ACLs are calculated by the Risk Exposure and Analysis Modeling System (REAMS) using a residential ground water~~ groundwater ~~ingestion modeling scenario by VADEQ. If an ACL or EPA Region III Tap Water RSL for a specific constituent is less than the lowest LOQ listed in SW-846 for that constituent, then an appropriate, DEQ approved, LOQ should be used.~~

IV. RECORD KEEPING AND REPORTING

IV.A. INTRODUCTION

Copies of all groundwater analytical results, groundwater semiannual reports, groundwater annual reports, and groundwater level elevations, as well as the Groundwater ~~Sampling and Analysis Plan~~S&AP, ~~Facility Operating Permit, etc.~~ shall be maintained at the RFAAP throughout the active life of the facility and post-closure care period. The Permittee shall report the groundwater monitoring information to the Director described in Sections IV.B and IV.C below.

IV.B. GROUNDWATER MONITORING RESULTS

The Permittee shall report concentrations or values of the parameters and constituents listed in **Attachment IV.B** for each required groundwater monitoring well within 30 days after completing each analysis.

IV.C. ANNUAL REPORT

The Permittee shall submit an Annual Groundwater Monitoring Report to the ~~Virginia Department of Environmental Quality~~ DEQ by March 1st of the following year for the year beginning January 1st and ending December 31st. The annual report should contain: ~~containing:~~

1. Static groundwater level elevations;

2. Potentiometric surface maps reflecting each sampling event;

3. Groundwater flow rate and direction in the uppermost aquifer calculated after each sampling event;

4. Statistical evaluations of the concentrations or values of the parameters and constituents listed in **Attachment IV.B**;

5. The calculated or measured rate of migration of hazardous waste or hazardous waste constituents in the groundwater; and

6. Results of the evaluations of groundwater surface evaluations to determine whether the requirements for locating the monitoring wells continue to meet the criteria set forth in 40 CFR § 264.97.

Appendix 1

GROUNDWATER LOG EXAMPLE

SAMPLING EVENT _____
LOCATION _____
WELL NO. _____ DATE: _____
WEATHER _____ TEMPERATURE: _____

MEASUREMENT TEAM _____
TIME WELL CASING UNLOCKED_____
DEPTH TO WATER FROM TOP OF OUTER CASING _____FT
DEPTH OF WELL FROM TOP OUTER CASING _____FT
STATIC WASTER LEVEL _____FT

MEASUREMENT TECHNIQUE: [ ] WATER LEVEL INDICATOR
[ ] OTHER/EXPLAIN _____

FORMULAS FOR DETERMINING PURGE VOLUME **TWD =**
Water Level above Sand Pack: [ ]
$3 \times [(\pi r_b^2 h_s - \pi r_c^2 h_s) \times 0.3 + (\pi r_c^2 h_w)]$

Water Level below Sand Pack: [ ]
$3 \times [\pi r_b^2 h_w - \pi r_c^2 h_w) \times 0.3 + (\pi r_c^2 h_w)]$

where:
r_b = radius of boring =
r_c = radius of casing =
h_s = height of sand =
h_w = height of water =

IMMISCIBLE LAYERS: [ ] YES [ ]NO
DETECTION METHOD: [ ] VISUAL [ ] OTHER_____
COLLECTION METHOD: [ ] BEAKER [ ]OTHER_____

SAMPLE IDENTIFICATION _____

PURGE TEAM _____

PURGE PROCEDURE/EQUIPMENT: [ ]TEFLON BAILER
[ ]WELL PUMP

PURGE TIME _____ PURGE VOLUME _____

PURGE APPEARANCE _____
COMMENTS _____

Appendix 1V.A (cont'd)

SAMPLING EVENT: _____
LOCATION: _____
WELL: _____ DATE _____

SAMPLING PROCEDURE/EQUIPMENT: [ ]TEFLON BAILER
[ ]WELL PUMP

SAMPLING TIME: _____

pH METER CALIBRATED WITH BUFFERS: [ ]4 [ ]7 [ ]10
pH METER CALIBRATED BY: _____
CONDUCTIVITY METER CALIBRATED WITH STANDARD SOLUTION OF _____
CONDUCTIVITY METER CALIBRATED BY: _____

pH(S.U.) _____, _____, _____,

TEMP (ºC) _____, _____, _____,

COND (µS) _____, _____, _____,

SAMPLE COLLECTION TIME: CONTAINER*/PRESERVATIVE

(1)_____	VOC(G/NONE)	(2)_____	TOX(A/HNO_3)
(3)_____	TOC(A/H_2SO_4)	(4)_____	COD(A/H_2SO_4)
(5)_____	O&G/TPH(A/HCL)	(6)_____	PHEN(A/H_2SO_4)
(7)_____	N(/)	(8)_____	PHOS(A/H_2SO_2)
(9)_____	SO(/)	(10)_____	TMET(P/HNO_3)
(11)_____	DMET(P/NONE)	(12)_____	pH,COND(P/NONE)
(13)_____	CHLORIDE(P/NONE)	(14)_____	SMLL TST(P/NONE)
(15)_____	CN^- (P/NONE)	(16)_____	(P/NONE)

FINAL pH (S.U.) _____ FINAL TEMPERATURE (ºC)_____
FINAL CONDUCTIVITY (µS) _____

LOCKED WELL AT _____

COMMENTS _____

NOTES:

1. G = GLASS, A=AMBER GLASS BOTTLE, P=PLASTIC(POLYETHYLENE)
2. Samples requiring chilling to <6 º C should be placed in shipping containers with ice to reduce the temperature as soon as possible after sample collection. Ideally, samples should be shipped the day of collection for overnight delivery to the laboratory. If samples cannot be shipped the day of collection, the sample temperature should be maintained at ~~hipping containers (cooling chest with ice or ice pack) should be certified as to the~~ <6 º C, until they are shipped to and received by the laboratory. ~~temperature at time of sample placement into these containers. Preservation of samples requires that the temperature of collected samples be adjusted to <6the 4º C immediately after collection. Shipping coolers must be at <6 4º C and maintained at <6 4º C upon placement of sample and during shipment. Chain-of-custody~~ COC forms will have Shipping/Receiving ~~(max/min)~~ temperature boxes for recording data. ~~and verification~~.
3. IDW: Collect all used decontamination solutions and rinses; store in a labeled 55 gallon drum for no more than 90 days in accordance with DEQ's ~~IDW~~ Investigation Derived Waste (IDW) Policy.
4. SILTATION: If the level of siltation is higher than 1 foot above the base of the screen, the well will need to be redeveloped. Note whether the level of siltation is greater than 1 foot in the comments section.
5. DEDICATED TEFLON TUBING: replace if older than one year; note in comments the date the tubing was installed.

Commented [RFAAP26]: This section revised for clarity and for consistency with EPA requirements

Appendix 2

CALCULATIONS OF PURGE VOLUME

Determine purge volume as follows:

Water Level above sand pack:

$3 \times [(\Pi\, r_b^2\, h_s - \Pi\, r_c^2\, h_s) \times 0.3 + (\Pi\, r_c^2\, h_w)]$

Water Level below sand pack

$3 \times [(\Pi\, r_b^2\, h_w - \Pi\, r_c^2\, h_w) \times 0.3 + (\Pi\, r_c^2\, h_w)]$

where:

r_b = radius of boring
r_c = radius of casing
h_s = height of sand
h_w = height of water

This calculation must be based upon 30% filter pack volume. Once the volume to be purged is known, purging can begin. The purge water will be collected, containerized and disposed of in accordance with local, state and federal regulations and laws.

Appendix 3

EXAMPLE CHAIN OF CUSTODY

Appendix 4

SAMPLE CONTAINERS AND PRESERVATIVES

Analyte	SW-846 Analysis Numbers	Container	Preservative	Holding Time (days)
Metals except mercury	6010~~B~~, 6020~~A~~	HDPE	HNO_3 to pH<2	6 months
Dissolved Metals except mercury	6010,6020	HDPE	Field filter using 0.45 micron filter. HNO_3 to pH<2	6 months
Mercury	7470~~A~~	HDPE	HNO_3 to pH<2	28
Dissolved mercury	7470	HDPE	Field filter using 0.45 micron filter. HNO_3 to pH<2	28
Energetics and PETN	8330	Amber glass	<64º C	7/40
Nitroglycerin	~~8332~~8330	Amber glass	<64º C	7/40
Cyanide	~~9010B~~9012	HDPE	<6º C , NaOH to pH>12	14
~~Nitrate/nitrite/chloride/~~Aalkalinity	~~353.2~~~~IC300~~310.2/2320	Amber Glass or HDPE	<64º C	~~48 hours~~14 days
Nitrate as N	9056	Glass	<6º C	48 hours
Sulfate/Chloride	9056	Glass	<6º C	28 days
Chlorate~~, chlorite~~	IC300	Amber Glass	EDA, <6º C	28 days
Chlorite	IC300	Amber glass	EDA, <6º C	14 days
Perchlorate	314.0/6850	HDPE or Glass	<6º C ~~None~~, field filtered using 0.2 micron filter	28
Total Organic Carbon (TOC)	9060	HDPE	<6º C , HCl or H2S04, to pH <2	28
Dissolved Organic Carbon (DOC)	9060	HDPE	Field filter using 0.45 micron filter	28

Commented [RFAAP27]: Table revised to reflect correction information

Commented [RFAAP28]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP29]: Revised in accordance with VDEQ-approved Class 1 Permit Modification dated June 12, 2014.

Commented [RFAAP30]: Revised to be consistent with Permit Attachment V.D.

Commented [RFAAP31]: Revised to be consistent with Permit Attachment VII.C.

			HCl or-H2S04, to pH <2, <6º C	
Appendix IX Volatile Organics	8260~~B~~	40 ml Glass VOA	<6 4º C, HCl ~~H_2SO_4~~ to pH<2,	14
Appendix IX Semi-volatile Organics	8270~~C~~	Amber glass	<6 4º C	7/40
Appendix IX Organochlorines	8081~~A~~	Amber glass	<64º C	7/40
Appendix IX Herbicides	8151~~A~~	Amber glass	<6 4º C	7/40
Appendix IX Organophosphates	8141~~A~~	Amber glass	<6 4º C	7/40

NOTES:

1. References:
   Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, SW-846 (~~2nd~~ 3rd Edition~~edition, 1982)~~., as updated.

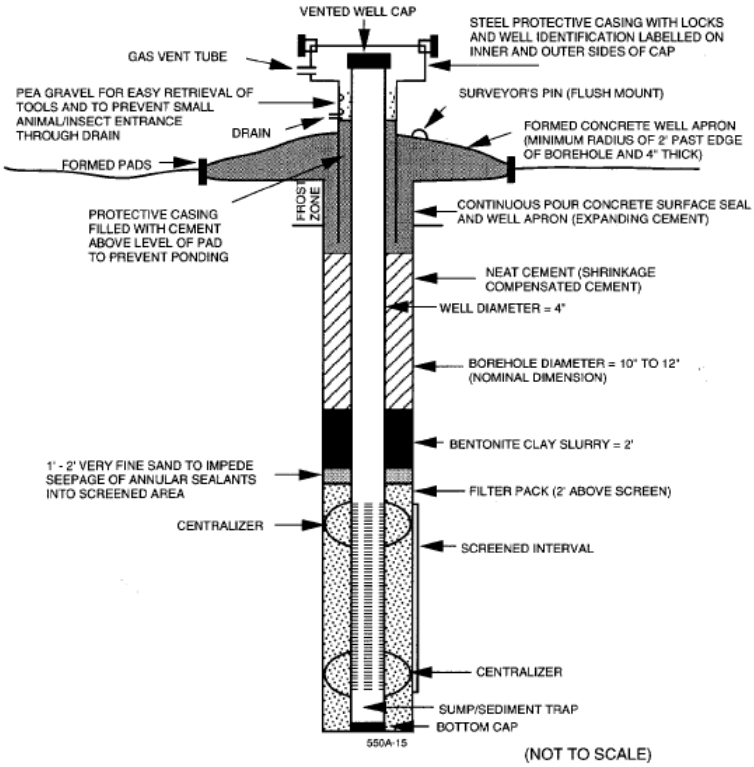
   Methods for Chemical analysis of Water and Wastes, EPA-600/4-79-020.
   Standard Methods for the Examination of Water and Wastewater, 19~~6~~th edition ~~(1985)~~or other method with prior VDEQ approval.

   *Current analytical method updates are represented with suffixes on each method (e.g., SW-846 Method 6020**A**). ~~Analysis~~The laboratory performing the analysis must be VELAP ~~as~~ accredited ~~under the Virginia Environmental Laboratory Accreditation Program (VELAP~~., ~~for a~~for a current method update.*

2. Container Types:
   HDPE = Plastic (polyethylene)
   T = Fluorocarbon resins (PTFE, Teflon. FEP, PFA, etc.)

Appendix 5

MONITORING WELL CONSTRUCTION DIAGRAM
(from *EPA Technical Enforcement Guidance Document, 1986*)



CROSS-SECTION OF TYPICAL MONITORING WELL

Appendix 6

STATISTICAL PROCEDURES

A. HIGHLIGHTS

In accordance with 40 CFR 264.97(g), the permittee will collect an appropriate number of samples from upgradient well(s) and an appropriate number of samples from each of the point of compliance wells specified in Permit Section IV.C.1. Appropriate background sample sizes for the preferred method of statistical analysis will be collected prior to the scheduled date of the statistical analysis.

Statistical analysis of the groundwater data will include the following:

1. Outliers
2. Testing of normality
3. Missing data
4. Evaluation of data below detection limits or quantitation limits
5. Selection of statistical method
6. Verification sampling strategy (optional)

B. OUTLIERS

An outlier refers to a data point which is an inconsistently large or small value. An outlier can be observed due to sampling, laboratory, transportation, or transcription errors. To remove the possibility of including data with this type of error, the historical data should be screened for each well and constituent for the existence of outliers (USEPA 1992 section 6.2) using the method described by Dixon (1953) or another method approved by the VADEQ. Background observations, which are considered to be outliers, should not be included in the statistical analysis. If an extreme value occurs in a point-of-compliance well or during a Detection sampling event, the facility should collect a re-sample during the Detection period of the initial sample. Any elimination of an outlier data must be approved by the Department.

Commented [RFAAP32]: Revised June 2016 in response to NOD 3s.4.

C. TESTING NORMALITY OF DATA DISTRIBUTION

The Permittee shall verify that the distribution of monitoring data for the Hazardous Constituents is consistent with the assumptions of the selected statistical test method. A multiple group version of the Shapiro-Wilk test shall be applied to determine if the distribution of the data is normal or lognormal. To test for log normality, the natural logarithms of original data are taken and if the distribution of the transformed concentrations is normal then the data are considered to be log-normally distributed. The permittee may use any other appropriate method for testing the distributional assumptions (see Gibbons 1994a for a review, also see USEPA 1992). However, the permittee shall demonstrate that the alternative method can detect deviations from normality with similar power as the Shapiro-Wilk and Shapiro-Francia methods. No testing of normality is required when the percentage of non-detects or non-quantified values is greater than 50%. Once the distribution of the data is determined, the permittee should apply statistical tests as follows:

- When the detection frequency is less than 50% and/or transformation fails to bring about normality, a non-parametric method should be used.

- When the detection frequency is between 50%-75%, a parametric test can be performed with an adjustment for non-detects. Aitcheson's or Cohen's adjustments are recommended. Determination of the appropriate adjustment to be applied should be based on the properties of the data set (USEPA, 1992, S~~s~~ection 2.2).

- When the detection frequency is 75% or greater, an appropriate parametric test may be applied without adjusting for non-detects. Non-detects should be analyzed using one half the laboratory limit of detection or quantitation.

D. MISSING DATA

If a sampling event results in a missing data value, an attempt to resample for the missing value shall be made within two weeks.

E. DATA BELOW DETECTION LIMITS

For data where the non-detects or non-quantified values are less than 25 percent~~, the~~, the Permittee shall replace the non-detects or non-quantified values with one half the laboratory limit of detection or quantitation. However, when the percentage of non-detects or non-quantified values is greater than 25 percent and less than 50 percent the mean and standard deviation should be adjusted using Atchison's method (USEPA 1992

section 2.2.2 and Aitchison, 1955). An acceptable alternative to Aitchison's method is Cohen's maximum likelihood estimator (Cohen, 1961). Extensive tables and computational details are also provided in Gibbons, 1994a. The approach for selection between the two methods is described in USEPA (1992) section 2.2.1.

F. SELECTION OF STATISTICAL METHOD

The Permittee shall use an appropriate statistical method consistent with the Virginia Hazardous Waste Management Regulations. As specified in these regulations, the level of significance for individual well comparison shall be no less than 0.01 and no less than 0.05 for multiple comparisons. However, these performance standards do not apply for prediction intervals, tolerance intervals and control charts. The false positive rate for these interval methods or control charts can depend on the number of data points available from the background wells at the time of statistical comparison. A larger number of background data points can decrease the false positive rate for these tests. In the event the Permittee has decided to use ~~an interval~~an interval method or other statistical method, and if the selected method requires additional samples~~, the~~, the Permittee shall collect the requisite additional samples ~~prior to the date specified in this permit~~ for conducting appropriate statistical analysis within DEQ acceptable timeframes and frequencies. The statistical comparison shall not be delayed due to collection of an inadequate number of samples. The false positive rate for a single constituent/well comparison shall not be lower than .01 unless the Permittee can demonstrate that an alternative false positive rate will provide at least 50% power to detect a 3 standard deviation increase above background levels and 80% power to detect a 4 standard deviation increase above background levels.

1. Interval Method

If the Permittee uses an interval method and the percentage of detects is greater than 50%, the Permittee shall test the data from the background wells for normality. If the background well data are normally or log-normally distributed the permittee shall use a parametric interval method. Table 1 provides the suggested minimum number of samples for calculation of parametric interval methods that are acceptable to VADEQ. In the event the background data are not normally or log-normally distributed the permittee shall use a non-parametric interval ~~method .~~ method. Suggested test methods and recommended minimum sample size requirements are provided in Table 1. However, a statistical analysis can be conducted with a smaller dataset than the suggested size at any time. Please note that these methods can lead to higher false positive or false negative rates with smaller samples sizes. For each sampling event, the permittee shall

calculate the appropriate interval for the background data set based on the method selected, and compare each data point from the compliance well to the upper limit. If the compliance well data exceeds the upper limit, the permittee shall report that there has been a statistical increase of contaminants in the groundwater.

2. Other Methods

In the event the Permittee has selected any other method listed in the Virginia Hazardous Waste Management Regulations, the Permittee shall collect the appropriate number of samples and shall maintain the appropriate level of significance specified above.

G. VERIFICATION SAMPLING (OPTIONAL)

Verification resampling can be an integral part of the statistical methodology. ~~(USEPA, 1992 section 5)~~.~~; however, it should be considered as a part of the statistical test and based on the site-specific condition. Since the probability of an initial exceedance is very high for the site as a whole (considering only test-wise false positive rates), the verification sample is considered as a part of the evaluation to conclude a statistically significant exceedance. A pre-planned verification sample can be incorporated into the calculation of the statistical limits to calculate an upper limit using a smaller false positive rate. Without verification resampling, an attempt to minimize the false positive rates will lead to very large prediction limits. This will increase the false negative rates and decrease the power of the test to detect a release from the facility.~~ All verification samples must be collected prior to the next scheduled sampling event at the earliest time ~~possible~~ practical ~~(prior to next scheduled sampling event)~~ or as approved by the DEQ or as specified in this permit. ~~Note that the Department must be informed of any planned verification resampling in advance.~~

~~Verification resampling can involve one or two samples. DEQ's preferred strategy includes passing one verification resample or passing one of two verification resamples. Statistical analyses which incorporate verification samples must provide at least 50% power to detect a 3 standard deviation increase above background levels and 80% power to detect a 4 standard deviation increase above background levels.~~

Commented [RFAAP33]: Revised to reflect current DEQ policy for verification sampling

H. COMPARISON OF POINT OF COMPLIANCE WELL DATA TO A STANDARD DURING COMPLIANCE OR CORRECTIVE ACTION MONITORING

Commented [RFAAP34]: Revised this Section June 2016 in response to NOD 3s.5, except where noted.

The facility will initially perform a value-to-value comparison to GPS for all groundwater monitoring data. If a GPS exceedance is noted during the value-to-value comparison for a parameter(s), the facility may collect a verification sample and results from the verification sample will be compared to the GPS in a value-to-value comparison as long as the comparison is completed within 30 days of receipt of the the initial sampling event data from the laboratory. Further, the facility may collect three additional independent groundwater samples during the compliance period for the suspect constituent(s) in order to perform a statistical comparison to GPSs that is based on ACL or MCL. The facility should calculate lower normal confidence limit to compare ti to the standard compliance wells data. The facility should calculate upper normal confidence limit to compare it to the standard corrective action monitoring wells data. The level of confidence of the interval should be 80% for a sample size of 4-7 and 9-% for a sample size of 8-10.

Commented [RFAAP35]: Revised June 2016 in response to NOD 3s.5. Changed from within 30 days of the initial sampling event to as noted (30 days from receipt of lab data). This allows for review of data and completion of a verification event. DEQ will be notified of GPS exceedance and intent to resample within 7 days from receipt of lab data per permit.

~~In accordance with the Virginia Hazardous Waste Management Regulations the point of compliance data shall be compared to the GWPS. If a maximum contaminant level (MCL) is promulgated or alternate concentration limit (ACL) is established for a constituent, and the ACL or MCL is greater than the background limit (or statistically determined background level), the ACL or MCL is the groundwater protection standard. All new concentrations in the point of compliance wells should be compared to the standard (i.e., ACL or MCL) using the lower 95% confidence limit computed from the last four sampling values (collected during the last 12 months).~~

~~If an upper limit based on a tolerance or prediction limit calculated from naturally occurring background data exceeds the MCL or ACL, then the background limit will be the groundwater protection standard. If the groundwater protection standard is based on a tolerance or prediction limit, the point of compliance samples shall be compared to the GWPS using a point comparison. If the point of compliance sample exceeds the background based GWPS, a statistical exceedence above the GWPS shall be reported to the Department.~~

~~However, for all constituents analyzed, if the established groundwater protection standard is less than the Department accepted Limit of Quantitation (LOQ) then the LOQ becomes the standard, and the new point of compliance well data will be compared to the LOQ.~~

~~Comparisons of point of compliance well data to a groundwater protection standard based~~

~~on a MCL or ACL should be performed by a parametric or non-parametric confidence interval. If data are normally or log-normally distributed a 95% lower confidence limit on the last four samples (collected during the last 12 months) can be calculated for comparison to the MCL or ACL. If data are not normally or log-normally distributed the minimum concentration from the last four samples (collected during the last 12 months) should be compared to the groundwater protection standard (based on a MCL or ACL). Alternative statistical methods for comparing lower limits of Compliance well data to a groundwater protection standard based on a MCL or ACL should be approved by the Department prior to implementation. If the lower confidence limit or minimum concentration exceeds the groundwater protection standard based on a MCL or ACL then the permittee has shown a statistical exceedence above the ground water protection standard.~~

~~Please note that a point comparison (non-statistical) to the GWPS (based on a MCL or ACL) may be performed if only one data point exists for a sampling event. If the point comparison indicates that the given data point is above the groundwater protection standard, and the GWPS is based on a MCL or ACL, and the facility chooses not to use data from the previous three sampling events, then additional samples (at least three additional samples will be required to calculate a confidence interval) may be collected within the next 3 months and a statistical comparison to the GWPS (based on a MCL or ACL) may be performed.~~ .

I. REFERENCES

1. Aitchison, J. On the distribution of a positive random variable having discrete probability mass at the origin, Journal of American Statistical Association, 50(272), 901-908 (1955).

2. Cohen, A.C. Tables for maximum likelihood estimates: Singly truncated and singly censored samples, Technometrics, 3, 535-541 (1961).

3. Gibbons, R.D. Statistical Methods for Groundwater Monitoring, John Wiley and Sons, Inc., 1994.

4. Gibbons, R.D. Some conceptual and statistical issues in analysis of groundwater monitoring data, Environmetrics, 7, 185-199 (1996).

5. USEPA, Statistical analysis of groundwater monitoring data at RCRA facilities. Addendum to Interim Final Guidance. Office of Solid Waste, July 1992.

6. USEPA, Statistical analysis of groundwater monitoring data at RCRA facilities - Interim Final guidance (April 1989).

7. USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*. USEPA Office of Resource Conservation and Recovery. March 2009. GPO. Washington, DC. EPA 530/R-09-007.

Commented [RFAAP36]: Updated to reflect current guidance document

Table 1

Suggested Minimum Samples*			
	Parametric	Non-Parametric	Non-Parametric Interval %Confidence
CABF T-test	4	NA	NA
Wilcoxon Rank Sum	NA	5	NA
Confidence Interval	4	NA	NA
Tolerance Interval	8	19	95%
Prediction Interval	8	13	99%#
Shewhart CUSUM Chart+	8	NA	NA

* The above tests can be used with fewer samples; however it will increase the false positive rate.

Includes one verification re-sample, use 19 samples for a 95% Prediction Interval with no verification re-samples.

+ For Intra-well testing only.

NA Not Applicable.

Appendix 7

MONITORING WELL ABANDONMENT PROCEDURES

NOTE: Approval from the Director must be granted before any monitoring well may be abandoned.

A. Well abandonment activites must be completed in accordance with the Department's well abandonment policy, *VDEQ Recommended Well Abandonment Policy*, VDEQ, July 10, 2015 or most recent policy.

INSERT JULY 2015 DEQ MEMORANDUM ON WELL ABANDONMENT (PAGE 1)

INSERT JULY 2015 DEQ MEMORANDUM ON WELL ABANDONMENT (PAGE 2)

~~Monitoring wells and/or piezometers will be abandoned by pressure grouting methods. Surface installations (protective covers or manholes) will be removed and an attempt to pull the casing string with the rig will be made. Once this has either been accomplished or has failed, grouting operations will commence as described below.~~

~~A.1. Monitoring well abandonment will be accomplished by lowering a tremie pipe to the bottom of the borehole.~~

~~A.2. Portland cement/bentonite grout will then be pumped down the tremie pipe until an even flow of consistent grout returns at the surface.~~

~~A.3. The tremie pipe will be removed from the borehole on completion of grouting operations and a minimum four inch thick and six foot diameter concrete cap will be constructed over the grouted borehole.~~

~~B. Removed casings will be steam cleaned, cut up into manageable sections, and disposed of as refuse.~~

~~C. All tremie rods and other downhole equipment will be steam cleaned prior to introduction into the hole or well.~~

~~D. All decontamination fluid will be containerized and handled pursuant to decontamination fluid handling procedures contained in Appendix 9.~~.

Appendix 8

BORING LOGS AND WELL CONSTRUCTION DIAGRAMS

Boring logs and well construction diagrams for groundwater monitoring wells are included as appendices to this Attachment.

Well 13MW~~-~~1
Well 13MW~~-~~2
Well 13MW~~-~~3
Well 13MW~~-~~4
Well 13MW~~-~~5
Well 13MW~~-~~6
Well 13MW~~-~~7
Well 13MW-8 ~~(to be inserted upon installation of well)~~

Commented [RFAAP37]: Dashes removed from well nomenclature for consistency with maps

Commented [RFAAP38]: Well 13MW8 was installed in October 2013.

BORING LOG AND WELL
CONSTRUCTION DIAGRAM FOR 13MW-1

BORING LOG AND WELL
CONSTRUCTION DIAGRAM FOR 13MW-2

BORING LOG AND WELL
CONSTRUCTION DIAGRAM FOR 13MW-3

BORING LOG AND WELL
CONSTRUCTION DIAGRAM FOR 13MW-4

BORING LOG AND WELL
CONSTRUCTION DIAGRAM FOR 13MW-5

BORING LOG AND WELL
CONSTRUCTION DIAGRAM FOR 13MW-6

BORING LOG AND WELL
CONSTRUCTION DIAGRAM FOR 13MW-7

BORING LOG AND WELL CONSTRUCTION DIAGRAM FOR 13MW8

~~(to be inserted upon installation of well)~~

Commented [RFAAP39]: Well 13MW8 was installed in October 2013.
PLEASE INSERT BORING LOG FOR WELL 13MW8 HERE>

Appendix 9

~~INVESTIGATIVE~~ INVESTIGATION DERIVED WASTE POLICY

PERMIT ATTACHMENT IV.B

GROUND WATER MONITORING LIST

PERMIT ATTACHMENT IV.B

GROUND WATER MONITORING LIST

Constituents	CASRN	Analytical Method
Energetics		
1,3,5-trinitrobenzene	99354	8330
1,3-dinitrobenzene	99650	8330
2,4-dinitrotoluene	121142	8330
2,6-dinitrotoluene	606202	8330
Nitroglycerin	55630	8330
Semivolatiles		
2,4-dichlorophenol	120832	8270
3,3'-dimethylbenzidine	119937	8270
2-chlorophenol	95578	8270
3-methylphenol	108394	8270
4-methylphenol	106445	8270
4-nitrophenol	100027	8270
Acetophenone	98862	8270
Benzo(a)anthracene	56553	8270
Benzo(a)pyrene	50328	8270
Benzo(b)fluoranthene	205992	8270
Benzo(k)fluoranthene	207089	8270
Bis(2-ethylhexyl)phthalate	117817	8270
Butyl benzyl phthalate	85687	8270
Dibenzo(a,h)anthracene	53703	8270
Dibenzofuran	132649	8270
Dibutyl phthalate	84742	8270
Diethyl phthalate	84662	8270
Dimethyl phthalate	131113	8270
Di-n-butyl phthalate	84742	8270
Di-n-octyl phthalate	117840	8270

Commented [RFAAP1]: Note multiple constituents proposed for deletion. See Permit Attachment VII.C for discussion and basis.

Commented [RFAAP2]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP3]: Revised in accordance with VDEQ-approved Class 1 Permit Modification dated June 12, 2014.

Commented [RFAAP4]: Revised February 2017 per NOD 2S.5. Table was updated to reflect constituents inadvertently deleted. Applies to all edits below. Note when the Unit returns to Detection Monitoring, a permit mod will be prepared and additional changes to applicable lists for Module IV will be proposed with appropriate justification at that time.

Commented [RFAAP5]: Corrected to be consistent with Permit Attachments V.B, V.E, and VII.C.

Constituents	CASRN	Analytical Method
Diphenylamine	122394	8270
Fluoranthene	206440	8270
Hexachloroethane	67721	8260
Indeno(1,2,3-cd)pyrene	193395	8270
Naphthalene	91203	8260
Nitrobenzene	98953	8270
Phenol	108952	8270
Pyrene	129000	8270
Volatiles		
1,1-dichloroethane	75343	8260~~8260B~~
1,2-dichloroethane	107062	8260
1,1-dichloroethene	75354	8260
Benzene	71432	8260
Benzyl chloride	100447	8260
Carbon tetrachloride	56235	8260
Chlorobenzene	108907	8260
Chloroform	67663	8260
Methyl bromide	74839	8260
Methyl chloride	74873	8260
Methylene chloride	75092	8260
Tetrachloroethene	127184	8260
Toluene	108883	8260
1,1,1-trichloroethane	71556	8260~~8260B~~
Trichloroethene	79016	8260
Trichlorofluoromethane	75694	~~8260B~~8260
Vinyl chloride	75014	8260
Total Metals		
Antimony	7440360	6010/6020
Arsenic	7440382	6010/6020
Barium	7440393	6010/6020

Commented [RFAAP2]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP6]: Added to annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

Commented [RFAAP7]: Added to annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

Commented [RFAAP8]: Added to annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

Commented [RFAAP9]: Revised to be consistent with Permit Attachments V.B, V.E, and VII.C.

Constituents	CASRN	Analytical Method
Cadmium	7440439	6010/6020
Chromium	7440473	6010/6020
Lead	7439921	6010/6020
Mercury	7439976	7470
Nickel	7440020	6010/6020
Selenium	7782492	6010/6020
Silver	7440224	6010/6020
Zinc	7440666	6010/6020
Miscellaneous		
Perchlorate	14797730	314.0/6850

Commented [RFAAP2]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP10]: Revised to be consistent with Permit Attachment VII.C.

Note:

1. Alternate SW-846 Methods may be approved by the Department if the request is in writing and submitted at least 30 days prior to the sample collection event. Proposed alternative methods must achieve the appropriate Data Quality Objective (i.e. at least a Department approved health-based concentration limit).

2. Current method updates are represented without suffixes on each method (e.g., SW-846- Method 6020A). The laboratory performing the analysis must be VELAP accredited for a current method update.

3. The laboratory performing the analysis must be VELAP accredited for the matrix, method and analyte.

Commented [RFAAP11]: Revised and updated for clarification

~~1.~~

PERMIT ATTACHMENT IV.C

INITIAL BACKGROUND CONCENTRATIONS

PERMIT ATTACHMENT IV.C

INITIAL BACKGROUND CONCENTRATIONS

Constituents	CASRN	Initial Background Concentration
Energetics		
1,3,5-trinitrobenzene	99354	2.5
1,3-dinitrobenzene	99650	2.5
2,4-dinitrotoluene	121142	10
2,6-dinitrotoluene	606202	5
Nitroglycerin	55630	16
Semivolatiles		
2,4-dichlorophenol	120832	10
3,3'-dimethylbenzidine	119937	10
2-chlorophenol	95578	10
3-methylphenol	108394	20
4-methylphenol	106445	20
4-nitrophenol	100027	20
Acetophenone	98862	10
Benzo(a)anthracene	56553	10
Benzo(a)pyrene	50328	10
Benzo(b)fluoranthene	205992	10
Benzo(k)fluoranthene	207089	10
Bis(2-ethylhexyl)phthalate	117817	10
Butyl benzyl phthalate	85687	10
Dibenzo(a,h)anthracene	53703	10
Dibenzofuran	132649	10
~~Dibutyl phthalate~~	~~84742~~	
Diethyl phthalate	84662	10
Dimethyl phthalate	131113	10
Di-n-butyl phthalate	84742	10
Di-n-octyl phthalate	117840	10
Diphenylamine	122394	10
Fluoranthene	206440	10
Hexachloroethane	67721	10
Indeno(1,2,3-cd)pyrene	193395	10
Naphthalene	91203	1

Commented [RFAAP12]: This column is blank in the original Permit. Background concentrations added from Permit Attachment V.E.

Commented [RFAAP13]: Revised February 2017, deleting this row as the constituent appears elsewhere in the table

Constituents	CASRN	Initial Background Concentration
Nitrobenzene	98953	10
Phenol	108952	10
Pyrene	129000	10
Volatiles		
1,1-dichloroethane	75343	1
1,2-dichloroethane	107062	1
1,1-dichloroethene	75354	1
Benzene	71432	5
Benzyl chloride	100447	5
Carbon tetrachloride	56235	5
Chlorobenzene	108907	5
Chloroform	67663	1
Methyl bromide	74839	1
Methyl chloride	74873	5
Methylene chloride	75092	5
Tetrachloroethene	127184	1
Toluene	108883	5
1,1,1-trichloroethane	71556	1
Trichloroethene	79016	1
Trichlorofluoromethane	75694	1
Vinyl chloride	75014	1
Total Metals		
Antimony	7440360	6
Arsenic	7440382	5
Barium	7440393	206
Cadmium	7440439	1
Chromium	7440473	112
Lead	7439921	14
Mercury	7439976	2.52
Nickel	7440020	5
Selenium	7782492	5
Silver	7440224	2.4
Zinc	7440666	5
Miscellaneous		
Perchlorate	14797730	4

Commented [RFAAP12]: This column is blank in the original Permit. Background concentrations added from Permit Attachment V.E.

Commented [RFAAP14]: Added to semiannual Compliance monitoring list and annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

Commented [RFAAP15]: Added to semiannual Compliance monitoring list and annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

Commented [RFAAP16]: Added to semiannual Compliance monitoring list and annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

MODULE V

GROUNDWATER COMPLIANCE MONITORING PROGRAM

Commented [RFAAP1]: Suggested revisions added June 2015 as part of the RCRA permit renewal application for the RFAAP open burning ground

V.A. HIGHLIGHTS

~~T~~The Open Burn Ground (OBG) (a.k.a., Hazardous Waste Management Unit - 13 (HWMU-13) at the Radford Army Ammunition Plant (RFAAP) is a waste propellant open burning ground. The OBG is located on the southeastern end of the Horseshoe Area on the flood plain of the New River and consists of eight above-ground burning assemblies. The waste spill "clean-up" residues are hazardous due to their reactivity (D003) as specified in 9VAC 20-60-261, incorporating 40 CFR 261.23, toxicity (D005, D008 and D030) as specified in 9VAC 20-60-261, incorporating 40 CFR 261.24, and/or ignitability (D001) as specified in 9VAC 20-60-261, incorporating 40 CFR 261.21.

Groundwater monitoring has been conducted at the OBG since 1992. The OBG was in Interim Status, and groundwater monitoring activities were conducted quarterly in accordance with the requirements of 40 CFR 265. In October 1999, the "Groundwater Quality Assessment Report" for the OBG was submitted to the Virginia Department of Environmental Quality (DEQ/Department). A groundwater monitoring list was included in the report. The monitoring list consisted of a subset of the constituents listed in 40 CFR 264 Appendix IX that previously had been detected in the groundwater and/or that would be reasonably expected to be in or derived from the waste burned at OBG.

In September 2005, DEQ issued the original *Permit for the Treatment of Hazardous Waste by Open Burning* (Permit) for the OBG (effective on October 28, 2005). However, beginning in Fourth Quarter 2003, quarterly groundwater monitoring was conducted in accordance with the "Detection Groundwater Monitoring Program for the Open Burning Ground", dated September 2003, in anticipation of receipt of the Permit.

Exceedances of established background values for carbon tetrachloride and perchlorate during the Fourth Quarter 2005 Detection monitoring event prompted

the need to develop a Compliance Monitoring program in accordance with the requirements of the Permit. As a result, during First Quarter 2006, all wells were sampled for the full Appendix IX constituent list and the hazardous constituents detected formed the basis for the Compliance Monitoring List for the OBG Unit.

The Permittee submitted a revised Compliance Monitoring Plan with proposed Groundwater Protection Standards (GPSs) to the Department and the first semiannual groundwater Compliance Monitoring event for 2007 was conducted in accordance with the revised Compliance Monitoring Plan during Second Quarter 2007.

During semiannual groundwater Compliance Monitoring, concentrations of at least two constituents, perchlorate and carbon tetrachloride, exceeded their respective GPSs at one or more downgradient well(s). As a result, according to 40 CFR 264.91(a)(2), the Permittee implemented a Corrective Action Program (CAP) under 40 CFR 264.100.

Permit Module VII – *Corrective Action and Groundwater Monitoring Program*, was approved by the DEQ in the Class 3 Hazardous Waste Permit Modification dated September 27, 2011. This module was revised on Feb 22, 2012, November 9, 2013, June 12, 2014 and with this permit module.

Currently, groundwater is conducted semiannually in accordance with the Corrective Action and Groundwater Monitoring Program.

This permit module, Module IV – Detection Monitoring, presents requirements of the Detection Monitoring Program and includes the Sampling and Analyis Plan (SAP) for the facility which is incorporated by reference in the Compliance Monitoring and Corrective Action Monitoring permit modules.

Currently, RFAAP continues to monitoring groundwater semiannually at the OBG in accordance with the Corrective Action and Groundwater Monitoring Program.

This permit module, Module V – Compliance Monitoring, presents requirements of the Compliance Monitoring Program in the event the OBG returns to semiannual groundwater Compliance monitoring.

~~The Open Burn Ground (OBG) Hazardous Waste Management Unit 13 (HWMU-13) at the Radford Army Ammunition Plant (RAAP) is a waste propellant open burning ground. The waste spill "clean-up" residues are hazardous due to their reactivity (D003) as specified in 9VAC 20-60-261, incorporating 40 CFR 261.23, toxicity (D005, D008 and D030) as specified in 9VAC 20-60-261, incorporating 40 CFR 261.24, and ignitability (D001) as specified in 9VAC 20-60-261, incorporating 40 CFR 261.21.~~

~~The "Groundwater Quality Assessment Report" for the OBG HWMU-13 was submitted in October 1999. A groundwater monitoring list was included in the report. The monitoring list consists of a subset of the constituents listed in Appendix IX to 40 CFR 264 that previously have been detected in the groundwater and/or that are reasonably expected to be in or derived from the waste burned at OBG HWMU-13.~~

~~The Permit for the Treatment of Hazardous Waste by Open Burning (OBG HWMU-13) was issued on September 28, 2005 and was effective on October 28, 2005. Prior to the issuance of the Permit, the OBG was in Interim Status, and groundwater monitoring activities were conducted quarterly in accordance with the requirements of 40 CFR 265. Beginning in Fourth Quarter 2003, the groundwater at the OBG was monitored quarterly in accordance with the "Detection Groundwater Monitoring Program for the Open Burning Ground", dated September 2003, in anticipation of receipt of the Permit for the HWMU-13. The permittee began semiannual detection monitoring at the OBG in accordance with the Permit after it went into effect in October 2005. Perchlorate and carbon tetrachloride detections exceeding their respective unit-specific background concentrations were found during Fourth Quarter 2005.~~

~~The Permittee determined that hazardous constituents related to the site were detected at statistically significant concentrations above background concentrations at the point of compliance for the OBG HWMU-13 area at the Radford AAP. Therefore, according to 40 CFR 264.91 (a)(1), the Permittee shall implement the Compliance Monitoring Program specified below in accordance the requirements of 40 CFR 264.99.~~

V.A.1. Soils and Geology

For general soil occurrence and properties for ~~Radford AA~~RFAAP~~P~~ see Section 2.1 of **Permit Attachment II.C**. The general hydrogeologic setting and characteristics for ~~Radford AAP~~ RFAAP are described in Sections 2.0 and 2.2 of **Permit Attachment II.C**.

For HWMU-13 the geological cross section location map and geological cross sections are included in Figures V.A.1 and V.A.2 at Attachment V.A.

The OBG is underlain by an approximately 13-20 feet thick alluvial deposit consisting of clay and silt overlying sand and gravel. The alluvium is underlain by Middle Cambrian Age carbonate bedrock of the Elbrook Formation comprised of dolomite and limestone with lesser shale and siltstone. The distinctive feature of the formation is the thin bedding and generally shaley character. Much brecciation is evident through the formation. Lowlands characterized by karst features form over these rock types. Bedrock was encountered beneath HWMU-13OBG at depths ranging from 13 to 20 feet BGS. The bedrock surface is irregular.

Geologically distinctive or consistent karst lineament trends were not observed within the Horseshoe Area. Karst features are likely obscured or are not obvious due to the thickness of the mantled terrace deposits, and/or due to historical site development. In the Horseshoe Area, unconsolidated materials are most likely eroded and conveyed to the New River via internal networks of natural "conduits" in the bedrock. These conduits consist of solutionally-enlarged joints, bedding, planes, and fault surfaces. During field reconnaissance, solution channels were most often observed in association with outcrops of tectonic brecc~~e~~ia; several outcrops of tectonic breccia were observed within the steep slope along the northern edge of HWMU-13 the OBG. Significant dissolution of bedrock was not typically observed along joints and bedding. A perennial spring (with several adjacent seeps) is located approximately 1,700 feet north/northeast of HWMU-13 the OBG. No other springs or perennial surface water flow was observed in the Horseshoe Area. Except during extreme precipitation events, almost all precipitation infiltrates into the subsurface via sinkholes or other karst features. Very little or no precipitation is conveyed to the New River via surface channels.

V.A.2. Hydrology and Groundwater

Specific groundwater elevation contour and flow direction maps (2nd and 4th Quarters 2012 2014) for HWMU-13 the OBG are included in Figures V.A.3 and V.A.4 of **Permit Attachment - V.A.**

The monitoring wells at HWMU-13 the OBG are screened within the carbonate bedrock or across the alluvium/bedrock interface. Static water levels during the last year ranged from approximately 1680.11 to 1680.201678.31 to 1679.97 for 13MW7 and from approximately 1679.47 to 1681.0716778.22 to 1679.61 for 13MW1 feet

above Mean Sea Level (MSL). The groundwater fluctuations at ~~HWMU-13~~ the OBG typically range from approximately ~~0.1 to 3~~0.9 to 1.9 feet annually. As shown on the groundwater contour maps (Figure V.A.3 and V.A.4 of **Permit Attachment V.A**), the apparent horizontal groundwater flow direction beneath the ~~HWMU-13~~ ~~the~~ OBG is generally to the south toward the New River.

Karst hydrogeologic systems are usually anisotropic, and characterized by turbulent flow and vertical hydraulic gradients. For the groundwater flow velocity calculation Darcian flow conditions were assumed for the weathered carbonate bedrock beneath ~~HWMU-13~~OBG.

The estimated groundwater velocity across the ~~HWMU-13~~OBG was calculated to be approximately 4.25 x 10^{-2} ft/day or 15.5 ft/year, based on the following:

- an average hydraulic conductivity of 6.56 * 10Exp(-5) ft/second;
- an average hydraulic gradient of 0.003 ft/ft; and
- an assumed effective porosity of 0.40, based on a representative range of porosities for karst carbonate rock and clayey, silty sand and gravel alluvium.

The actual groundwater flow velocities in the carbonate bedrock may vary as much as one to two orders of magnitude from the velocity presented above, depending on water level conditions and the distribution of karst conduits.

V.B. COMPLIANCE MONITORING SYSTEM REQUIREMENTS

The groundwater beneath ~~HWMU-13~~OBG shall be monitored in accordance with 40 CFR 264.97 and 246.99.

V.B.1. Groundwater Monitoring System

Groundwater beneath ~~HWMU-13~~OBG shall be monitored with one (1) upgradient background groundwater monitoring well, ~~five~~ three (~~5~~3) downgradient point of compliance wells, and ~~one~~ three (~~1~~3) downgradient plume monitoring well located as specified on the maps presented in Figures V.A.3 and V.A.4 of **Permit Attachment V.A**. Monitoring well 13MW-2 is located upgradient of the unit and will serve as the background well for the OBG. Monitoring wells 13MW-3, 13MW-4, ~~13MW-5, 13MW-6~~ and 13MW-7 are located downgradient of the unit and will serve as the point of compliance wells. Monitoring wells 13MW5, 13MW6, and 13MW-8 ~~is~~ are

Commented [RFAAP2]: Updated to 2014 data.

Commented [RFAAP3]: Updated to 2014 data.

Commented [RFAAP4]: Changes made below reflect a recommendation to reclassify wells 13MW5 an 13MW6 as plume monitoring wells.

the downgradient plume monitoring wells for the unit. In addition, well 13MW-1 will be used as a piezometer to measure static groundwater elevations during each sampling event. Further, the facility may collect background data from 13MW1 following approval from the Department.

Commented [RFAAP5]: Revised June 2016 in response to NOD 2s.2.

V.B.2. Sampling Schedule

The background wells and point of compliance wells shall be sampled in accordance with the Sampling and Analysis Plan (Permit Attachment IV.A) and the following schedule.

a. The downgradient point of compliance wells, plume monitoring wells and, when needed, the background well specified in **Permit Condition V.B.1.** shall be sampled at least semiannually for the constituents listed in **Permit Attachment V.B**. Samples shall be collected using the methods specified in **Permit Attachment IV.A** and analyses shall be obtained using the methods specified in **Permit Attachment V.B**. Additionally, the laboratory must be accredited for the analytical method, matrix and target analyte by the Virginia Environmental Laboratory Accreditation Program (VELAP).

Commented [RFAAP6]: Updated to reflect current DEQ requirement.

Commented [RFAAP7]: Revised per NOD 1s.36, removing "where applicable" as requested

b. Downgradient point of compliance wells specified in **Permit Condition V.B.1 shall** be sampled annually for all constituents listed in Appendix IX of 40 CFR

b. c. Part 264 Appendix IX**,** as listed in **Permit Attachment V.D**. Samples shall be analyzed using the methods specified in **Permit Attachment V.D**. The performing laboratory must have VELAP accreditation for the alternative method, matrix and analyte.

Commented [RFAAP8]: Revised for clarity

d. Alternate SW-846 methods may be approved by the Director, provided that the request is in writing and submitted thirty (30) days prior to the sampling event. Proposed alternate methods must achieve the same Limit of Quantitation, or lower, as the specified analytical method and must meet the requirements of **Permit Attachment IV.A, Section III.C**. In addition, the performing laboratory must have VELAP accreditation for the alternative method, matrix and analyte.

Commented [RFAAP9]: Revised for clarity

V.C. WELL LOCATIONS, CONSTRUCTION AND MAINTENANCE

V.C.1. Well Locations

a. The locations of the monitoring wells comprising the groundwater monitoring system as described in **Permit Condition V.B.1** are presented on Figures V.A.3 and V.A. 4 of **Permit Attachment V.A**.

b. Boring logs, design and construction details for monitoring wells listed in **Permit Condition V.B.1** are presented in **Permit Attachment IV.A, Appendix 8.**

V.C.2. Well Maintenance

Monitoring wells shall be maintained at their locations depicted on Figures V.A.3 and V.A.4 presented in **Permit Attachment V.A.** The Permittee shall inspect all monitoring wells listed in **Permit Condition V.B.2** at each sampling event to ensure that they are not damaged. Any required repairs shall be made by the Permittee as soon as possible. If any of these wells are damaged beyond reasonable efforts for repair, the Permittee may petition the Director for approval to abandon the affected monitoring well in accordance with **Permit Condition V.C.4**. Permit modification applications shall be submitted in accordance with 40 CFR 270.42.

V.C.3. Maintenance Standard

All monitoring wells required by this Permit shall be maintained in conformance with the following, pursuant to 40 CFR 264.97(a):

a. The groundwater monitoring system must yield samples in the background wells that represent the quality of the background water unaffected by leakage from any regulated unit and, in downgradient wells yield samples that represent groundwater quality passing the point of compliance.

b. The number and location of groundwater monitoring wells must be sufficient to identify and define all logical release pathways from the regulated unit to the uppermost aquifer based on site specific hydrogeologic characterization.

V.C.4. Installation and Abandonment

The Director must approve the addition or removal of all monitoring wells prior to installation or abandonment, in accordance with 40 CFR 270.42.

a. All monitoring wells which are to be abandoned shall be plugged and abandoned in accordance with **Permit Attachment IV.A., Appendix 7**. Well abandonment methods and certification shall be submitted to the Director within thirty (30) days from the date the wells are removed from the monitoring program.

b. All monitoring wells added to the groundwater monitoring system detailed in **Permit Condition V.B.1** must be constructed in accordance with USEPA's RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD) or subsequent USEPA guidance documents, and must meet the requirements of 40 CFR 264.99(b).

V.D. GROUNDWATER PROTECTION STANDARD

The Permittee shall monitor the groundwater to determine if the regulated unit complies with the groundwater protection standard (GPS) established in accordance with 40 CFR Part 264.92 and 9VAC-20-60-264.B(7).

V.D.1. Hazardous Constituents and Groundwater Protection Standard (GPS)

Commented [RFAAP10]: Changes below revised to provide consistency with other modules and to include 13MW1 in background data collection as needed.

a. Hazardous constituents are any constituents listed in Appendix VIII to 40 CFR 261 or in Appendix IX to 40 CFR 264 Appendix IX, as defined in 9VAC-20-60-264.B(6).

b. GPS are established based upon background concentrations from background groundwater monitoring at HWMU-13OBG, USEPA Safe Drinking Water Act Maximum Contaminant Levels (MCL), or Alternate Concentration Limits (ACL) established by the Department, or USEPA Region III Regional Screening Levels (RSLs).

c. Background concentrations established at the time of permit issuance are listed in **Permit Attachment V.C**. For any newly detected hazardous constituents, background values shall be established in accordance with 40 CFR 264.97(g) and as specified in **Permit Attachment IV.A, Appendix 6**. Background groundwater quality for a constituent or monitoring parameter shall be based on at least four (4) data points collected at background monitoring well(s) during a period not exceeding one (1) year. Background groundwater quality for a new monitoring

parameter or constituent shall be based on data from quarterly sampling of 13MW2 obtained over the course of one year. Existing data may be used to establish background concentrations provided it is of sufficient quality, following approval from DEQ.

Commented [RFAAP11]: Revised June 2016 in response to NOD 2s.3.

d. The hazardous constituents of concern and their groundwater protection standards GPS for HWMU-13OBG are listed in **Permit Attachment V.E**.

e. If USEPA implements any changes to MCLs, the GPS defined by that MCL shall be updated to reflect the most current value established by USEPA. The Department will notify the Permittee of any such change and will provide an amended **Permit Attachment V.E.** to the Permittee. Within ninety (90) days of receiving the amended **Permit Attachment V.E**., the Permittee shall provide notice of the modification(s) to all persons on the facility mailing list.

f. Any concentration limit based on a background value or ACL may be updated if new data become available. The Department will review the ACL changes annually and decide if the changes were significant enough to warrant the Department pursuing a permit amendment. The Department will notify the Permittee of any such change and will provide an amended Permit Attachment V.E. to the Permittee. Within ninety (90) days of receiving the amended Permit Attachment V.E., the Permittee shall provide notice of the modification(s) to all persons on the facility mailing list.

g. Newly detected hazardous constituents and their GPS will be added to **Permit Attachment V.E**. by the Department in accordance with **Permit Condition V.H.7**.

h. Removal of any constituent from **Permit Attachment V.E**. shall be requested in accordance with 40 CFR 270.42.

V.D.2. Point of Compliance

The point of compliance extends vertically into the uppermost aquifer and is defined by the downgradient monitoring wells 13MW-3, 13MW-4, 13MW-5, 13MW-6 and 13MW-7. The point of compliance represents the downgradient limit of HWMU-13OBG.

Commented [RFAAP12]: Recommend reclassifying wells 13MW5 and 13MW6 as plume monitoring wells.

V.D.3. Compliance Period

a. The compliance period, during which the groundwater protection standard GPS must occur, is equal to the period of time from the beginning of the waste management area's active life, including any waste management activity prior to permitting, until the end of the closure period and begins when the Permittee initiates a Compliance Monitoring Program meeting the requirements of 40 CFR 264.99. HWMU-13OBG is currently still active.

b. If the Permittee is required to conduct corrective action at the end of the specified compliance period, then the compliance period shall be extended until the Permittee demonstrates that the groundwater protection standardGPS has not been exceeded for three consecutive years.

V.E. SAMPLING AND ANALYSIS PROCEDURES

Pursuant to 40 CFR 264.97(e), the groundwater monitoring program must include sampling and analytical methods that are appropriate for groundwater sampling and that accurately measure hazardous constituents in groundwater samples. To make changes to the groundwater sampling and analysis procedures specified in this section, the Permittee shall submit for Director approval an application for a Class 1 permit modification in accordance with 40 CFR 270.42, Appendix I.

V.E.1. Sample Collection and Sample Frequency

a. Groundwater samples shall be collected using the techniques described in **Permit Attachment IV.A.**

b. The Permittee must determine the concentration of constituents and parameters listed in **Permit Attachment V.B** in the groundwater at all background well(s) and all downgradient point of compliance and plume monitoring wells at least semiannually.

c. Additionally, downgradient point of compliance wells shall be sampled for the constituents from Appendix IX of 40 CFR Part 264 Appendix IX as presented in Permit Attachment V.D (Annual Monitoring List) at least annually.

V.E.2. Sample Preservation, Transport and Documentation

a. Groundwater samples shall be preserved, packed and shipped to the receiving laboratory for analysis in accordance with the procedures specified in **Permit Attachment IV.A**.

b. Groundwater samples shall be tracked and controlled using the chain-of-custody procedures specified in **Permit Attachment IV.A**.

V.E.3. Sample Analysis

Groundwater samples shall be analyzed in accordance with the procedures described in **Permit Attachments IV.B and D by a laboratory accredited for the analyte, matrix and method under VELAP.**

V.F. GROUNDWATER SURFACE ELEVATION

V.F.1. Determination of Groundwater Surface Elevation

The Permittee shall determine the groundwater surface elevation in accordance with Permit Attachment IV.A at each groundwater monitoring well described in Permit Condition V.B.1 at least semiannually and each time groundwater is sampled.

V.F.2. Additional/Replacement Wells

The Permittee shall report the surveyed elevation of any additional or replacement monitoring well(s) when installed with as built drawings. The total well depth and the elevation of the following shall be recorded: top of the casing, ground surface and/or apron elevation, and top of the protective casing.

V.G. STATISTICAL PROCEDURES

Commented [RFAAP13]: Revised text below to create consistency between this and other modules.

For each hazardous constituent listed in Permit Attachment V.E, the Permittee shall determine whether there is a statistically significant increase over the concentration limit for that parameter or hazardous constituent during each compliance monitoring event in accordance with 40 CFR 264.99(d) and the following procedures.

V.G.1. Statistical Evaluation

a. When evaluating the monitoring results pursuant to **Permit Condition V.H.**, the Permittee shall use the statistical procedures in **Permit Attachment IV.A, Appendix 6.**

b. ~~If the GPS is defined by a MCL or ACL, the~~ The Permittee may elect to perform a single empirical comparison of point of compliance well data to the GPS. If the point comparison indicates that the given data point is above the GPS, statistical procedures specified in **Permit Attachment IV.A, Appendix 6** may be followed.

c. ~~If the GPS is based on background concentrations, the Permittee shall use a statistical comparison as specified in **Permit Attachment IV.A, Appendix 6.**~~ If the statistical comparison indicates that a statistically significant exceedance has occurred, the Permittee may elect to perform verification sampling as soon as ~~possible~~ practical but prior to the next regularly scheduled sampling event, pursuant to **Permit Attachment IV.A, Appendix 6.**

V.G.2. Schedule for Statistical Evaluation

The Permittee shall perform the required statistical evaluation within thirty (30) days of receipt of the analytical results from the laboratory.

V.H. MONITORING PROGRAM AND DATA EVALUATION

The Permittee shall determine groundwater quality in accordance with Permit Sections V.E., V.F. and V.G. as discussed below.

V.H.1. Groundwater Flow Direction and Velocity

The Permittee shall determine the groundwater flow direction and velocity in the uppermost aquifer at least semi-annually in accordance with Permit Condition V.B.2. Contaminant migration rate shall be calculated, if necessary to assure the effectiveness of compliance monitoring. Potentiometric maps showing groundwater elevation contour and flow direction during each sampling event shall be prepared at least annually.

V.H.2 Analytical Data Presentation

a. The Permittee shall present the groundwater quality at each monitoring well in a form appropriate for the determination of statistically significant increases, in accordance with 40 CFR 264.97(h); and

b. The Permittee's report shall include at least the following information: the constituents analyzed, the GPS, the SW-846 test methods, method detection limits, level of quantitation, the internal laboratory laboratory and method required quality assurance/quality control (QA/QC) results, matrix spike duplicates, percent recovery, duplicate analyses, dilution factors, any laboratory specific limit of detection and/or limit of quantitation, the results of any screening analyses, and any other information needed to evaluate accuracy, precision, representativeness, comparability, and completeness of the groundwater quality data.

V.H.3. Determination of Increased Concentration

a. Pursuant to 40 CFR 264.99(a), the Permittee shall determine the concentration of hazardous constituents and parameters listed in **Permit Attachment V.B.** in accordance with **Permit Condition V.B.2.**

b. During each compliance monitoring event, the Permittee shall determine for each hazardous constituent or parameter listed in **Permit Attachment V.E**. and in accordance with **Permit Section V.G.**, whether there is a statistically significant increase over the GPS for that parameter or hazardous constituent.

V.H.4. Determination of Additional Constituents Present

a. Pursuant to procedures in 40 CFR 264.98(f) and **Permit Condition V.B.2.**, the Permittee shall determine if any additional hazardous constituents are present in the uppermost aquifer, and if so, at what concentrations. Constituent concentrations at levels between the Limit of Detection (LOD) and the Limit of Quantitation (LOQ) are subject to the requirements of **Permit Condition V.H.4**.

b. If a hazardous constituent is detected that is not already listed in **Permit Attachment V.B.**, the Permittee may re-sample within one month of receipt of the analytical data and repeat the analysis. If the second analysis confirms the presence of the additional constituents, the Permittee shall report the concentration to the Director in writing within seven (7) days after the completion of the second analysis.

c. If the Permittee does not resample, or the second analysis confirms the presence of the additional constituent(s), the Permittee shall determine whether there is a statistically significant increase over the background values for each newly detected hazardous constituent. In determining whether such an increase has occurred, the Permittee must compare the groundwater quality at each point of compliance monitoring well specified in **Permit Condition V.B.1** to background concentrations, in accordance with the statistical procedures specified in **Permit Section V.G. and the following (Section V.H.5) procedures.**

V.H.5. Background Values for Newly Detected Constituents

a. The Permittee shall establish background concentrations for each additional constituent detected pursuant to **Permit Condition V.H.4**. Background values shall be established in accordance with 40 CFR 264.97(g) and the following procedures:

b. Background groundwater quality for a new monitoring parameter or constituent shall be based on data from quarterly sampling of 13MW2 obtained over the course of one year as specified in **Permit Attachment IV.A, Appendix 6 (Statistical Analysis).** The facility may collect quarterly background data from 13MW1 to obtain a more robust background dataset following approval from the Department. In this case, the background dataset would be one year's worth of data from the combination of wells 13MW1 and 13MW2. Existing data may be used to establish background concentrations provided it is of sufficient quality with approval from DEQ. ~~Background groundwater quality for a newly listed hazardous constituent shall be based on at least four (4) data points collected from background monitoring well(s) during a period not to exceed one (1) year, as specified in **Permit Attachment IV.A, Appendix 6 (Statistical Analysis)**.~~ Background monitoring well(s) are specified in **Permit Condition V.B.1.**

Commented [RFAAP14]: Added 13MW1 to background data collection as needed.

Commented [RFAAP15]: Revised February 2017, per NOD 2s.2, removing "at their discretion" as requested

Commented [RFAAP16]: Revised June 2016 in response to NOD 2s.2

c. Newly detected constituent will be added to the Compliance Monitoring List (**Permit Attachment V.B**) and the established background value will be added to the Background Values Table (**Permit Attachment V.C**). To addAdding a newly detected constituent and its background concentration to the **Permit Attachment V.B** and **V.C** is a class Class 1 permit modification.

V.H.6. Alternate Source Demonstration for Newly Detected Constituents

Pursuant to 40 CFR 264.98(g)(6) and the following conditions, the Permittee may attempt to demonstrate that the newly detected additional hazardous constituent came from a source other than the regulated unit, was due to an error in sampling, analysis or statistical evaluation, or was due to natural variability. The Director shall be notified of the intent to make the demonstration within seven (7) days of determining evidence of a statistically significant evidence of contaminationincrease at the compliance point.

a. The demonstration shall begin within a reasonable time subsequent to the notification and a report documenting the results shall be submitted for review no later than ninety (90) days from the original notification.

b. The Permittee must continue to monitor in accordance with the Compliance Monitoring Program established in **Permit Module V** pursuant to 40 CFR 264.99 (i)(4).

c. The Permittee must submit within ninety (90) days from the original notification a permit modification request to make any necessary changes to the compliance monitoring program at the facility in case the alternate source demonstration is unsuccessful.

V.H.7. Groundwater Protection Standard for Newly Detected Constituents

a For any additional Appendix IX to 40 CFR Part 264 Appendix IX hazardous constituent(s) determined to have a statistically significant exceedance above background, the Permittee shall put into effect a Class 1 permit modification to add the constituent to the compliance monitoring list, **Permit Attachment V.B.** In notifying the Director concerning the modification, the Permittee shall include the concentration of each hazardous constituent and a proposed concentration limit. The Permittee shall also specify if any changes to the groundwater monitoring system or the monitoring and analysis procedures are necessary to ensure continued compliance with 40 CFR 264.99.

b. The Director will specify the GPS for each hazardous constituent and provide the Permittee with the amended **Permit Attachment V.E.** In establishing concentration limits, the Director will utilize background values determined through **Permit Condition V.H.5** if no applicable MCL or ACL exists. The Permittee may request and the Director may establish an ACL in accordance with 40 CFR 264.94 (b).

c. Within ninety (90) days of receiving the amended **Permit Attachment V.E.,** the Permittee shall provide notice of the modifications to all persons on the facility mailing list.

V.I. SPECIAL REQUIREMENTS FOR GROUNDWATER PROTECTION STANDARD EXCEEDENCE

V.I.1. Notification

Pursuant to 40 CFR 264.99(h), if the Permittee determines that concentration limits for any constituent are being exceeded for any point of compliance well, the Permittee shall notify the Director in writing within seven (7) days from the date of that determination. The notification must indicate the constituent(s), concentration(s), and sample location(s).

V.I.2. Corrective Action Requirements

The Permittee shall submit to the Director an application for a permit modification to establish a corrective action program meeting the requirements of **40 CFR Part 264.100** within one hundred eighty (180) days, or within ninety (90) days if an engineering feasibility study has been previously submitted to the Regional Administrator under 40 CFR Part 264.98(h)(5). The application must at a minimum include the following information:

a. A detailed description of corrective action that will achieve compliance with the GPS specified in the permit under paragraph (a) of this section; and

b. A plan for a groundwater monitoring program that will demonstrate the effectiveness of the corrective action. Such a groundwater monitoring program may be based on a compliance monitoring program developed to meet the requirements of 40 CFR 264.99.

V.I.3. Alternate Source Demonstration

Pursuant to 40 CFR 264.99(i), the Permittee may make a demonstration that the concentration limit was exceeded due to a source other than the regulated unit, or due to error in sampling, analysis, or statistical evaluation or due to natural variation., In making such a demonstration the Permittee shall:

a. Notify the Director within seven (7) days of determination that the demonstration will be attempted; and

b. Within ninety (90) days of the notification, submit a report to the Director demonstrating that a source other than the regulated unit caused the exceedance; and

c. Submit within ninety (90) days of the notification, an application for a permit modification to make any appropriate changes to the compliance monitoring program in case the alternate source demonstration is unsuccessful; and

d. Continue to monitor in accordance with the Compliance Monitoring Program established in **Permit Module V** pursuant to 40 CFR 264.99 (i)(4).

V.J. REPORTING

The Permittee shall submit the analytical results required by Permit Section V.H whenever there is a change in flow rate or direction such that the groundwater monitoring system defined in Permit Condition V.B.1 is no longer adequate for the Compliance Monitoring Program, or whenever evidence of a statistically significant ~~evidence of increased contamination above concentration limits~~ increase is identified, or at least annually with the annual groundwater monitoring report. Additional reporting requirements are specified in the following:

V.J.1. Groundwater Elevation/Potentiometric Contour Maps

a. Annually, the Permittee shall submit groundwater elevations and potentiometric contour maps depicting groundwater flow paths and supporting groundwater elevation data to determine if the requirements for locating the monitoring well network continue to be satisfied.

b. If the evaluation determines that the existing monitoring well network no longer satisfies the requirements of 40 CFR 264.97(a), the Permittee shall immediately submit an application for a permit modification to make any appropriate changes to bring the monitoring system into compliance.

V.J.2. Contents of Annual Report

The report, submitted by March 1 of each year, shall meet all the requirements of an Annual Groundwater Report. The following items shall be included, at a minimum:

- groundwater sampling results collected during the previous calendar year;
- long-term time concentration plots of constituents of concern exceeding background for each well;
- when appropriate, graphic representation of groundwater contamination plumes for constituents exceeding background;
- laboratory certificates from the previous calendar year;
- potentiometric surface maps and static groundwater level elevation data collected during each sampling event during the previous calendar year;
- evaluation of groundwater flow directions and gradients;
- calculated or measured rate of migration of hazardous constituents in the groundwater;
- when appropriate, statistically calculated background values;
- statistical evaluations of the groundwater data collected during the previous calendar year, including all computations, calculated means, variances, t-statistic values, and t-test results or the calculations and results of statistical tests that the Director has determined to be equivalent as appropriate; and
- copies of all notifications and reports submitted as required by this Permit.

V.K. RECORDKEEPING

Groundwater monitoring data collected in accordance with Permit Section V.E, including all monitoring, testing and analytical data, must be maintained in the facility operating record in accordance with Permit Section I.E.

V.L. ASSURANCE OF COMPLIANCE

The Permittee shall demonstrate to the Director that groundwater compliance monitoring measures necessary to maintain compliance with the monitoring requirements under 40 CFR 264.99 are being conducted during the term of the permit.

V.M. PERMIT MODIFICATION REQUEST

If the Permittee or the Director determines that the compliance monitoring program no longer satisfies the requirements of 40 CFR 264.99, then the Permittee shall submit, within ninety (90) days, an application for a permit modification to make any appropriate changes to the program.

PERMIT ATTACHMENT V.A

HYDROGEOLOGICAL MAPS/FIGURES
For OBG (HWMU-13)

Figure V.A.1 OBG/HWMU-13 Geological Cross Section Location Map

Figure V.A.2 OBG/HWMU-13 Geological Cross Section Figures

Figure V.A.3 OBG/HWMU-13 Groundwater Elevation Contour Map (2nd Quarter ~~2012~~2014)

Figure V.A.4 OBG/HWMU-13 Groundwater Elevation Contour Map (4th Quarter ~~2012~~2014)

Commented [RFAAP17]: Insert most recent GW maps for 2014

PERMIT ATTACHMENT V.B

COMPLIANCE
GROUNDWATER MONITORING LIST

Constituent	CAS RN	Analytical Method
Energetics		
1,3,5-trinitrobenzene	99-35-4	8330
1,3-dinitrobenzene	99-65-0	8330
2,4-dinitrotoluene	121-14-2	8330
2,6-dinitrotoluene	606-20-2	8330
Nitroglycerin	55-63-0	8330
Semivolatiles		
2,4-dichlorophenol	120-83-2	8270
3,3'-dimethylbenzidine	119-93-7	8270
2-chlorophenol	95-57-8	8270
3-methylphenol	108-39-4	8270
4-methylphenol	106-44-5	8270
4-nitrophenol	100-02-7	8270
Acetophenone	98-86-2	8270
Benzo(a)anthracene	56-55-3	8270
Benzo(a)pyrene	50-32-8	8270
Benzo(b)fluoranthene	205-99-2	8270
Benzo(k)fluoranthene	207-08-9	8270
Bis(2-ethylhexyl)phthalate	117-81-7	8270
Butyl benzyl phthalate	85-68-7	8270
Dibenzo(a,h)anthracene	53-70-3	8270
~~Dibenzofuran~~	132-64-9	8270
Diethyl phthalate	84-66-2	8270
Dimethyl phthalate	131-11-3	8270
Di-n-butyl phthalate	84-74-2	8270
~~Di-n-octyl phthalate~~	11-78-40	8270
Diphenylamine	122-39-4	8270

Commented [RFAAP1]: Revised June 2016 in response to NODs 2s.5 and 2s.6.

Commented [RFAAP2]: Suffixes removed to be consistent with Permit Attachment VII.C.

Constituents proposed for removal according to changes documented in Attachment VII.C

Method modifications made pursuant to VDEQ-approved Class 1 Permit Modification dated June 12, 2014.

Constituent additions made based on changes made to the annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

Commented [RFAAP3]: Revised February 2017 per NOD 2S.8 and 2S.9. RFAAP submitted a separate request for OBG soil constituent removal and select GW constituents that have not been detected in GW since 2005. Based on email from A. Scott , DEQ, dated 12-14-2016 to RFAAP, Ashby noted "I've discussed the proposed modification with Leslie and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list. Final revision of this table pending risk assessment. If DEQ agrees that the discussed constituents can be removed based on the results from the risk assessment, RFAAP proposes to revised Permit Att V.B accordingly and prior to final permit renewal. At this time, Att V.B reflects only proposed removal of pyrene, dibenzofuran and dinoctylphthalate as well as the Class 1 permit modification noted above

Commented [RFAAP4]: Revised February 2017 per NOD 2s.5. Proposed for deletion based on DEQ's approval to remove pyrene

Commented [RFAAP5]: Revised February 2017 per NOD 2s.5. Proposed for deletion based on DEQ's approval to remove pyrene

Constituent	CAS RN	Analytical Method
Fluoranthene	206-44-0	8270
Hexachloroethane	67-72-1	8260
Indeno(1,2,3-cd)pyrene	193-39-5	8270
Naphthalene	91-20-3	8260
Nitrobenzene	98-95-3	8270
Phenol	108-95-2	8270
~~129-00-0~~		~~8270~~
Volatiles		
1,1-dichloroethane	75-34-3	8260
1,2-dichloroethane	107-06-2	8260
1,1-dichloroethene	75-35-4	8260
Benzene	71-43-2	8260
Benzyl chloride	100-44-7	8260
Carbon tetrachloride	56-23-5	8260
Chlorobenzene	108-90-7	8260
Chloroform	67-66-3	8260
Methyl bromide	74-83-9	8260
Methyl chloride	74-87-3	8260
Methylene chloride	75-09-2	8260
Tetrachloroethene	127-18-4	8260
Toluene	108-88-3	8260
1,1,1-trichloroethane	71-55-6	8260
Trichloroethene	79-01-6	8260
Trichlorofluoromethane	75-69-4	8260
Vinyl chloride	75-01-4	8260
Total Metals		
Antimony	7440-36-0	6010/6020
Arsenic	7440-38-2	6010/6020
Barium	7440-39-3	6010/6020
Cadmium	7440-43-9	6010/6020
Chromium	7440-47-3	6010/6020

Commented [RFAAP2]: Suffixes removed to be consistent with Permit Attachment VII.C.

Constituents proposed for removal according to changes documented in Attachment VII.C

Method modifications made pursuant to VDEQ-approved Class 1 Permit Modification dated June 12, 2014.

Constituent additions made based on changes made to the annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

Commented [RFAAP3]: Revised February 2017 per NOD 2S.8 and 2S.9. RFAAP submitted a separate request for OBG soil constituent removal and select GW constituents that have not been detected in GW since 2005. Based on email from A. Scott , DEQ, dated 12-14-2016 to RFAAP, Ashby noted "I've discussed the proposed modification with Leslie and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list. Final revision of this table pending risk assessment. If DEQ agrees that the discussed constituents can be removed based on the results from the risk assessment, RFAAP proposes to revised Permit Att V.B accordingly and prior to final permit renewal. At this time, Att V.B reflects only proposed removal of pyrene, dibenzofuran and dinoctylphthalate as well as the Class 1 permit modification noted above

Commented [RFAAP6]: Revised June 2016. Removed constituent per approval from DEQ provided in NOD 2s.6.

Constituent	CAS RN	Analytical Method
Lead	7439-92-1	6010/6020
Mercury	7439-97-6	7470
Nickel	7440-02-0	6010/6020
Selenium	7782-49-2	6010/6020
Silver	7440-22-4	6010/6020
Zinc	7440-66-6	6010/6020
Miscellaneous		
Perchlorate	14797-73-0	314.0/6850

Commented [RFAAP2]: Suffixes removed to be consistent with Permit Attachment VII.C.

Constituents proposed for removal according to changes documented in Attachment VII.C

Method modifications made pursuant to VDEQ-approved Class 1 Permit Modification dated June 12, 2014.

Constituent additions made based on changes made to the annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

Commented [RFAAP3]: Revised February 2017 per NOD 2S.8 and 2S.9. RFAAP submitted a separate request for OBG soil constituent removal and select GW constituents that have not been detected in GW since 2005. Based on email from A. Scott , DEQ, dated 12-14-2016 to RFAAP, Ashby noted "I've discussed the proposed modification with Leslie and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list. Final revision of this table pending risk assessment. If DEQ agrees that the discussed constituents can be removed based on the results from the risk assessment, RFAAP proposes to revised Permit Att V.B accordingly and prior to final permit renewal. At this time, Att V.B reflects only proposed removal of pyrene, dibenzofuran and dinoctylphthalate as well as the Class 1 permit modification noted above

Commented [RFAAP7]: Revised to be consistent with Attachment VII.C

Note:

1. Alternate SW-846 Methods may be approved by the Department if the request is in writing and submitted at least 30 days prior to the sample collection event. Proposed alternative methods must achieve the appropriate Data Quality Objective (i.e. at least a Department approved health-based concentration limit).
2. Current method updates are represented without suffixes on each method (e.g., SW-846- Method 6020A). The laboratory performing the analysis must be VELAP accredited for a current method update.
3. The laboratory performing the analysis must be VELAP accredited for the matrix, method and analyte.

Commented [RFAAP8]: Footers updated for clarification and to reference VELAP requirements

PERMIT ATTACHMENT V.C

OPEN BURNING GROUND
CALCULATED BACKGROUND VALUES

Constituent	CAS RN	Background Value (µg/l unless otherwise noted)
Energetics		
1,3,5-trinitrobenzene	99-35-4	2.5
1,3-dinitrobenzene	99-65-0	2.5
2,4-dinitrotoluene	121-14-2	10
2,6-dinitrotoluene	606-20-2	5
Nitroglycerin	55-63-0	16
Semivolatiles		
2,4-dichlorophenol	120-83-2	10
3,3'-dimethylbenzidine	119-93-7	10
2-chlorophenol	95-57-8	10
3-methylphenol	108-39-4	20
4-methylphenol	106-44-5	20
4-nitrophenol	100-02-7	20
Acetophenone	98-86-2	10
Benzo(a)anthracene	56-55-3	10
Benzo(a)pyrene	50-32-8	10
Benzo(b)fluoranthene	205-99-2	10
Benzo(k)fluoranthene	207-08-9	10
Bis(2-ethylhexyl)phthalate	117-81-7	10
Butyl benzyl phthalate	85-68-7	10
Dibenzo(a,h)anthracene	53-70-3	10
~~Dibenzofuran~~	~~132-64-9~~	~~10~~
Diethyl phthalate	84-66-2	10
Dimethyl phthalate	131-11-3	10
Di-n-butyl phthalate	84-74-2	10
~~Di-n-octyl phthalate~~	~~117-84-0~~	~~10~~
Diphenylamine	122-39-4	10
Fluoranthene	206-44-0	10
Hexachloroethane	67-72-1	10
Indeno(1,2,3-cd)pyrene	193-39-5	10
Naphthalene	91-20-3	1

Commented [RFAAP9]: Constituent additions made based on changes made to the annual Corrective Action monitoring list in Feb 22, 2012 VDEQ-approved Class 1 Permit Modification.

Commented [RFAAP10]: Revised February 2017 per NOD 2S.8 and 2S.9. RFAAP submitted a separate request for OBG soil constituent removal and select GW constituents that have not been detected in GW since 2005. Based on email from A. Scott , DEQ, dated 12-14-2016 to RFAAP, Ashby noted "I've discussed the proposed modification with Leslie and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list. Final revision of this table pending risk assessment. If DEQ agrees that the discussed constituents can be removed based on the results from the risk assessment, RFAAP proposes to revise Permit Att V.C accordingly and prior to final permit renewal.

Commented [RFAAP11]: Revised February 2017 per NOD 2s.6. Constituent is proposed for deletion based on DEQ's approval to remove pyrene. Not detected in GW since 2005

Commented [RFAAP12]: Revised February 2017 per NOD 2s.6. Constituent is proposed for deletion based on DEQ's approval to remove pyrene. Not detected in GW since 2005

Constituent	CAS RN	Background Value (µg/l unless otherwise noted)
Nitrobenzene	98-95-3	10
Phenol	108-95-2	10
Volatiles		
1,1-dichloroethane	75-34-3	1
1,2-dichloroethane	107-06-2	1
1,1-dichloroethene	75-35-4	1
Benzene	71-43-2	5
Benzyl chloride	100-44-7	5
Carbon tetrachloride	56-23-5	5
Chlorobenzene	108-90-7	5
Chloroform	67-66-3	1
Methyl bromide	74-83-9	1
Methyl chloride	74-87-3	5
Methylene chloride	75-09-2	5
Tetrachloroethene	127-18-4	1
Toluene	108-88-3	5
1,1,1-trichloroethane	71-55-6	1
Trichloroethene	79-01-6	1
Trichlorofluoromethane	75-69-4	1
Vinyl chloride	75-01-4	1
Total Metals		
Antimony	7440-36-0	6
Arsenic	7440-38-2	5
Barium	7440-39-3	205.9
Cadmium	7440-43-9	1
Chromium	7440-47-3	112
Lead	7439-92-1	14
Mercury	7439-97-6	2.52
Nickel	7440-02-0	5
Selenium	7782-49-2	5
Silver	7440-22-4	2.4
Zinc	7440-66-6	5
Miscellaneous		
Perchlorate	14797-73-0	4

Commented [RFAAP13]: Revised June 2016. Removed constituent per approval from DEQ provided in NOD 2s.6.

PERMIT ATTACHMENT V.D

APPENDIX IX of 40 CFR Part 264
GROUNDWATER MONITORING LIST

Constituent	CAS RN	Method	QL µg/l
Antimony	7440-36-0	6010/6020	5
Arsenic	7440-38-2	6010/6020	5
Barium	7440-39-3	6010/6020	10
Beryllium	7440-41-7	6010/6020	1
Cadmium	7440-43-9	6010/6020	1
Chromium	7440-47-3	6010/6020	5
Cobalt	7440-48-4	6010/6020	5
Copper	7440-50-8	6010/6020	5
Lead	7439-92-1	6010/6020	5
Mercury	7439-97-6	7470A	0.2
Nickel	7440-02-0	6010/6020	5
Selenium	7782-49-2	6010/6020	5
Silver	7440-22-4	6010/6020	2
Thallium	7440-28-0	7841	2
Tin	7440-31-5	6010/6020	10
Vanadium	7440-62-2	6010/6020	5
Zinc	7440-66-6	6010/6020	530
Sulfide	18496-25-8	9034	5000
Cyanide	57-12-5	9012	10
Acenaphthene	83-32-9	8270	10
Acenaphthylene	208-96-8	8270	10
Acetone	67-64-1	8260	10
Acetonitrile	75-05-8	8260	20
Acetophenone	98-86-2	8270	10
2-Acetylaminofluorene	53-96-3	8270	100
Acrolein	107-02-8	8260	20
Acrylonitrile	107-13-1	8260	20
Aldrin	309-00-2	.8081	0.05
Allyl chloride	107-05-1	8260	2
4-Aminobiphenyl	92-67-1	8270	50
Aniline	62-53-3	8270	10
Anthracene	120-12-7	8270	10
Aramite	140-57-8	8270	10
Benzene	71-43-2	8260	1
Benzyl alcohol	100-51-6	8270	10
Carbon tetrachloride	56-23-5	8260	1
Benzo[a]anthracene	56-55-3	8270	10
Benzo[b]fluoranthene	205-99-2	8270	10
Benzo[k]fluoranthene	207-08-9	8270	10
Benzo[a]pyrene	50-32-8	8270	10
Chlorobenzene	108-90-7	8260	1
Chloromethane	74-87-3	8260	1
Benzo[ghi]perylene	191-24-2	8270	10
Di-n-butyl phthalate	84-74-2	8270	10
Diethyl phthalate	84-66-2	8270	10
2,4-Dinitrotoluene	121-14-2	8330B	10

Commented [RFAAP14]: Revised June 2016 in response to NOD 2s.7. (Reverted to original, with the exception of pyrene, which was removed)
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Commented [RFAAP15]: Revised February 2017 per NOD 2S.8 and 2S.9. RFAAP submitted a separate request for OBG soil constituent removal and select GW constituents that have not been detected in GW since 2005. Based on email from A. Scott , DEQ, dated 12-14-2016 to RFAAP, Ashby noted "I've discussed the proposed modification with Leslie and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list. Final revision of this table pending risk assessment. If DEQ agrees that the discussed constituents can be removed based on the results from the risk assessment, RFAAP proposes to revise Permit Att V.D accordingly and prior to final permit renewal. At this time, Att V.D is revised to reflect proposed removal of pyrene, dibenzofuran and dioctylphthalate.

Commented [RFAAP16]: Suffixes removed to be consistent with Attachment VII.C

Commented [RFAAP17]: Revised February 2017 to reflect changes made in December 1, 2016, Class 1 permit modification

p-Phenylenediamine	106-50-3	8270	100
Diphenylamine	122-39-4	8270	10
alpha-BHC	319-84-6	8081	0.05
Constituent	**CAS RN**	**Method**	**QL µg/l**
beta-BHC	319-85-7	8081	0.05
delta-BHC	319-86-8	8081	0.05
gamma-BHC	58-89-9	8081	0.05
Hexachloroethane	67-72-1	8270	10
Methylene chloride	75-09-2	8260	1
bis(2-Chloro-1-methylethyl)ether	108-60-1	8270	10
bis(2-Chloroethoxy)methane	111-91-1	8270	10
bis(2-Chloroethyl) ether	111-44-4	8270	10
bis(2-Ethylhexyl)phthalate	117-81-7	8270	10
Bromodichloromethane	75-27-4	8260	1
Bromoform	75-25-2	8260	1
4-Bromophenyl phenyl ether	101-55-3	8270	10
2-Butanone	78-93-3	8260	10
Butyl benzyl phthalate	85-68-7	8270	10
Carbon disulfide	75-15-0	8260	1
Chlordane	57-74-9	8081	0.5
p-Chloroaniline	106-47-8	8270	10
Chlorobenzilate	510-15-6	8270	10
p-Chloro-m-cresol	59-50-7	8270	10
Chloroethane	75-00-3	8260	1
Chloroform	67-66-3	8260	1
2-Chloronaphthalene	91-58-7	8270	10
2-Chlorophenol	95-57-8	8270	10
4-Chlorophenyl phenyl ether	7005-72-3	8270	10
Chloroprene	126-99-8	8260	2
Chrysene	218-01-9	8270	10
2,4-Dichlorophenoxyacetic acid	94-75-7	8151A	4
4,4'-DDD	72-54-8	8081	0.05
4,4'-DDE	72-55-9	8081	0.05
4,4'-DDT	50-29-3	8081	0.05
Diallate	2303-16-4	8270	20
Dibenz(a,h)anthracene	53-70-3	8270	10
~~Dibenzofuran~~	132-64-9	8270	10
Dibromochloromethane	124-48-1	8260	1
1,2-Dibromo-3-chloropropane	96-12-8	8260	2
1,2-Dibromoethane	106-93-4	8260	1
1,2-Dichlorobenzene	95-50-1	8270	10
1,3-Dichlorobenzene	541-73-1	8270	10
1,4-Dichlorobenzene	106-46-7	8270	10
3,3'-Dichlorobenzidine	91-94-1	8270	50
trans-1,4-Dichloro-2-butene	110-57-6	8260	1
Dichlorodifluoromethane	75-71-8	8260	1
1,1-Dichloroethane	75-34-3	8260	1
1,2-Dichloroethane	107-06-2	8260	1
1,1-Dichloroethene	75-35-4	8260	1
trans-1,2-Dichloroethene	156-60-5	8260	1
2,4-Dichlorophenol	120-83-2	8270	10
2,6-Dichlorophenol	87-65-0	8270	10
cis-1,3-Dichloropropene	10061-01-5	8260	1

Commented [RFAAP18]: Revised February 2017 per NOD 2s.7. Proposed for deletion based on DEQ's approval to remove pyrene.

trans-1,3-Dichloropropene	10061-02-6	8260	1
Dieldrin	60-57-1	8081	0.05
1,2-Dichloropropane	78-87-5	8260	1
O,O-Diethyl O-2-pyrazinyl	297-97-2	8270	50
Dimethoate	60-51-5	8270	20
Constituent	**CAS RN**	**Method**	**QL µg/l**
p-(Dimethylamino)azobenzene	60-11-7	8270	20
3,3'-Dimethylbenzidine	119-93-7	8270	50
a,a-Dimethylphenethylamine	122-09-8	8270	50
2,4-Dimethylphenol	105-67-9	8270	10
Dimethyl phthalate	131-11-3	8270	10
m-Dinitrobenzene	99-65-0	8270	10
4,6-Dinitro-o-cresol	534-52-1	8270	50
2,4-Dinitrophenol	51-28-5	8270	50
2,6-Dinitrotoluene	606-20-2	8330B	10
Dinoseb	88-85-7	8270	20
~~Di-n-octyl phthalate~~	117-84-0	8270	10
1,4-Dioxane	123-91-1	8260	200
Disulfoton	298-04-4	8270	50
Endosulfan I	959-98-8	8081	0.05
Endosulfan II	33213-65-9	8081	0.05
Endosulfan sulfate	1031-07-8	8081	0.05
Endrin	72-20-8	8081	0.05
Endrin aldehyde	7421-93-4	8081	0.05
Ethylbenzene	100-41-4	8260	1
Ethyl methacrylate	97-63-2	8260	1
Ethyl methanesulfonate	62-50-0	8270	10
Famphur	52-85-7	8270	10
Fluoranthene	206-44-0	8270	10
Fluorene	86-73-7	8270	10
Heptachlor	76-44-8	8081	0.05
Heptachlor epoxide	1024-57-3	8081	0.05
Hexachlorobenzene	118-74-1	8270	10
Hexachlorobutadiene	87-68-3	8270	10
Hexachlorocyclopentadiene	77-47-4	8270	50
Hexachlorophene	70-30-4	8270	100
Hexachloropropene	1888-71-7	8270	100
2-Hexanone	591-78-6	8260	10
Indeno[1,2,3-cd]pyrene	193-39-5	8270	10
Isobutyl alcohol	78-83-1	8260	50
Isodrin	465-73-6	8081	0.1
Isophorone	78-59-1	8270	10
Isosafrole	120-58-1	8270	20
Kepone	143-50-0	8081	1
Methacrylonitrile	126-98-7	8260	2
Methapyrilene	91-80-5	8270	50
Methoxychlor	72-43-5	8081	0.1
Bromomethane	74-83-9	8260	1
3-Methylcholanthrene	56-49-5	8270	20
Iodomethane	74-88-4	8260	1
Methyl methacrylate	80-62-6	8260	2
Methyl methane sulfonate	66-27-3	8270	10
2-Methylnaphthalene	91-57-6	8270	10
Methyl parathion	298-00-0	8270	10

Commented [RFAAP19]: Revised February 2017 per NOD 2s.7. Proposed for deletion based on DEQ's approval to remove pyrene.

4-Methyl-2-pentanone	108-10-1	8260	10
2-Methylphenol	95-48-7	8270	10
3 & 4-Methylphenol	m 108-39-4/p 106-44-5	8270	10
Dibromomethane	74-95-3	8260	1
Naphthalene	91-20-3	8260	10
Constituent	**CAS RN**	**Method**	**QL µg/l**
1,4-Naphthoquinone	130-15-4	8270	50
1-Naphthylamine	134-32-7	8270	10
2-Naphthylamine	91-59-8	8270	10
o-Nitroaniline	88-74-4	8270	50
m-Nitroaniline	99-09-2	8270	50
p-Nitroaniline	100-01-6	8270	50
Nitrobenzene	98-95-3	8270	10
o-Nitrophenol	88-75-5	8270	10
p-Nitrophenol	100-02-7	8270	50
4-Nitroquinoline-1-oxide	56-57-5	8270	100
N-Nitrosodi-n-butylamine	924-16-3	8270	10
N-Nitrosodiethylamine	55-18-5	8270	10
N-Nitrosodimethylamine	62-75-9	8270	10
N-Nitrosodiphenylamine	86-30-6	8270	10
N-Nitrosodipropylamine	621-64-7	8270	10
N-Nitrosomethylethylamine	10595-95-6	8270	10
N-Nitrosomorpholine	59-89-2	8270	10
N-Nitrosopiperidine	100-75-4	8270	10
N-Nitrosopyrrolidine	930-55-2	8270	10
5-Nitroso-o-toluidine	99-55-8	8270	20
Parathion	56-38-2	8270	10
Pentachlorobenzene	608-93-5	8270	10
Pentachloroethane	76-01-7	8270	50
Pentachloronitrobenzene	82-68-8	8270	50
Pentachlorophenol	87-86-5	8270	10
Phenacetin	62-44-2	8270	20
Phenanthrene	85-01-8	8270	10
Phenol	108-95-2	8270	10
Phorate	298-02-2	8270	50
2-Picoline	109-06-8	8270	20
PCBs	1336-36-3	8082	0.5
Pronamide	23950-58-5	8270	20
Propionitrile	107-12-0	8260	4
~~Pyrene~~	~~129-00-0~~	~~8270~~	~~10~~
Pyridine	110-86-1	8270	20
Safrole	94-59-7	8270	20
Silvex	93-72-1	8151	1
Styrene	100-42-5	8260	1
Sulfotep	3689-24-5	8270	50
Total TCDF	55722-27-5	8280	*
Total PeCDF	30402-15-4	8280	*
Total HxCDF	55684-94-1	8280	*
Total TCDD	41903-57-5	8280	*
2,3,7,8-TCDD	1746-01-6	8280	*
Total PeCDD	36088-22-9	8280	*
Total HxCDD	34465-46-8	8280	*
2,4,5-Trichlorophenoxyacetic acid	93-76-5	8151	1

Commented [RFAAP20]: Revised June 2016. Removed constituent pyrene per approval from DEQ provided in NOD 2s.7.

1,2,4,5-Tetrachlorobenzene	95-94-3	8270	10
1,1,1,2-Tetrachloroethane	630-20-6	8260	1
1,1,2,2-Tetrachloroethane	79-34-5	8260	1
Tetrachloroethene	127-18-4	8260	1
2,3,4,6-Tetrachlorophenol	58-90-2	8270	50
Toluene	108-88-3	8260	1
o-Toluidine	95-53-4	8270	20
Constituent	**CAS RN**	**Method**	**QL µg/l**
Toxaphene	8001-35-2	8081	2
1,2,4-Trichlorobenzene	120-82-1	8270	10
1,1,1-Trichloroethane	71-55-6	8260	1
1,1,2-Trichloroethane	79-00-5	8260	1
Trichloroethene	79-01-6	8260	1
Trichlorofluoromethane	75-69-4	8260	1
2,4,5-Trichlorophenol	95-95-4	8270	10
2,4,6-Trichlorophenol	88-06-2	8270	10
1,2,3-Trichloropropane	96-18-4	8260	1
O,O,O-Triethyl phosphorothioate	126-68-1	8270	50
sym-Trinitrobenzene	99-35-4	8270	50
Vinyl acetate	108-05-4	8260	10
Vinyl chloride	75-01-4	8260	2
Xylenes (Total)	1330-20-7	8260	10

Notes:

Commented [RFAAP21]: Footers revised for clarity

1. CAS RN. Denotes Chemical Abstracts Registry Number.

2. Method. **Denotes *Test Methods for Evaluating Solid Waste – Physical and Chemical Methods, SW-846 (as updated)***

3. QL. Denotes estimated quantitation limit for method. Actual quantitation will depend on instrument used for analysis, sample matrix and laboratory .

4. Current method updates are represented without suffixes on each method (e.g., SW-846- Method 6020A). The laboratory performing the analysis must be VELAP accredited~~, where applicable~~ for a current method update.

5. The laboratory performing the analysis must be VELAP accredited~~, where applicable~~ for the matrix, method and analyte.

Commented [RFAAP22]: Revised February 2017, removing "where applicable" as requested by DEQ

PERMIT ATTACHMENT V.E

GROUNDWATER PROTECTION STANDARDS

~~MODIFIED: JUNE 13, 2013~~
~~MODIFIED: MAY 1, 2015~~
~~JANUARY 31, 2017~~

Commented [RFAAP1]: Suggested revisions added June 2015 as part of the RCRA permit renewal application for the RFAAP open burning ground

Commented [RFAAP2]: Revised February 2017 per NODs 2S.8 and 2S.9. RFAAP submitted a separate request for OBG soil constituent removal and select GW constituents that have not been detected in GW since 2005. Based on email from A. Scott , DEQ, dated 12-14-2016 to RFAAP, Ashby noted "I've discussed the proposed modification with Leslie and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list. Final revision of this table pending risk assessment. If DEQ agrees that the discussed constituents can be removed based on the results from the risk assessment, RFAAP proposes to revised Permit Att V.E accordingly and prior to final permit renewal At this time, Att V.E. reflects proposed removal for pyrene, dibenzofuran and di n octylphthalate and previous updates as noted. However, pending final permit renewal RFAAP request final revision of tables to update to current regulatory limits (i.e., ACLs, RSLs etc…).

PERMIT ATTACHMENT V.E- GROUNDWATER PROTECTION STANDARDS

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on
Antimony, Total	metal	7440-36-0	6010~~B~~/6020	5	6	6	~~6.26~~7.8		6	MCL
Arsenic, Total	metal	7440-38-2	6010~~B~~/6020	5	5	10	~~0.045~~0.052		10	MCL
Barium, Total	metal	7440-39-3	6010~~B~~/6020	10	206	2000	~~3130~~3800		2000	MCL
Cadmium, Total	metal	7440-43-9	6010~~B~~/6020	1	1	5	~~7.825~~9.2	-	5	MCL
Chromium, Total	metal	7440-47-3	6010~~B~~/6020	5	112	100	-		112	Bckgrnd
Lead, Total	metal	7439-92-1	6010~~B~~/6020	~~5~~10	14	15	-		15	MCL
Mercury, Total	metal	7439-97-6	7470~~A~~	0.5	2.52	2	~~0.19~~0.63		2.52	Bckgrnd
Nickel, Total	metal	7440-02-0	6010~~B~~/6020	5	5	-	~~313~~390		~~313~~390	ACL
Selenium, Total	metal	7782-49-2	6010~~B~~/6020	5	5	50	~~78.25~~100		50	MCL
Silver, Total	metal	7440-22-4	6010~~B~~/6020	2	2.4	-	~~78.25~~94	-	~~78.25~~94	ACL

Commented [RFAAP3]: Table revised to reflect proposed constituent reductions as detailed in Attachment VII.C.

Commented [RFAAP4]: Revised February 2017 in response to NOD 2s.8

Commented [RFAAP5]: Revised June 2016 to reflect updated ACL/RSL where applicable.

Commented [RFAAP7]: ACLs revised to reflect most recent update (Feb 15, 2015).

Commented [RFAAP6]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP8]: Revised June 2016, updating the lab QL.

Commented [RFAAP9]: GPS's based on ACLs revised to reflect most recent update (Feb 15, 2015).

Constituent	CLASS	CAS #	USEPA	QL	BACK-GROUND	MCL (mg/L)	ACL	RSL	GPS	GPS Based
Zinc, Total	metal	7440-66-6	6010~~B~~/6020	~~5~~30	5	-	~~469~~560.00		~~469~~560.00	ACL
Perchlorate	Misc.	14797-73-0	314.0/6850	4	4	-	-	—15	15	RSL
Benzo[a]anthracene	PNA	56-55-3	8270~~C~~	10	10	-	~~0.092~~0.034		~~0.0917~~0.034	ACL
Benzo[a]pyrene	PNA	50-32-8	8270~~C~~	10	10	0.2	~~0.009~~0.0034		0.2	MCL
Benzo[b]fluoranthene	PNA	205-99-2	8270~~C~~	10	10	-	~~0.092~~0.034		~~0.0917~~0.034	ACL
Benzo[k]fluoranthene	PNA	207-08-9	8270~~C~~	10	10	-	~~0.917~~0.34		~~0.917~~0.34	ACL
Dibenz[a,h]anthracene	PNA	53-70-3	8270~~C~~	10	10	-	~~0.009~~0.0034		~~0.00917~~0.0034	ACL
Fluoranthene	PNA	206-44-0	8270~~C~~	10	10	-	~~626~~800		~~626~~800	ACL
Indeno [1,2,3-cd] pyrene	PNA	193-39-5	8270~~C~~	10	10	-	~~0.092~~0.034		~~0.0917~~0.034	ACL
~~Pyrene~~	~~PNA~~	~~129-00-0~~	~~8270C~~	~~10~~	~~10~~	~~-~~	~~67.0712~~ ~~0~~	~~-~~	~~67.0712~~ ~~0~~	~~ACL~~
1,3,5-Trinitrobenzene; *sim-*	energetic	99-35-4	8330~~B~~	10	2.5	-	~~469.559~~0		~~469.559~~0	ACL
1,3-Dinitrobenzene; *m-*	energetic	99-65-0	8330~~B~~	4	2.5	-	~~1.565~~2		~~1.565~~2	ACL
2,4-Dinitrotoluene	energetic	121-14-2	8330~~B~~	10	10	-	~~31.3~~0.2		~~31.3~~0.2	ACL

Commented [RFAAP7]: ACLs revised to reflect most recent update (Feb 15, 2015).

Commented [RFAAP10]: Revised February 2017, updating value to reflect December 2, 2016, Class 1 permit modification

Commented [RFAAP11]: Revised June 2016, updating the lab QL.

Commented [RFAAP6]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP12]: Revised to be consistent with Permit Attachment VII.C.

Commented [RFAAP13]: Revised February 2017. Proposing to remove pyrene based on DEQ's approval for removal of this compound from Attachment V.B, Compliance Monitoring List (reference NOD 2s.8 and 2s.9)

Constituent	CLASS	CAS #	USEPA	QL	BACK-GROUND	MCL (ug/L)	ACL	RSL	GPS	GPS Based
							4		4	
2,6-Dinitrotoluene	energetic	606-20-2	8330B	10	5	-	~~15.65~~0.048		~~15.70~~0.048	ACL
Nitroglycerin	energetic	55-63-0	~~8332~~8330	16	16	-	-	~~3.7~~0.~~1~~~~5~~2	~~3.7~~0.~~15~~2	RSL
Acetophenone	semivolatile	98-86-2	8270~~C~~	10	10	-	~~223.6~~1900	-	~~223.57~~1900	ACL
Bis (2-ethylhexyl) phthalate	semivolatile	117-81-7	8270~~C~~	10	10	6	~~4.78~~5.6		6	MCL
Butyl benzyl phthalate	semivolatile	85-68-7	8270~~C~~	10	10	-	~~35.25~~16		~~35.2487~~16	ACL
2-Chlorophenol	semivolatile	95-57-8	8270~~C~~	10	10	-	~~11.2~~91	-	~~11.2~~91	ACL
~~Dibenzofuran~~	~~semivolatile~~	~~132-64-9~~	~~8270C~~	~~10~~	~~10~~	-	~~7.9~~	~~37~~	~~377.9~~	~~RSLACL~~
Diethyl phthalate	semivolatile	84-66-2	8270~~C~~	10	10	-	~~12520~~15000		~~12520~~15000	ACL
3,3'-Dimethylbenzidine	semivolatile	119-93-7	8270~~C~~	10	10	-	~~0.006~~0.0065		~~0.006~~0.0065	ACL
Dimethyl phthalate	semivolatile	131-11-3	8270~~C~~	10	10	-	-		10	QL/Bckgnd
Di-n-butyl phthalate	semivolatile	84-74-2	8270~~C~~	10	10	-	~~1565~~900		~~1565~~900	ACL
~~Di-n-octyl phthalate~~	~~semivolatile~~	~~117-84-0~~	~~8270C~~	~~10~~	~~10~~	-	~~313~~200	-	~~313~~200	~~ACL~~
2,4-Dichlorophenol	semivolatile	120-83-2	8270~~C~~	10	10	-	~~46.95~~46	-	~~46.95~~46	ACL

Commented [RFAAP7]: ACLs revised to reflect most recent update (Feb 15, 2015).

Commented [RFAAP6]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP14]: Revised June 2016, updating the RSL.

Commented [RFAAP15]: Revised February 2017. Proposing removal of this constituent on similar basis to removal of pyrene that was approved for Attachment V.B, Compliance Monitoring List (reference NODs 2s.8 and 2s.9). Compound not detected since 2005.

Commented [RFAAP16]: Revised February 2017. Proposing removal of this constituent on similar basis to removal of pyrene that was approved for Attachment V.B, Compliance Monitoring List (reference NODs 2s.8 and 2s.9). Compound not detected since 2005.

Constituent	CLASS	CAS #	USEPA	QL	BACK-GROUND	MCL	ACL	RSL	GPS	GPS Based
Diphenylamine	semivolatile	122-39-4	8270~~C~~	10	10	-	~~391.25~~3 10	-	~~391.25~~3 10	ACL
Hexachloroethane	semivolatile	67-72-1	8270~~C~~	10	10	-	~~4.78~~0.9	-	~~4.78~~0.9	ACL
3-Methylphenol; *m*-Cresol	semivolatile	108-39-4	8270~~C~~	10	20	-	~~782.5~~93 0	-	~~782.5~~93 0	ACL
4-Methylphenol; *p*-Cresol	semivolatile	106-44-5	8270~~C~~	10	20	-	~~78.25~~19 00	-	~~78.25~~19 00	ACL
Nitrobenzene	semivolatile	98-95-3	8270~~C~~	10	10	-	~~1.304~~0. 14	-	~~1.304~~0. 14	ACL
4-Nitrophenol; *p*-	semivolatile	100-02-7	8270~~C~~	20	20	-	-	-	20	QL/Bckgnd
Phenol	semivolatile	108-95-2	8270~~C~~	10	10	-	~~4695~~58 00	-	~~4695~~58 00	ACL
Benzene	volatile	71-43-2	8260~~B~~	1	5	5	~~0.33~~0.4 5		5	MCL
Benzyl Chloride	volatile	100-44-7	8260~~B~~	5	5	-	-	~~0.0790~~ .024 0.089	~~0.0790.~~ 0~~0.089~~	RSL
Carbon tetrachloride	volatile	56-23-5	8260~~B~~	1	5	5	~~0.162~~0. 45		5	MCL
Chlorobenzene	volatile	108-90-7	8260~~B~~	1	5	100	~~32.7~~78	-	100	MCL
Chloroform	volatile	67-66-3	8260~~B~~	1	1	80	~~0.13~~0.2 2		80(9)	MCL

Commented [RFAAP7]: ACLs revised to reflect most recent update (Feb 15, 2015).

Commented [RFAAP6]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP18]:

Commented [RFAAP17]: Revised June 2016, updating the RSL.

Constituent	CLASS	CAS #	USEPA	QL	BACK-GROUND	MCL (mg/L)	ACL (mg/L)	RSL	GPS (mg/L)	GPS Based
1,1-Dichloroethane	volatile	75-34-3	8260~~B~~	1	1	-	~~2.42~~2.7		~~2.42~~2.7	ACL
1,2-Dichloroethane	volatile	107-06-2	8260~~B~~	1	1	5	~~0.12~~0.17	-	5	MCL
1,1-Dichloroethene	volatile	75-35-4	8260	1	1	7	~~125.2~~280	-	7	MCL
Methyl bromide; Bromomethane	volatile	74-83-9	8260~~B~~	1	1	-	~~3.18~~7.5		~~3.18~~7.5	ACL
Methyl chloride; Chloromethane	volatile	74-87-3	8260~~B~~	1	5	-	~~1.434~~190		~~1.4342~~190	ACL
Methylene chloride; Dichloromethane	volatile	75-09-2	8260~~B~~	1	5	5	~~8.9288~~11		5	MCL
Naphthalene	volatile	91-20-3	8260~~B~~	1	1	-	~~0.089~~0.17		~~0.0886~~0.17	ACL
Tetrachloroethene (PCE)	volatile	127-18-4	8260	1	1	5	~~0.104~~11	-	5	MCL
Toluene	volatile	108-88-3	8260~~B~~	1	5	1000	937.11100		1000	MCL
1,1,1-Trichloroethane	volatile	71-55-6	8260~~B~~	1	1	200	~~3329.79~~8000		200	MCL
Trichloroethene (TCE)	volatile	79-01-6	8260~~B~~	1	1	5	~~1.328~~0.49		5	MCL
Trichlorofluoromethane	volatile	75-69-4	8260~~B~~	1	1	-	1113		1113	ACL
Vinyl chloride;	volatile	75-01-4	8260~~B~~	1	1	2	~~0.084~~0.	-	2	MCL

Commented [RFAAP7]: ACLs revised to reflect most recent update (Feb 15, 2015).

Commented [RFAAP6]: Suffixes removed to be consistent with Permit Attachment VII.C.

Constituent	CLASS	CAS #	USEPA	QL	BACK-GROUND	MCL	ACL	RSL	GPS	GPS Based
Chloroethene							019			

This Annual GW Monitoring Constituent List for the CA Program is based on the Groundwater Compliance Monitoring List Attachment V.B, plus any constituent detected in Appendix IX in the past, the constituents reasonably expected or suspected to be in or derived from the waste managed in the unit, and the daughter products for carbon tetrachloride. ~~The criteria by which GPSs are developed are following:~~

(1) CAS #: Chemical Abstracts Service registry number.

(2) *Test Methods for Evaluating Solid Waste- Physical/Chemical Methods, SW-846 (as updated).* *Current method updates are represented without suffixes on each method (e.g., SW-846 Method 6020A). The laboratory performing the analysis must be VELAP accredited, where applicable, for current method update.*

(3) QL: Quantitation Limit. Actual laboratory-specific QL may vary under the approval of DEQ.

(4) Calculated background. See *Constituent Background Values for the Detection Groundwater Monitoring Program* prepared by Draper Aden Associates, May 10, 2005 for listed Background values.

(5) MCL: Maximum Contaminant Level of USEPA National Primary Drinking Water Regulations (Safe Drinking Water Act).

(6) ACL: VA DEQ Alternate Concentration Limit. ~~January 27, 2009~~ January 21, 2015; effective February 15, 2015.

(7) No MCL or ACL for Perchlorate has been promulgated. EPA Region III promulgated a Regional Screening Level (RSL) value of 26 ug/l. Thus, the GPS for Perchlorate was set originally at 26 ug/l. However, in November 2012, EPA Region III revised the RSL for perchlorate from 26 ug/l to 11 ug/l, but stated in the November 2012 RSL Table as associated Frequently Asked Questions that the EPA Interim Drinking Water Health Advisory concentration of 15 ug/l is recommended for use as the preliminary remediation goal (PRG) for perchlorate. Therefore, the GPS for Perchlorate was revised to 15 ug/l. Current RSL Table dated .Novermber 2015 (accessed May 12, 2016 website noted below.

(8) GPS: Groundwater Protection Standard. The criteria by which GPSs are developed are following:

a. Use calculated Background values if greater than promulgated regulatory values (EPA MCL or VDEQ ACL). If Background = QL and is greater than promulgated regulatory value (EPA MCL or VDEQ ACL), then use MCL or ACL as GPS.

Commented [RFAAP7]: ACLs revised to reflect most recent update (Feb 15, 2015).

Commented [RFAAP6]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP19]: Footers revised for clarity and to reflect latest updates to the referenced GPS

Commented [RFAAP20]: Revised June 2016, updating the reference to the correct date.

Constituent	CLASS	CAS #	USEPA	QL	BACK-GROUND	MCL	ACL	RSL	GPS	GPS Based

b. If EPA MCL is promulgated and Background is less than the MCL, use the MCL as GPS.

c. If EPA MCL is not promulgated, use the VDEQ ACL as GPS if greater than Background.

d. If no MCL or ACL, use EPA Region III Regional Screening Level (RSL). For Perchlorate, no MCL or ACL has been promulgated. EPA Region III promulgated a RSL value of 26 ug/l; however, in November 2012, EPA Region III stated that the EPA Interim Drinking Water Health Advisory concentration of 15 ug/l is recommended for use as the preliminary remediation goal (PRG) for perchlorate. Therefore, the GPS for Perchlorate was revised to 15 ug/l. RSLs are developed by the Oak Ridge National Laboratory under an Interagency Agreement with EPA (May 2010). See web site "Mid-Atlantic Risk Assessment" at ~~http://www.epa.gov/reg3hwmd/risk/human/index.htm~~ https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2015

(9) The MCL for total Trihalomethanes, including Bromodichloromethane, Bromoform, Dibromochloromethane, and Chloroform, is 80 ug/l.

~~(10) TBD: To be determined. 1,1-Dichloroethane, 1,1,1-Trichloroethane, and Trichlorofluoromethane were added to the Compliance Monitoring List for the OBG in Second Quarter 2010. Radford AAP is in the process of establishing background for these constituents in accordance with Permit Condition V.H.5 and GPS in accordance with Permit Condition V.H.7.~~

For any monitoring event, if a GPS for a constituent in the table above is less than the QL, the Permittee will perform verification of any detection (i.e. value greater than the Detection Limit) of such a constituent using low-level analytical methods, if such methods are standard methods that are routinely available from commercial laboratories. Furthermore, the low-level analytical method will be used only if the QL achievable by that method is less than, or equal to, the MCL or ACL for the subject constituent. If the verification event confirms a quantifiable detection (i.e. value greater than the QL) above the applicable MCL or ACL, a revised background concentration will be established using low-level analytical methods, if appropriate, and the GPS will be updated based on the new background concentration if warranted.

Commented [RFAAP7]: ACLs revised to reflect most recent update (Feb 15, 2015).

Commented [RFAAP6]: Suffixes removed to be consistent with Permit Attachment VII.C.

Commented [RFAAP21]: Revised June 2016 in response to NOD 1s.31

MODULE VII

CORRECTIVE ACTION AND GROUNDWATER MONITORING PROGRAM

Commented [RFAAP1]: Suggested revisions added June 2015 as part of the RCRA permit renewal application for the RFAAP open burning ground

VII.A HIGHLIGHTS

Commented [RFAAP2]: This section updated to reflect the current status of the Site

The Open Burn Ground (OBG) (a.k.a., Hazardous Waste Management Unit - 13 (HWMU-13) at the Radford Facility Army Ammunition Plant (RFAAP) is a waste propellant open burning ground. The OBG is located on the southeastern end of the Horseshoe Area on the flood plain of the New River and consists of eight above-ground burning assemblies. The waste spill "clean-up" residues are hazardous due to their reactivity (D003) as specified in 9VAC 20-60-261, incorporating 40 CFR 261.23, toxicity (D005, D008 and D030) as specified in 9VAC 20-60-261, incorporating 40 CFR 261.24, and/or ignitability (D001) as specified in 9VAC 20-60-261, incorporating 40 CFR 261.21.

Groundwater monitoring has been conducted at the OBG since 1992. The OBG was in Interim Status, and groundwater monitoring activities were conducted quarterly in accordance with the requirements of 40 CFR 265. In October 1999, the "Groundwater Quality Assessment Report" for the OBG was submitted to the Virginia Department of Environmental Quality (DEQ/Department). A groundwater monitoring list was included in the report. The monitoring list consisted of a subset of the constituents listed in 40 CFR 264 Appendix IX that previously had been detected in the groundwater and/or that would be reasonably expected to be in or derived from the waste burned at OBG.

In September 2005, DEQ issued the original *Permit for the Treatment of Hazardous Waste by Open Burning* (Permit) for the OBG (effective on October 28, 2005). However, beginning in Fourth Quarter 2003, quarterly groundwater monitoring was conducted in accordance with the "Detection Groundwater Monitoring Program for the Open Burning Ground", dated September 2003 and included in the Part B Permit Application for the OBG, in anticipation of ~~receipt~~issuance of the Permit.

Exceedances of established background values for carbon tetrachloride and perchlorate during the Fourth Quarter 2005 Detection monitoring event prompted the need to develop a Compliance Monitoring program in accordance with the requirements of the Permit. As a result, during First Quarter 2006, all wells were sampled for the full Appendix IX constituent list and the hazardous constituents detected formed the basis for the Compliance Monitoring List for the OBG Unit.

The Permittee submitted a revised Compliance Monitoring Plan with proposed Groundwater Protection Standards (GPSs) to the Department and the first semiannual groundwater Compliance Monitoring event for 2007 was conducted in accordance with the revised Compliance Monitoring Plan during Second Quarter 2007.

During semiannual groundwater Compliance Monitoring, concentrations of ~~at least~~ two constituents, perchlorate and carbon tetrachloride, were detected greater than their respective GPSs at one or more downgradient well(s). As a result, according to 40 CFR 264.91(a)(2), the Permittee implemented a Corrective Action Program (CAP) under 40 CFR 264.100.

Permit Module VII – *Corrective Action and Groundwater Monitoring Program*, was approved by the DEQ in the Class 3 Hazardous Waste Permit Modification dated September 27, 2011. This module was revised on February 22, 2012, November- 9, 2013, June 12, 2014 and with this ~~permit module.~~reissuance of the Permit.

Currently, groundwater is conducted semiannually in accordance with the Corrective Action and Groundwater Monitoring Program.

VII.B **CORRECTIVE ACTION PROGRAM**

VII.B.1 The Corrective Action Program shall meet the requirements specified in 40 CFR- 264.100.

VII.B.2 The Corrective Action Program shall prevent hazardous constituents listed in the Annual Groundwater Monitoring List for Corrective Action Program from exceeding their respective GPSs (or concentration limits) listed in **Permit Attachment VII.C** at the point of compliance by removing the hazardous waste constituents or by treating them in place, pursuant to 40 CFR 264.100(b).

VII.B.3 The Permittee shall conduct a corrective action program to remove or treat in place any hazardous constituents that exceed their respective concentration limits, as determined pursuant to **Permit Condition VII.H** (~~Groundwater Protection Standard~~GPS), in the groundwater between the point of compliance and the downgradient facility property boundary, in accordance with 40 CFR 264.100(e).

VII.B.4 The Corrective Action Program, undertaken pursuant to 40 CFR 264.100 and this permit, as modified, may be terminated with the prior approval of the Director if the concentrations of all hazardous constituents listed in the **Permit Attachment VII.C** are reduced to levels below their respective GPSs specified in **Permit**

Attachment VII.C. If the compliance period has not ended at the time of the Director's approval to terminate the corrective action program, groundwater monitoring shall then be conducted in accordance with **Permit Module V – Compliance Monitoring Program**. The Permittee shall continue corrective action measures during the compliance period to the extent necessary to ensure that the ~~Groundwater Protection Standard~~ GPS is not exceeded, pursuant to 40 CFR 264.100(f).

VII.B.5 If corrective action is required beyond the compliance period, it shall continue until the ~~Groundwater Protection Standard~~GPS for any constituent in any well has not been exceeded for three consecutive years, pursuant to 40 CFR 264.100(f).

VII.B.6 The Permittee shall report in writing to the Director on the effectiveness of the Corrective Action Program, and shall propose all appropriate modifications and/or additional corrective action measures. The Permittee shall submit these reports at least annually, on March 1 of each year, and may combine these reports with the annual groundwater monitoring reports required by **Permit Condition VII.L.**

VII.B.7 The Permittee shall implement the ~~CAP~~Corrective Action Program as specified in this Permit Module, pursuant to 40 CFR 264.100. The goal of this corrective action program is to reduce perchlorate and carbon tetrachloride to levels below their GPSs within a reasonable period of time at the point of compliance and throughout the plume (40 CFR 264.100), using ~~source area evaluation, source removal and~~ monitored natural attenuation (MNA).

VII.C SOURCE AREA EVALUATION

Commented [RFAAP3]: Revised section to discuss work completed to date

VII.C.1 ~~Within ninety 90 days of the date the~~ ~~Subsequent to~~In accordance with the 2011 Class 3 Permit Modification~~ is signed and issued~~, the Permittee ~~shall initiate~~completed a Source Area Evaluation (SAE) at the OBG~~ in order~~ to evaluate (to the extent possible) the source area(s) of the hazardous constituents of concern (HCOCs) ~~that have been~~were detected at concentrations exceeding the ~~proposed~~ GPSs at that time in the groundwater at the Unit. The SAE was conducted in accordance with the ~~V~~DEQ-approved SAE Sampling and Analysis Plan (SAP) included as **Permit Attachment VII.A**. ~~This timeframe may be extended at the discretion of the Department without the need for a Permit Modification.~~ The results of the SAE ~~will be~~ were used to further refine the remediation activities to be conducted under the CAP to protect human health and the environment. ~~The SAE shall be conducted in accordance with the SAE Sampling and Analysis Plan (SAP) is included as **Permit Attachment VII.A**.~~

~~**VII.C.2** The proposed boring locations from which soil and groundwater samples will be collected during the SAE are illustrated in Figure 3 of **Permit Attachment VII.A**.~~

~~The proposed borings are located within or near former burn pits used at the OBG prior to the construction of the current burn pads. The locations of the former burn pits illustrated in **Permit Attachment VII.A** are derived from the USEPA Environmental Photographic Interpretation Center (EPIC) *Installation Assessment, Radford Army Ammunition Plant, Radford Virginia, Volume 2*, dated June 1992 (TS-PIC-92372).~~

~~**VII.C.3** All soil and groundwater samples collected from all borings in support of the SAE shall be analyzed for perchlorate. All soil and groundwater samples collected from all borings in support of the SAE shall be analyzed for carbon tetrachloride and its associated daughter products: chloroform, methylene chloride, and chloromethane. Chloroform, methylene chloride, and chloromethane have not been detected previously in the groundwater at the OBG.~~

~~**VII.C.4** All results shall be reported by the laboratory to the Method Detection Limit (MDL). The laboratory shall report the MDL and the Quantitation Limit (QL). The QLs for soil sample constituents shall be lower than the removal response goals shown in **Permit Condition VII.D.2.** The QLs for groundwater sample constituents shall be lower than the applicable GPS.~~

VII.C.~~5~~ 2 ~~Within ninety (90) days of completion of the SAE and upon determination by the Department or the Permittee that excavation, bioremediation or another corrective action is necessary, the Permittee shall submit to the Department any additional workplans (e.g., excavation plan, bioremediation work plan, etc.) in support of the CAP that are deemed to be necessary as a result of the SAE activities.~~ Additional submittals in support of **Permit Conditions VII.D** and **VII.E** shall not be considered ~~to be~~ changes to the ~~CAP~~ Corrective Action Program as required by 40 CFR Part 264.100(h) [i.e., they are not considered to be a determination that the ~~CAP~~ Corrective Action Program no longer satisfies the requirements of the regulations]; therefore, submission of such addenda shall not require a permit modification.

VII.D SOURCE REMOVAL (RESERVED)

Commented [RFAAP4]: Source removal not required. Removed text in this section, as the methods described were never implemented (or required to be implemented). This section remains for formatting purposes.

VII.D.1 Source material was not discovered during the SAE and source removal as anticipated in the 2011 Permit modification was not implemented. ~~If a source material containing HCOC concentrations exceeding the removal response goals listed in **Permit Condition VII.D.2** is discovered during the SAE in the vadose zone (above the groundwater surface), the Permittee shall determine whether the material can be removed or treated in place without adversely disrupting OBG operations. The Permittee shall evaluate multiple methods of source removal as listed in **Permit Condition VII.D.3** until the SAE is completed and an appropriate source removal alternative can be determined. Prior to any source~~

removal action and within ninety (90) days of completion of the SAE, a source removal work plan will be submitted to the Department for approval.

VII.D.2 The removal response goals for the source material are based on the USEPA Region III May 2010 Regional Screening Levels (RSLs) for industrial soil. The RSLs for the HCOCs at the OBG are:

Hazardous Constituent of Concern	**Industrial Soil Screening Level (RSL)**
Perchlorate	7.2E+02 mg/kg
Carbon tetrachloride	3.0E+00 mg/kg
Chloroform	1.5E+00 mg/kg
Methylene chloride	5.3E+01 mg/kg
Chloromethane	5.0E+02 mg/kg

VII.D.3 Source Removal Method Alternatives

a. Excavation and Off-site Disposal

If approved by the Department as the source removal alternative, source material containing HCOC concentrations exceeding the removal response goals listed in **Permit Condition VII.D.2** shall be excavated and transported off-site for treatment and disposal. It is anticipated that the excavated material will be non-hazardous waste; however, waste characterization analyses shall be conducted to appropriately characterize material and to develop waste profiles for appropriate handling and disposal in accordance with the Department's IDW Policy (**Appendix 9 to Permit Attachment IV.A**) and other applicable guidance. The extent of excavation shall be determined based on the results of the SAE.

A site-specific Excavation Plan shall be prepared and submitted to the Department for review and approval in accordance with **Permit Conditions VII.C.5** and **VII.D.1** if excavation is deemed to be appropriate based on the results of the SAE. The Excavation Plan shall include plans and specifications for excavation, waste characterization, transportation and disposal, decontamination, confirmation sampling, erosion and sedimentation control, backfilling and site restoration, quality assurance requirements and procedures, and health and safety procedures.

b. In Situ Bioremediation of Vadose Zone Soils

If approved by the Department as the source removal alternative, source material containing HCOC concentrations exceeding the removal response goals listed in **Permit Condition VII.D.2** shall be treated in situ by enhanced bio-remediation. The extent and scope of the in-situ treatment system shall be determined based on the results of the SAE and the field pilot test.

~~A site-specific Bioremediation Work Plan shall be prepared and submitted to the Department for review and approval in accordance with **Permit Conditions VII.C.5** and **VII.D.1** if in-situ bioremediation of vadose zone soils is deemed to be appropriate based on the results of the SAE. The Bioremediation Work Plan shall be developed for field pilot tests and shall include a site-specific data review, preliminary site screening for enhanced anaerobic degradation, proposed technical approach, field program, schedule, quality assurance requirements and procedures, and health and safety procedures.~~

VII.E GROUNDWATER REMEDIATION

Commented [RFAAP5]: Revised this section for clarity

VII.E.1 Remediation Objectives

Concurrent with source area evaluation ~~and removal~~ activities ~~specified in **Permit Sections VII.C and VII.D**~~, the Permittee ~~shall~~ implemented a Monitored Natural Attenuation (MNA) as the groundwater remedy. The principal remediation objective is to reduce perchlorate and carbon tetrachloride concentrations ~~to levels~~ below their respective GPSs within a reasonable period of time at the point of compliance. To accomplish this principal objective, the Ceorrective Action Program~~lan~~ ~~CAP shall collect data listed in **Permit Attachment VII.B** and~~was designed to:

- Collect data listed in **Permit Attachment VII.B**
- Delineate the extent of the perchlorate and carbon tetrachloride plumes in groundwater; and
- Identify the presence and concentrations of HCOCs and biodegradation indicators in groundwater which verify the efficacy of natural attenuation. Perchlorate degradation to chloride proceeds in the general sequence of perchlorate to chlorate to chlorite to hypochlorite to chloride. Carbon tetrachloride is degraded to chloroform, methylene chloride, chloromethane and ultimately methane.

~~a. Extent of Perchlorate and Carbon Tetrachloride Plumes~~

- As of Fourth Quarter 2015, concentrations of perchlorate and carbon tetrachloride are below the respective ~~groundwater protection standard (GPS)~~GPS and it appears that progress is being made toward the remedial objectives. As a result, RFAAP continues to monitor groundwater at the OBG semiannually in accordance with the Corrective Action and Groundwater Monitoring Program. Historical concentrations and trend graphs for perchlorate and carbon tetrachloride from 2003 through 2015 are included in **Permit Attachment**

Commented [RFAAP6]: Revised June 2016 to add information regarding the extent of the plume in response to NOD 1s.34.

VII.D.~~1 a-d~~. Fourth Quarter 2015 concentrations for perchlorate and carbon tetrachloride are presented in Figures VII.D.1-2 in **Permit Attachment VII.D.~~1.e-f~~**.

VII.E.2 Installation of Additional Monitoring Wells

~~Depending~~ Based on the results of the SAE, an additional well, 13MW8 was~~s may be required to be~~ installed in order to monitor impacted groundwater. 13MW8 was installed in accordance with the requirements of **Permit Condition VII.G.4**, and shall serve as a plume well for the monitoring of the HCOCs and daughter products identified in **Permit Attachment VII.B** and **Attachment VII.C**, if any. Additional monitoring wells, if required, shall be installed in accordance with the requirements of **Permit Condition VII.G.4**, and shall serve as plume wells for the monitoring of the HCOCs and daughter products identified in **Permit Attachment VII.B** and **Attachment VII.C**, if any.

VII.E.3 Performance Monitoring

The MNA component of corrective action at the site will rely on performance monitoring to document progress in restoring groundwater quality. Performance monitoring will be conducted in accordance with the Corrective Action Monitoring Program as specified in **Permit Sections VII.F** through **VII.O**.

VII.E.4 Program Evaluation

The performance monitoring data will be compiled, validated and reported to the Department on at least an annual basis to evaluate the performance and effectiveness of MNA to reduce constituent concentrations below the GPSs. The performance monitoring data will be included in the Annual Groundwater Monitoring Report specified in **Permit Condition VII.L**. The evaluation shall contain adequate information to demonstrate that the remedial measures are addressing the groundwater contamination at the OBG and progress is being made toward the remediation objectives. The following contents shall be contained in the evaluation, if available:

Commented [RFAAP7]: Revised February 2017, restoring original language "contamination" as requested.

a. Estimated amounts of contaminants remediated during the previous six months and total remediated;

b. Sampling and analysis results;

c. Proposed modifications to the corrective action program to enhance performance and/or to correct deficiencies and malfunctions; and

d. Other recommendations regarding the CAP, as appropriate.

VII.E.5 Alternative Groundwater Remediation Methods

If the Department or the Permittee determine that MNA is ineffective as a corrective action program, the Permittee shall evaluate and pursue other means of groundwater remediation. The Permittee shall submit to the Department an application for a Class II permit modification to modify the ~~CAP~~ Corrective Action ~~Plan~~Program within 180 days of the determination that MNA is no longer effective and that a modification to the corrective action process is required. Alternative groundwater remediation methods may include ex-situ pump-and-treat (P&T) systems utilizing for example ion exchange or granular activated carbon, ex-situ biological processes, enhanced in situ anaerobic bioremediation, or a combination of these.

VII.F <u>CORRECTIVE ACTION MONITORING PROGRAM</u>

A groundwater monitoring program must be implemented to demonstrate the effectiveness of the corrective action program (§264.100(d)). The corrective

action monitoring program may be based on the compliance monitoring program (**Permit Module V**), but must be as effective in determining compliance with the ~~groundwater protection standard~~ GPS under 40 CFR ~~§~~264.92 and in determining the success of the corrective action program.

This Corrective Action Monitoring Program is based upon the Compliance Monitoring Program (**Permit Module V**) modified as necessary to meet the performance standards for a Corrective Action Monitoring Program (9VAC20-60-264.100).

VII.F.1 Groundwater Monitoring System

a. The groundwater beneath the unit shall be monitored with one upgradient groundwater monitoring well, ~~five~~ three downgradient point of compliance wells, and ~~one~~ three downgradient plume monitoring well located as specified on the map presented in Figure V.A.3 in **Permit Attachment V.A**.

b. Monitoring well ~~1~~ 13MW2 is located upgradient of the unit and will serve as the background well for the OBG. Monitoring wells 13MW3, 13MW4, ~~13MW5, 13MW6~~ and 13MW7 are located downgradient of the unit and will serve as the point of compliance wells. Monitoring wells 13MW5, 13MW6, and 13MW-8 ~~is~~ are the downgradient plume monitoring wells for the unit. In addition, well 13MW-1 will be used as a piezometer to measure static groundwater elevations during each sampling event. Further, the facility may collect quarterly background data from 13MW1 following approval from the Department in order to obtain a more robust background dataset. Additional monitoring wells, if required ~~as a result of the SAE,~~ will serve as plume wells for the monitoring of the HCOCs and daughter products and for the MNA parameters listed in **Permit Attachment VII.B**.

c. Static groundwater elevations (and total depths for wells that do not contain dedicated pumps) will be measured at all wells specified in **Permit Conditions VII.F.1.a and b**. during each sampling event.

VII.F.2 Sampling Schedule

a. The background well, point of compliance wells, and plume monitoring well(s) will be sampled in accordance with the Sampling and Analysis Plan (**Permit Attachment IV.A**) and the following schedule.

b. The downgradient point of compliance and plume monitoring wells and, when needed, the background well specified in **Permit Condition VII.F.1** will be sampled at least semiannually for the constituents listed in **Permit Attachment VII.B**. The downgradient point of compliance and plume monitoring wells will also be sampled at least semiannually for the MNA parameters listed in **Permit Attachment VII.B**. Samples will be collected

Commented [RFAAP8]: Recommend reclassifying wells 13MW5 and 13MW6 as plume monitoring wells

Commented [RFAAP9]: Revised June 2016 in response to NOD 2s.4

Commented [RFAAP10]: Added 13MW1 to background data collection as needed.

Commented [RFAAP11]: Revised to be consistent with similar language in Post-Closure Care Permit for HWMUs 5 and 16.

using the methods specified in **Permit Attachment IV.A** and analyses will be conducted using the methods specified in **Permit Attachments V.B** and **VII.B**.

c. Additional plume monitoring wells, if required ~~as a result of the SAE~~ as discussed in **Permit Condition VII.E.2** will be sampled at least semiannually for the HCOCs and daughter products and for the MNA parameters listed in **Permit Attachment VII.B**.

Commented [RFAAP12]: Revised to clarify that additional wells installed will be plume monitoring wells as detailed in Permit Condition VII.E.2.

d. Downgradient point of compliance wells specified in **Permit Condition VII.F.1** will be sampled annually for all constituents listed in **Permit Attachment VII.C**. Samples will be analyzed using the methods specified in **Permit Attachment VII.C**.

e. Alternate SW-846 methods, or other applicable methods, may be approved by the Director, provided that the request is in writing and submitted thirty (30) days prior to the sampling event. Proposed alternate methods must achieve the same QL, or lower, as the specified analytical method and must meet the requirements of **Permit Attachment IV.A (Groundwater Monitoring Sampling and Analysis Plan)**.

f. Additionally, the laboratory must be accredited for the analytical method, matrix and target analyte ~~(where applicable)~~ by the Virginia Environmental Laboratory Accreditation Program ~~-~~(VELAP).

Commented [RFAAP13]: Revised February 2017, removing "where applicable" as requested in NOD 1s.36.

VII.G WELL LOCATIONS, CONSTRUCTION, AND MAINTENANCE

VII.G.1 Well Locations

a. The locations of the monitoring wells comprising the groundwater monitoring system as described in **Permit Condition VII.F.1** are presented on Figure V.A.3 of **Permit Attachment V.A.**

b. Boring logs, design and construction details for monitoring wells listed in **Permit Condition VII.F.1** are presented in **Permit Attachment IV.A, Appendix 8**.

c. Boring logs, design and construction details for additional monitoring wells, if required, installed ~~as a result of the SAE~~ as discussed in **Permit Condition VII.E.2** will be submitted as an addendum to the ~~CAP~~Corrective Action Plan.

VII.G.2 Well Maintenance

Monitoring wells shall be maintained at their locations depicted on **Figure V.A.3** presented in **Permit Attachment V.A**.

a. All monitoring wells in the Monitoring Program, as listed in **Permit Condition VII.F.1**, shall be maintained and inspected at least semiannually to ensure proper operation. Any required repairs shall be made by the Permittee as soon as possible.

b. The Permittee shall inspect all monitoring wells listed in Permit **Condition VII.F.1** at least annually to ensure that they are not damaged. If any of these wells are damaged beyond reasonable efforts for repair, the Permittee may petition the Director for approval to abandon the affected monitoring well in accordance with **Permit Condition VII.G.4**. Appropriate permit modification applications shall be submitted in accordance with 40 CFR 270.42.

VII.G.3 Maintenance Standard

All monitoring wells required by this Permit will be maintained in conformance with the following, pursuant to 40 CFR 264.97(a):

a. The groundwater monitoring system must yield samples in the background well(s) that represent the quality of the groundwater unaffected by a release from any regulated unit and, in downgradient wells yield samples that represent groundwater quality passing the point of compliance.

b. The number and location of groundwater monitoring wells must be sufficient to identify and define all logical release pathways from the regulated unit to the uppermost aquifer based on site specific hydrogeologic characterization.

VII.G.4 Installation and Abandonment

The Director must approve the addition or removal of all monitoring wells prior to installation or abandonment, in accordance with 40 CFR 270.42.

a. All monitoring wells which are to be abandoned shall be plugged and abandoned in accordance with **Permit Attachment IV.A**, **Appendix 7**. Well abandonment methods and certification shall be submitted to the Director within thirty (30) days from the date the wells are removed from the monitoring program.

b. All monitoring wells added to the groundwater monitoring system must be constructed in accordance with USEPA's RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD) or subsequent USEPA guidance documents, and must meet the requirements of 40 CFR 264.99(b).

VII.H <u>GROUNDWATER PROTECTION STANDARD</u>

The Permittee will monitor the groundwater to document that the regulated unit complies with the GPS established in accordance with 40 CFR Part 264.92 and 9VAC-20-60-264.B(7), or that the groundwater is being remediated to attain that standard.

VII.H.1 Hazardous Constituents and Groundwater Protection Standard (GPS)

a. Hazardous constituents are any constituents listed in ~~Appendix VIII to~~ 40 CFR 261 Appendix VIII or in ~~Appendix IX to~~ 40 CFR 264 Appendix IX, as defined in 9VAC-20-60-264.B(6).

b. GPSs are established based upon background values from background groundwater monitoring at the OBG, USEPA Safe Drinking Water Act Maximum Contaminant Levels (MCL), Alternate Concentration Limits (ACL) established by the Department, or USEPA Region III Regional Screening Levels (RSLs).

c. Background concentrations established at the time of permit issuance are listed in **Permit Attachment V.C**. For any newly detected hazardous constituents, background values shall be established in accordance with 40 CFR 264.97(g) and as specified in **Permit Attachment IV.A**, **Appendix 6**. Background groundwater quality for a constituent or monitoring parameter shall be based on at least four (4) data points collected at background monitoring well(s) during a period not exceeding one (1) year.

d. The hazardous constituents annually analyzed and their GPSs for the CA program for the OBG are listed in **Permit Attachment VII.C**. Constituents in **Permit Attachment VII.C** were based on the groundwater Compliance Monitoring Constituents (**Permit~~n~~ Attachment V.B**), plus previously detected in the groundwater beneath the units, or were determined to be part of the hazardous waste or hazardous waste constituents treated at the unit.

VII.H.2 Changes to Groundwater Protection Standards

a. The Permittee will use the GPS presented in **Permit Attachment VII.C**. If USEPA implements any changes to MCLs or RSLs, the GPS defined by that MCL or RSL shall be updated to reflect the most current value established by USEPA. The Department will notify the Permittee of any such change and will provide an amended **Permit Attachment VII.C** to the Permittee. Within ninety (90) days of receiving the amended **Permit Attachment VII.C**, the Permittee shall provide notice of the modification(s) to all persons on the facility mailing list.

b. Any concentration limit based on a background value or ACL may be updated if new data become available. The Department will review the ACL changes annually and decide if the changes were significant enough to warrant the

Department pursuing a permit amendment. The Department will notify the Permittee of any such change and will provide an amended Permit Attachment V.E. to the Permittee. Within ninety (90) days of receiving the amended Permit Attachment V.E., the Permittee shall provide notice of the modification(s) to all persons on the facility mailing list.

VII.I SAMPLING AND ANALYSIS PROCEDURES

Pursuant to 40 CFR 264.97(e), the groundwater monitoring program must include sampling and analytical methods that are appropriate for groundwater sampling and that accurately measure hazardous constituents in groundwater samples. The groundwater monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide a reliable indication of ~~ground water~~groundwater quality below the waste management area. To make changes to the groundwater sampling and analysis procedures specified in this section, the Permittee will submit for Director approval an application for a Class 1 permit modification in accordance with 40 CFR 270.42, Appendix I. The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in **Permit Condition VII.F.1.** ~~:~~Additionally, the laboratory performing the analysis ~~analyzing the samples,~~ must be VELAP accredited for the method, matrix and analyte.

Commented [RFAAP14]: Revised February 2017, removing "where applicable" as requested in NOD 1s.36.

VII.I.1 Sample Collection and Sample Frequency

Groundwater samples will be collected using the techniques described in **Permit Attachment IV.A**~~. and~~ at the frequency specified in **Permit Condition VII.F.2.**

VII.I.2 Sample Preservation, Transport and Documentation

a. Groundwater samples will be preserved, packed and shipped to the receiving laboratory for analysis in accordance with the procedures specified in **Permit Attachment IV.A**.

b. Groundwater samples will be tracked and controlled using the chain-of-custody procedures specified in **Permit Attachment IV.A**.

VII.I.3 Sample Analysis

Groundwater samples will be analyzed in accordance with the procedures described in **Permit Attachments VII.B** and **VII.C**. In addition, the performing laboratory must have VELAP accreditation for the alternative method, matrix and analyte.

VII.J GROUNDWATER SURFACE ELEVATION

VII.J.1 Determination of Groundwater Surface Elevation

The Permittee will determine the groundwater surface elevation in accordance with **Permit Attachment IV.A** at each groundwater monitoring well described in **Permit Condition VII.F.1** at least semiannually and each time groundwater is sampled.

VII.J.2 Elevation of Additional/Replacement Wells

The Permittee will report the surveyed elevation of any additional or replacement monitoring well(s) when installed with as built drawings. The total well depth and the elevation of the following will be recorded: top of the casing, ground surface and/or apron elevation, and top of the protective casing.

VII.K MONITORING PROGRAM AND DATA EVALUATION

The Permittee will determine groundwater quality in accordance with **Permit Sections VII.I and VII.J** as discussed below.

VII.K.1 Groundwater Flow Direction and Velocity

The Permittee will determine the groundwater flow direction and velocity in the uppermost aquifer at least semiannually in accordance with **Permit Condition VII.F.2**. Constituent migration rate will be calculated, if necessary to demonstrate the effectiveness of corrective action monitoring. Potentiometric maps showing groundwater elevation contour and flow direction during each sampling event shall be prepared at least annually.

VII.K.2 Analytical Data Presentation

Commented [RFAAP15]: This section revised for clarity

a. The Permittee shall determine the concentrations/values of hazardous constituents and MNA parameters semiannually listed in **Permit Attachment VII.B** and annually listed in **Permit Attachment VII.C** in accordance with **Permit Conditions VII.F.2. and VII.I.** The Permittee shall independently complete the validation of the data within the two (2) weeks of the data being available from the laboratory performing the analyses.

   Estimated values between the method detection limit (MDL) and quantitation limit (QL) will be validated and qualified with the "J" flag to indicate the ~~result that a~~ constituent is present and detected at or above the MDL, but below the QL and the associated value is estimated. The "U" flag will be used to indicate that the constituent is not detected at or above the MDL.

b. The Permittee will present the groundwater quality at each monitoring well in a form appropriate for the determination of statistically significant increases, in accordance with 40 CFR 264.97(h).

c. The Permittee's report will include at least the following information: the constituents analyzed and concentration with qualifier, the background value, the GPS, the SW-846 test methods, ~~method detection limits (MDL)~~MDL, q~~uantitation limits (QL)~~QL, ~~the internal~~ laboratory quality assurance/quality control (QA/QC) results, ~~matrix spike duplicates, percent recovery,~~ duplicate analyses, dilution factors, any laboratory specific ~~detection limit~~MDL and/or ~~quantitation limi~~QLt, the results of any screening analyses, and any other information needed to evaluate accuracy, precision, representativeness, comparability, and completeness of the groundwater quality data.

VII.K.3 Determination of Additional GPS-Exceedance Constituents Present

Commented [RFAAP16]: Revisions below made to be consistent with the requirements of the referenced Permit Condition or to correct incorrect citations.

The Permittee shall analyze samples from the Point of Compliance Wells specified in **Permit Condition VII.F.1.** for all constituents contained in **Permit Attachment VII.C (Annual Monitoring List for CAP)** annually to determine whether additional hazardous constituents, which are not the targets for the current corrective action (e.g. perchlorate and carbon tetrachloride~~s~~), are present in the uppermost aquifer at levels exceeding the established GPSs specified in **Permit Attachment VII.C**.

a. In determining whether such an exceedance has occurred, the Permittee shall compare the groundwater quality at each downgradient point of compliance ~~monitoring~~ well specified in **Permit Condition VII.F.1.** to the GPS for that constituent specified in **Permit Attachment VII.C**:

- If a single independent sample was collected at the point of compliance~~monitoring~~ well, the Permittee shall conduct a simple empirical comparison of the GPS and the measured value;
- If multiple independent samples were collected from each point of compliance~~monitoring~~ well, a statistical comparison to the GPS which is approved by the Director shall be conducted. The statistical comparison shall be in accordance with **Appendix 6** to **Permit Attachment IV.A**.

b. The Permittee shall notify the Director within seven (7) days from receipt of the laboratory data of any exceedances of the GPS. The notification shall include the concentration of constituent exceeding the GPS and shall identify the monitoring well(s) where the GPS was exceeded.

c. The Permittee may resample within (60) days from receipt of the laboratory data and repeat the analysis for the detected **Permit Attachment VII.C** constituent.

~~d.~~ If the second analysis confirms the presence of constituents at levels exceeding an established GPS or if the Permittee does not resample, the Permittee shall then report the constituents to the Director in writing within seven (7) days and the Permittee must take corrective action for that ~~contaminant~~ constituent as required by **Permit Condition VII.O**.

d.

VII.K.4 Alternate Source Demonstration

The Permittee may attempt to demonstrate that a groundwater concentration limit was exceeded due to sources other than the regulated unit, was due to an error in sampling, analysis or statistical evaluation, or was due to natural variability in the groundwater. The demonstration shall be conducted as follows:

a. The Permittee shall include a statement in the notification to the Director pursuant to **Permit Condition VII.K.3**. that the demonstration will be attempted.

b. Resampling, if a part of the demonstration, must be conducted within sixty (60 days of receipt of original laboratory data.

c. The Permittee must submit a report to the Director within 90 days of the notification that demonstrates a source other than the regulated unit caused the groundwater protection standard to be exceeded or that the apparent non-compliance was a result of an error in sampling, analysis, or evaluation. The Permittee must also submit to the Director within 90 days of the notification in **Permit Condition VII.K.3**. an application for a permit modification to make any appropriate changes in the Corrective Action Program.

~~e~~d. The Permittee must continue to monitor in accordance with the Corrective Action Program established under 40 CFR 264.100.

VII.L REPORTING

The Permittee will submit the analytical results required by **Permit Condition VII.K** whenever there is a change in flow rate or direction such that the groundwater monitoring system defined in **Permit Condition VII.F.1** is no longer adequate for the Corrective Action Monitoring Program, or whenever evidence of a statistically significant ~~evidence of increased concentrations~~ increase above~~-~~ the GPS ~~applicable concentration limits is identified~~, or at least annually with the Annual Groundwater Monitoring Report. Additional reporting requirements are specified in the following:

VII.L.1 Groundwater Elevation/Potentiometric Contour Maps

a. Annually, the Permittee will submit groundwater elevations and potentiometric contour maps depicting groundwater flow paths and supporting groundwater elevation data to determine if the requirements for locating the monitoring well network continue to be satisfied.

b. If the evaluation determines that the existing monitoring well network no longer satisfies the requirements of 40 CFR 264.97(a), the Permittee will submit an application for a permit modification to make appropriate changes to bring the monitoring system into compliance.

VII.L.2 Contents of Annual Report

The report, submitted by March 1 of each year, shall meet all the requirements of an Annual Groundwater Monitoring Report and shall include an evaluation of the corrective action program as required by **Permit Condition VII.E.4.** The following items will be included, at a minimum:

- The operator/owner certification signed and dated by an authorized representative of the Facility;
- Potentiometric surface maps and static groundwater level elevation data collected during each sampling event during the previous calendar year;
- Evaluation of groundwater flow directions and gradients;
- Calculated or measured rate of migration of hazardous constituents in the groundwater;
- Analytical Result/Data Summary containing the following columns: well name, sampling/analytical dates, constituents analyzed, analytical methods, MDL, ~~P~~QL, resulting data (concentrations) with qualifiers, RBC and MCL (if promulgated), and background values (if applied and calculated).
- Detections of constituents above the ~~Groundwater protection standard exceedances~~GPS, whether it is the first exceedance of that constituent or a repeated exceedance;
- Long-term time concentration plots of constituents of concern exceeding GPS for each well;
- When appropriate, graphic representation of groundwater impact plumes for constituents exceeding GPS;
- When appropriate, statistically calculated background values;
- Statistical evaluations of the groundwater data collected during the previous calendar year, including all computations, calculated means, variances, t-statistic values, and t-test results or the calculations and results of statistical tests that the Director has determined to be equivalent as appropriate;

- Copies of notifications and reports submitted as required by this Permit Module; and
- Data package with the certification from the contract analytical laboratory.

VII.M RECORDKEEPING

Groundwater monitoring data collected in accordance with **Permit Section VII.I**, including all monitoring, testing and analytical data, must be maintained in the facility operating record in accordance with **Permit Section I.E**.

VII.N ASSURANCE OF COMPLIANCE

The Permittee will demonstrate to the Director that groundwater monitoring and corrective action measures necessary to achieve compliance with the groundwater protection standard of 40 CFR 264.92 are being conducted during the term of the permit.

VII.O PERMIT MODIFICATION REQUESTS

VII.O.1. Modifications to Corrective Action Plan

If the Permittee or the Department determines that the corrective action ongoing at the OBG is not adequate to protect human health and the environment, the Permittee will submit to the Department an application for a permit modification to modify the corrective action plan within 180 days of receipt of the Department's determination that additional or modified corrective action is required. Specifically, permit modification during implementation of corrective measures at the point of compliance for the regulated unit OBG shall be required if the Permittee or the Department has made any of the following determination:

a. A GPS has been exceeded for a constituent for which the current corrective measure contained in the Permit will not achieve the remediation goals (see **Permit Condition VII.K.3** above) and an alternate remedial measure (see **Permit Condition VII.E.5** above) is required to meet the requirements of 40 CFR 264.100;

b. The corrective measures contained in this permit are no longer effective in remediating groundwater at the point of compliance and the GPSs are still being exceeded. A modification incorporating a different remedial measure is required; or

c. Significant changes must be made to the remedial measures contained in this Permit to protect human health and the environment.

VII.O.2. Modifications to Corrective Action Monitoring Program

If the Permittee or the Department determines that the corrective action monitoring program no longer satisfies the requirements of 40 CFR 264.99 and 264.100, then within ninety (90) days, the Permittee shall submit an application for a permit modification to make any appropriate changes.

PERMIT ATTACHMENT VII.C

CORRECTIVE ACTION PROGRAM – ANNUAL GROUNDWATER MONITORING LIST FOR RADFORD OBG~~#13~~/HWMU-13

~~SEPTEMBER 27, 2011~~
~~MODIFIED: FEBRUARY 22, 2012~~
~~MODIFIED: JUNE 13, 2013~~
~~MODIFIED: JUNE 12, 2014~~
~~MODIFIED:XXX , 2015.~~
~~JUNE~~
~~MODIFIED: JANUARY 31, 2017~~

Commented [RFAAP1]: Revised February 2017 per NODs 2S.8 and 2S.9. RFAAP submitted a separate request for OBG soil constituent removal and select GW constituents that have not been detected in GW since 2005. This table reflects constituents proposed for removal. Based on email from A. Scott , DEQ, dated 12-14-2016 to RFAAP, Ashby noted "I've discussed the proposed modification with Leslie and pending the results of the risk assessment, meaning as long as none of the constituents proposed for removal are risk drivers, I'm comfortable with them being removed from the monitoring list. Final revision of this table pending risk assessment. Constituents proposed for deletion are noted below.

Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG#13/HWMU-13

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on
Antimony, Total	metal	7440-36-0	6010/6020	5	6	6	6.26		6	MCL
Arsenic, Total	metal	7440-38-2	6010/6020	5	5	10	0.045		10	MCL
Barium, Total	metal	7440-39-3	6010/6020	10	206	2000	3130		2000	MCL
~~Cadmium, Total~~	~~metal~~	~~7440-43-9~~	~~6010/6020~~	~~1~~	~~1~~	~~5~~	~~7.825~~	~~-~~	~~5~~	~~MCL~~
Chromium, Total	metal	7440-47-3	6010/6020	5	112	100	-		112	Bckgrnd
Lead, Total	metal	7439-92-1	6010/6020	~~5~~10	14	15	-		15	MCL
Mercury, Total	metal	7439-97-6	7470	0.5	2.52	2	0.19		2.52	Bckgrnd
Nickel, Total	metal	7440-02-0	6010/6020	5	5	-	~~313~~390		~~313~~390	ACL
Selenium, Total	metal	7782-49-2	6010/6020	5	5	50	78.25		50	MCL
~~Silver, Total~~	~~metal~~	~~7440-22-4~~	~~6010/6020~~	~~2~~	~~2.4~~	~~-~~	~~78.25~~	~~-~~	~~78.25~~	~~ACL~~
Zinc, Total	metal	7440-66-6	6010/6020	~~5~~30	5	-	~~4695~~6000		~~4695~~6000	ACL
Perchlorate	Misc.	14797-73-0	314/6850	4	4	-	-	15	15	RSL

Commented [RFAAP2]: Constituents removed are those that have not been detected in recent monitoring history.
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REV 1 16 0515 – ACLs updated form DEQ table Jan 2016.
RSL updated based on June 2016 5 EPA RSL update (accessed May 27, 2016).

Commented [RFAAP3]: NOTE: Prior to final permit issuance, RFAAP will update this table with the most current RSLs.

Commented [RFAAP4]: Not detected since 2003.

Commented [RFAAP5]: Revised February 2017 to make consistent with December 1, 2016, Class 1 permit modification

Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG~~#13~~/HWMU-13

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on
Benzo[a]anthracene	PNA	56-55-3	8270	10	10	-	~~0.092~~0.012		~~0.09170~~.012	ACL
Benzo[a]pyrene	PNA	50-32-8	8270	10	10	0.2	~~0.009~~0.0034		0.2	MCL
Benzo[b]fluoranthene	PNA	205-99-2	8270	10	10	-	~~0.092~~0.034		~~0.0917~~0.034	ACL
Benzo[k]fluoranthene	PNA	207-08-9	8270	10	10	-	~~0.917~~0.34		~~0.917~~0.34	ACL
Dibenz[a,h]anthracene	PNA	53-70-3	8270	10	10	-	~~0.009~~0.0034		~~0.00917~~0.0034	ACL
Fluoranthene	PNA	206-44-0	8270	10	10	-	~~626~~.800		~~626~~.800	ACL
Indeno [1,2,3-cd] pyrene	PNA	193-39-5	8270	10	10	-	~~0.092~~0.034		~~0.0917~~0.034	ACL
~~Pyrene~~	~~PNA~~	~~129-00-0~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~67.07~~	~~-~~	~~67.07~~	~~ACL~~
1,3,5-Trinitrobenzene; *sim-*	energetic	99-35-4	8330	10	2.5	-	~~469.5~~590		~~469.5~~590	ACL
1,3-Dinitrobenzene; *m-*	energetic	99-65-0	8330	4	2.5	-	~~1.565~~2		~~1.565~~2	ACL
2,4-Dinitrotoluene	energetic	121-14-2	8330	10	10	-	~~31.3~~0.24		~~31.3~~0.24	ACL

Commented [RFAAP2]: Constituents removed are those that have not been detected in recent monitoring history.
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REV 1 16 0515 – ACLs updated form DEQ table Jan 2016.
RSL updated based on June 2016 5 EPA RSL update (accessed May 27, 2016).

Commented [RFAAP3]: NOTE: Prior to final permit issuance, RFAAP will update this table with the most current RSLs.

Commented [RFAAP6]: Revised June 2016. Updated to 2016 DEQ ACL

Commented [RFAAP7]: Revised June 2016. Updated to January 2016 DEQ ACL

Commented [RFAAP8]: Revised February 2017 pursuant to similar approval for removing pyrene from Module V, Attachment V.B – Compliance Monitoring list.

Commented [RFAAP9]: Not detected since 2005. Not on annual soil monitoring analyte list.

Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG~~#13~~/HWMU-13

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on
2,6-Dinitrotoluene	energetic	606-20-2	8330	10	5	-	~~15.65~~0.049		~~15.7~~0.049	ACL
Nitroglycerin	energetic	55-63-0	8330	16	16	-	-	~~3.7~~2	~~3.7~~2	RSL
~~Acetophenone~~	~~semivolatile~~	~~98-86-2~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~223.6~~	~~-~~	~~223.57~~	~~ACL~~
Bis (2-ethylhexyl) phthalate	semivolatile	117-81-7	8270	10	10	6	4.78		6	MCL
Butyl benzyl phthalate	semivolatile	85-68-7	8270	10	10	-	~~35.25~~16		~~35.2487~~16	ACL
~~2-Chlorophenol~~	~~semivolatile~~	~~95-57-8~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~11.2~~	~~-~~	~~11.2~~	~~ACL~~
~~Dibenzofuran~~	~~semivolatile~~	~~132-64-9~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~-~~	~~37~~	~~37~~	~~RSL~~
Diethyl phthalate	semivolatile	84-66-2	8270	10	10	-	~~12520~~15000		~~12520~~15000	ACL
3,3'-Dimethylbenzidine	semivolatile	119-93-7	8270	10	10	-	~~0.0060~~0.0065		~~0.0060~~0.0065	ACL
Dimethyl phthalate	semivolatile	131-11-3	8270	10	10	-	-		10	QL/ Bckgrnd
Di-n-butyl phthalate	semivolatile	84-74-2	8270	10	10	-	~~1565~~900		~~1565~~900	ACL

~~Modified: February 22, 2012~~
~~Modified: June 13, 2013.~~
~~Modified: June 12, 2014. Modified April 20 May 11, 2016~~

Commented [RFAAP2]: Constituents removed are those that have not been detected in recent monitoring history.
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REV 1 16 0515 – ACLs updated form DEQ table Jan 2016.
RSL updated based on June 2016 5 EPA RSL update (accessed May 27, 2016).

Commented [RFAAP3]: NOTE: Prior to final permit issuance, RFAAP will update this table with the most current RSLs.

Commented [RFAAP10]: Revised June 2016. Updated to January 2016 DEQ ACL

Commented [RFAAP11]: Revised June 2016. Updated to November 2015 RSL

Commented [RFAAP12]: Revised February 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal ... [1]

Commented [RFAAP13]: Not detected since 2005.

Commented [RFAAP14]: Revised February 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal ... [2]

Commented [RFAAP15]: Not detected since 2005.

Commented [RFAAP16]: Revised February 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal ... [3]

Commented [RFAAP17]: Not detected since 2005. Not on annual soil monitoring analyte list.

Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG~~#13~~/HWMU-13

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on
~~Di-n-octyl phthalate~~	~~semivolatile~~	~~117-84-0~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~313~~	~~-~~	~~313~~	~~ACL~~
~~2,4-Dichlorophenol~~	~~semivolatile~~	~~120-83-2~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~46.95~~	~~-~~	~~46.95~~	~~ACL~~
~~Diphenylamine~~	~~semivolatile~~	~~122-39-4~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~391.25~~	~~-~~	~~391.25~~	~~ACL~~
~~Hexachloroethane~~	~~semivolatile~~	~~67-72-1~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~4.78~~	~~-~~	~~4.78~~	~~ACL~~
~~3-Methylphenol; *m*-Cresol~~	~~semivolatile~~	~~108-39-4~~	~~8270~~	~~10~~	~~20~~	~~-~~	~~782.5~~	~~-~~	~~782.5~~	~~ACL~~
~~4-Methylphenol; *p*-Cresol~~	~~semivolatile~~	~~106-44-5~~	~~8270~~	~~10~~	~~20~~	~~-~~	~~78.25~~	~~-~~	~~78.25~~	~~ACL~~
~~Nitrobenzene~~	~~semivolatile~~	~~98-95-3~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~1.304~~	~~-~~	~~1.304~~	~~ACL~~
~~4-Nitrophenol; *p*-~~	~~semivolatile~~	~~100-02-7~~	~~8270~~	~~20~~	~~20~~	~~-~~	~~-~~	~~-~~	~~20~~	~~QL/Bckgnd~~
~~Phenol~~	~~semivolatile~~	~~108-95-2~~	~~8270~~	~~10~~	~~10~~	~~-~~	~~4695~~	~~-~~	~~4695~~	~~ACL~~
Benzene	volatile	71-43-2	8260	1	5	5	0.33		5	MCL
Benzyl Chloride	volatile	100-44-7	8260	5	5	-	-	~~0.079~~ 0.089	~~0.079~~ 0.089	RSL

Commented [RFAAP2]: Constituents removed are those that have not been detected in recent monitoring history.
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REV 1 16 0515 – ACLs updated form DEQ table Jan 2016.
RSL updated based on June 2016 5 EPA RSL update (accessed May 27, 2016).

Commented [RFAAP3]: NOTE: Prior to final permit issuance, RFAAP will update this table with the most current RSLs.

Commented [RFAAP18]: Not detected since 2003. Not ... [4]

Commented [RFAAP19]: Not detected since 2005.

Commented [RFAAP20]: Not detected since 2003.

Commented [RFAAP21]: Revised February 2017 pursua ... [5]

Commented [RFAAP22]: Not detected since 2003.

Commented [RFAAP23]: Not detected since 2005.

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Commented [RFAAP25]: Not detected since 2005.

Commented [RFAAP26]: Not detected since 2005.

Commented [RFAAP27]: Revised Febuary 2017 pursua ... [6]

Commented [RFAAP28]: Not detected since 2005.

Commented [RFAAP29]: Revised June 2016. Updated ... [7]

Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG~~#13~~/HWMU-13

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on
Carbon tetrachloride	volatile	56-23-5	8260	1	5	5	0.162		5	MCL
~~Chlorobenzene~~	~~volatile~~	~~108-90-7~~	~~8260~~	~~1~~	~~5~~	~~100~~	~~32.7~~	~~-~~	~~100~~	~~MCL~~
Chloroform	volatile	67-66-3	8260	1	1	80	0.13		80(9)	MCL
1,1-Dichloroethane	volatile	75-34-3	8260	1	1	-	~~2.42~~2.8		~~2.42~~2.8	ACL
~~1,2-Dichloroethane~~	~~volatile~~	~~107-06-2~~	~~8260~~	~~1~~	~~1~~	~~5~~	~~0.12~~	~~-~~	~~5~~	~~MCL~~
~~1,1-Dichloroethene~~	~~volatile~~	~~75-35-4~~	~~8260~~	~~1~~	~~1~~	~~7~~	~~125.2~~	~~-~~	~~7~~	~~MCL~~
Methyl bromide; Bromomethane	volatile	74-83-9	8260	1	1	-	~~3.18~~7.5		~~3.18~~7.5	ACL
Methyl chloride; Chloromethane	volatile	74-87-3	8260	1	5	-	~~1.434~~190		~~1.4342~~190	ACL
Methylene chloride; Dichloromethane	volatile	75-09-2	8260	1	5	5	8.9288		5	MCL
Naphthalene	volatile	91-20-3	8260	1	1	-	~~0.089~~0.17		~~0.0886~~0.17	ACL

~~Modified: February 22, 2012~~
~~Modified: June 13, 2013,~~
~~Modified: June 12, 2014, Modified April 20 May 11, 2016~~

Commented [RFAAP2]: Constituents removed are those that have not been detected in recent monitoring history.
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REV 1 16 0515 – ACLs updated form DEQ table Jan 2016.
RSL updated based on June 2016 5 EPA RSL update (accessed May 27, 2016).

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Commented [RFAAP30]: Revised Febuary 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal pending final results of risk assessment

Commented [RFAAP31]: Not detected since 2003.

Commented [RFAAP32]: Revised Febuary 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal pending final results of risk assessment

Commented [RFAAP33]: Not detected since 2003.

Commented [RFAAP34]: Revised Febuary 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal pending final results of risk assessment

Commented [RFAAP35]: Not detected since 2003.

Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG~~#13~~/HWMU-13

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on
~~Tetrachloroethene (PCE)~~	~~volatile~~	~~127-18-4~~	~~8260~~	~~1~~	~~1~~	~~5~~	~~0.104~~	~~-~~	~~5~~	~~MCL~~
Toluene	volatile	108-88-3	8260	1	5	1000	937.1		1000	MCL
1,1,1-Trichloroethane	volatile	71-55-6	8260	1	1	200	~~3329.79~~8000		200	MCL
Trichloroethene (TCE)	volatile	79-01-6	8260	1	1	5	~~1.328~~8.49		5	MCL
Trichlorofluoromethane	volatile	75-69-4	8260	1	1	-	~~1113~~5200		~~1113~~5200	ACL
~~Vinyl chloride; Chloroethene~~	~~volatile~~	~~75-01-4~~	~~8260~~	~~1~~	~~1~~	~~2~~	~~0.084~~	~~-~~	~~2~~	~~MCL~~

This Annual GW Monitoring Constituent List for the CA Program is based on the Groundwater Compliance Monitoring List Attachment V.B, plus any constituent detected in Appendix IX in the past, the constituents reasonably expected or suspected to be in or derived from the waste managed in the unit, and the daughter products for carbon tetrachloride. The criteria by which GPSs are developed are following:

(1) CAS #: Chemical Abstracts Service registry number.

Commented [RFAAP2]: Constituents removed are those that have not been detected in recent monitoring history.
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REV 1 16 0515 – ACLs updated form DEQ table Jan 2016.
RSL updated based on June 2016 5 EPA RSL update (accessed May 27, 2016).

Commented [RFAAP3]: NOTE: Prior to final permit issuance, RFAAP will update this table with the most current RSLs.

Commented [RFAAP36]: Revised Febuary 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal pending final results of risk assessment

Commented [RFAAP37]: Not detected since 2005.

Commented [RFAAP39]: Not detected since 2003.

Commented [RFAAP38]: Revised Febuary 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal pending final results of risk assessment

Commented [RFAAP40]: Footers revised for clarity

Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG~~#13~~/HWMU-13

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on

(2) *Test Methods for Evaluating Solid Waste- Physical/Chemical Methods, SW-846 (as updated~~)~~*. Current method updates are represented without suffixes on each method (e.g., SW-846- Method 6020A). The laboratory performing the analysis must be VELAP accredited for a current method update. The laboratory performing the analysis must be VELAP accredited for the matrix, method and analyte.

(3) QL: Quantitation Limit. Actual laboratory-specific QL may vary under the approval of DEQ.

(4) Calculated background. See *Constituent Background Values for the Detection Groundwater Monitoring Program* prepared by Draper Aden Associates, May 10, 2005 for listed Background values, as updated~~.~~

(5) MCL: Maximum Contaminant Level of USEPA National Primary Drinking Water Regulations (Safe Drinking Water Act).

(6) ACL: VA DEQ Alternate Concentration Limit. ~~January 27, 2009~~ January, 2016 (effective February 15, 2016)~~.~~

(7) RSL: No MCL or ACL for Perchlorate has been promulgated. However, EPA Region III promulgated a Regional Screening Level (RSL) value of 26 ug/l. Thus, the GPS for Perchlorate is set originally at 26 ug/l. However, in November 2012, EPA Region III revised the RSL for perchlorate from 26 ug/l to 11 ug/l, but stated in the November 2012 RSL table at associated Frequently Asked Questions that the EPA Interim Drinking Water Health Advisory concentration of 15 ug/l is recommended for use as the preliminary remediation goal (PRG) for perchlorate. Therefore, the GPS for Perchlorate was revised to 15 ug/l. Current RSL Table dated ~~May 2016~~June 2016 (website noted below.

~~Modified: February 22, 2012~~
~~Modified: June 13, 2013.~~
~~Modified: June 12, 2014. Modified April 20 May 11, 2016~~

Commented [RFAAP2]: Constituents removed are those that have not been detected in recent monitoring history.
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REV 1 16 0515 – ACLs updated form DEQ table Jan 2016.
RSL updated based on June 2016 5 EPA RSL update (accessed May 27, 2016).

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Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG~~#13~~/HWMU-13

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on

(8) GPS: Groundwater Protection Standard. The criteria by which GPSs are developed are following:

a. Use calculated Background values if greater than promulgated regulatory values (EPA MCL or VDEQ ACL). If Background = QL and is greater than promulgated regulatory value (EPA MCL or VDEQ ACL), then use MCL or ACL as GPS.

b. If EPA MCL is promulgated and Background is less than the MCL, use the MCL as GPS.

c. If EPA MCL is not promulgated, use the VDEQ ACL as GPS if greater than Background.

d. If no MCL or ACL, use EPA Region III Regional Screening Level (RSL). For Perchlorate, no MCL or ACL has been promulgated. However, EPA Region III originally promulgated a RSL value of 26 ug/l; however, in November 2012, EPA Region III stated that the EPA Interim Drinking Water Health Advisory concentration of 15 ug/l is recommended for use as the preliminary remediation goal (PRG) for perchlorate. Therefore, the GPS for Perchlorate was revised to 15 ug/l. RSL are developed by Oak Ridge National Laboratory under an Interagency Agreement with EPA (May 2010). See web site ~~"Mid-Atlantic Risk Assessment" at http://www.epa.gov/reg3hwmd/risk/human/index.htm~~. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016 (accessed May 27, 2016).

(9) The MCL for total Trihalomethanes, including Bromodichloromethane, Bromoform, Dibromochloromethane, and Chloroform, is 80 ug/l.

Commented [RFAAP2]: Constituents removed are those that have not been detected in recent monitoring history.
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REV 1 16 0515 – ACLs updated form DEQ table Jan 2016.
RSL updated based on June 2016 5 EPA RSL update (accessed May 27, 2016).

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Permit Attachment VII.C: Corrective Action Program -- Annual Groundwater Monitoring List for Radford OBG~~#13~~/HWMU-13

Constituent	CLASS	CAS # (1)	USEPA SW_846 METHOD (2)	QL (ug/L) (3)	BACK-GROUND (ug/l) (4)	MCL (ug/L) (5)	ACL (ug/L) (6)	RSL (ug/L) (7)	GPS (ug/L) (8)	GPS Based on

For any monitoring event, if a GPS for a constituent in the table above is less than the QL, the Permittee will perform verification of any detection (i.e. value greater than the Detection Limit) of such a constituent using low-level analytical methods, if such methods are standard methods that are routinely available from commercial laboratories. Furthermore, the low-level analytical method will be used only if the QL achievable by that method is less than, or equal to, the MCL or ACL for the subject constituent. If the verification event confirms a quantifiable detection (i.e. value greater than the QL) above the applicable MCL or ACL, a revised background concentration will be established using low-level analytical methods, if appropriate, and the GPS will be updated based on the new background concentration if warranted.

Commented [RFAAP2]: Constituents removed are those that have not been detected in recent monitoring history.
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REV 1 16 0515 – ACLs updated form DEQ table Jan 2016.
RSL updated based on June 2016 5 EPA RSL update (accessed May 27, 2016).

Commented [RFAAP3]: NOTE: Prior to final permit issuance, RFAAP will update this table with the most current RSLs.

Page 3: [1] Commented [RFAAP12]	RFAAP	2/7/2017 8:31:00 PM

Revised February 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal pending final results of risk assessment

Page 3: [2] Commented [RFAAP14]	RFAAP	2/7/2017 8:31:00 PM

Revised February 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal pending final results of risk assessment

Page 3: [3] Commented [RFAAP16]	RFAAP	2/7/2017 8:31:00 PM

Revised February 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal pending final results of risk assessment

Page 4: [4] Commented [RFAAP18]	RFAAP	5/28/2015 10:02:00 PM

Not detected since 2003. Not on soil monitoring list.

Page 4: [5] Commented [RFAAP21]	RFAAP	2/7/2017 8:31:00 PM

Revised February 2017 pursuant to requests under NOD 2s.9. Proposing constituent for removal pending final results of risk assessment

Page 4: [6] Commented [RFAAP27]	RFAAP	2/7/2017 8:31:00 PM

Revised Febuary 2017 pursuant to requests under NOD 2s.9. Proposing these five constituents for removal pending final results of risk assessment

Page 4: [7] Commented [RFAAP29]	RFAAP	6/6/2016 8:07:00 AM

Revised June 2016. Updated to November 2015 RSL