



# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF ENVIRONMENTAL QUALITY

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Secretary of Natural Resources

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February 5, 2016

### VIA ELECTRONIC MAIL

Mr. Jay Stewart  
Environmental Manager  
BAE Systems, Ordnance Systems, Inc.  
Radford Army Ammunition Plant  
4050 Pepper's Ferry Road  
Radford, Virginia 24141

**Re: 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 Permit Radford Army Ammunition Plant, Radford, VA  
EPA ID No. VA1210020730**

Dear Mr. Stewart:

The Part A and B permit applications for the renewal of the Hazardous Waste Subpart X Open Burning Permit at the Radford Army Ammunition Plant's (RAAP), Radford, Virginia facility, dated June 3, 2015, with revisions received on September 17, 2015, was determined to be administratively complete on October 26, 2015. In accordance with the Virginia Hazardous Waste Management Regulations as codified in Title 9 of the Virginia Administrative Code, Agency 20, Chapter 60 (9 VAC 20-60), this letter constitutes the Virginia Department of Environmental Quality's, Office of Financial Responsibility and Waste Programs' (DEQ's) first technical review of the Subpart X Open Burning Part A and B Permit applications.

Based on the review of the facility's permit application, additional information will need to be submitted in response to the DEQ's comments. The comments have been divided into six sections in order to address the specific technical deficiencies related to; the overall permit application, the groundwater permit modules, the proposed statistical methods used in the permit modules, the alternative treatment technology review, the risk assessment protocol and the air modeling methodology used in the risk assessment protocol.

Please review the comments and submit the requested response on a comment by comment basis within 30 days of your receipt of this letter (March 7, 2016). If more time is needed, please contact me at the email address or phone number listed below prior to the expiration of the 30 day deadline.

Mr. Jay Stewart  
Environmental Manager  
Radford Army Ammunition Plant  
February 5, 2016  
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Please submit the responses to the DEQ in the form of one hard copy and a CD in PDF format (or electronically attached to an e-mail) and a CD in Microsoft WORD format (or electronically attached to an e-mail), and submit the responses to the EPA and the DEQ's Blue Ridge Regional Office in the CD PDF format. Please be advised that the DEQ requires all sections of the application to be in an electronic format, including drawings. The DEQ does not have the capability to copy large drawings, i.e., anything over 11 inches by 17 inches.

If you should have any questions regarding these comments, please contact me at (804) 698-4467 or by email at [Ashby.Scott@deq.virginia.gov](mailto:Ashby.Scott@deq.virginia.gov).

Sincerely,



Ashby R. Scott  
Hazardous Waste Permit Writer  
Office of Financial Responsibility and  
Waste Programs

Attachments:

Notice of Deficiency —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 Permit, Sections 1 through 6

cc: Central Hazardous Waste Files  
Andrea Barbieri, EPA, Region III (3LC50)  
Aziz Farahmand, DEQ, BRRO  
Leslie Romanchik, Russ McAvoy, Sonal Iyer, Julia King-Collins, Hasan Keceli, Kurt Kochan, DEQ, CO

Jim McKenna, Radford Army Ammunition Plant

**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:**

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.
2. Attachment II.C has had the word “contamination” changed to “impacted or impact to soil”. Please provide a justification for this language change.

**Specific Comments for the RAAP Application:**

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.
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.
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.

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 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.

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.
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.
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.
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.
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.

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.

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.

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.

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.

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.

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 AARFAAP** 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.

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-nitrophenol has no Region III RSL value., Radford AARFAAP 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.*~~

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.

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.

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.
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.

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.
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.
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.
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:***

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 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.”*

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.
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.
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.
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.
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.
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.
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.
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.

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.
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.
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.
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.
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.

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.

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.

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.

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.

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.

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.”

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 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”*

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.

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.

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).

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.
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.
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.
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.
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.
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.”*
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.
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.

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.
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.
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.

## **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**

1. **Module IV, Section IV.D.3.a, Page IV-5** – 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. **Optionally, the facility may collect quarterly background data from 13MW1 at their discretion to obtain a more robust background dataset. 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.**”*

The DEQ concurs with the revisions with the exception of the language which allows the additional background sampling from 13MW1 to be optional, not requiring DEQ approval

before sampling proceeds and the frequency of sampling. The language shall be revised as follows:

*“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. **In addition, the facility may collect quarterly background data from 13MW1 following approval from the DEQ, to obtain a more robust background dataset. In this case, the background dataset would be one year's worth of quarterly data from well 13MW1 and supplemental data from 13MW2. Optionally, the facility may collect quarterly background data from 13MW1 at their discretion to obtain a more robust background dataset. 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.**”*

2. **Module V, Section V.B.1, Page V-5** – The permittee has revised the following language in section V.B.1:

***“V.B.1. Groundwater Monitoring System***

*Groundwater beneath ~~HWMU-13OBG~~ shall be monitored with one (1) upgradient background groundwater monitoring well, ~~five three (53)~~ downgradient point of compliance wells, and ~~one three (13)~~ 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 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. **Optionally, the facility may collect background data from 13MW1 at their discretion.**”*

The DEQ concurs with the revisions with the exception of the language which allows the additional background sampling from 13MW1 to be optional and not requiring DEQ approval before sampling proceeds. The language shall be revised as follows:

***“V.B.1. Groundwater Monitoring System***

*Groundwater beneath ~~HWMU-13OBG~~ shall be monitored with one (1) upgradient background groundwater monitoring well, ~~five three (53)~~ downgradient point of compliance wells, and ~~one three (13)~~ 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 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. ~~Optionally, the facility may collect background data from 13MW1 at their discretion~~*

3. **Module V, Section V.D.1.c, Page V-7** – The permittee has revised the following language in section V.D.1.c:

*“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. Optionally, the facility may collect quarterly background data from 13MW1 at their discretion to obtain a more robust background dataset. 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.~~”*

The DEQ concurs with the revisions with the exception of the language which allows the additional background sampling from 13MW1 to be optional, not specifying the sampling frequency and not requiring DEQ approval before sampling proceeds. The language shall be revised as follows:

*“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. In addition, the facility may collect quarterly background data from 13MW1 following approval from the DEQ, to obtain a more robust background dataset. In this case, the background dataset would be one year's worth of quarterly data from well 13MW1 and supplemental data from 13MW2. Optionally, the facility may collect quarterly background data from 13MW1 at their discretion to obtain a more robust background dataset. 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.”*

4. **Module VII, Section VII.F.1.b, Page VII-7** – The permittee has revised the following language in section VII.F.1.b:

*“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. ~~Optionally, the facility may collect background data from 13MW1 at their discretion.~~ 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.**”*

The DEQ concurs with the revisions with the exception of the language which allows the additional background sampling from 13MW1 to be optional, not specifying the sampling frequency and not requiring DEQ approval before sampling proceeds. The language shall be revised as follows:

*“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 DEQ, to obtain a more robust background dataset.~~ ~~Optionally, the facility may collect background data from 13MW1 at their discretion.~~ 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.**”*

5. **Module V, 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.
6. **Module V, Attachment V.C, Open Burning Ground Calculated Background Values -** Pyrene should be removed from the list as it is no longer a COC.
7. **Module V, 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.

8. **Module V, Attachment V.E, Groundwater Protection Standards** - The proposed Constituents of Concern (COC) for removal from the permit are approved at this time except Acetonitrile, Acrylonitrile, Sulfide, PCBs, 1,4-Dioxane, Total TCDF, Total PeCDF, Total HxCDD, Total TCDD, 2,3,7,8-TCDD, Total PeCDD, Total HxCDD.
9. **Module VII, Attachment VII.C, Corrective Action Program - Annual Groundwater Monitoring List for Radford OBG/HWMU-13** - 2,6-Dinitrotoluene, changed from 0.48 to 0.048 as per VA DEQ Alternate Concentration Limit. January 21, 2015 (effective February 15, 2015).

**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**

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”.
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).
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.
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.
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 STANDARD DURING 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.

#### **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**

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” versus 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.
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

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.
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.
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.
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.
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.

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

- 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.
- 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.
- 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.
- 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.

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.
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?
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.
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?
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.
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).

**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 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.

**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**

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.
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.
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.

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..*

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.

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.

- ii. Please include Hexachlorobenzene & Pentachlorophenol under section 2.2.
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 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?
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.
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.
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.
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.
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.

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

**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.**

**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.

**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](http://www3.epa.gov/reg3wcmd/ca/pdf/RCRA_OpenBurnOpenDet_Guide.pdf)

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

**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.
- 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.
- 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 292000 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.
- 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.
- 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.

- 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.

**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.
- 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.

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

**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.

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.
  - 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.
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.**
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.**
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.
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.
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.

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.
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.
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.
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.
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.
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.

- 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.
- 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.
  - 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.
- 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.
- 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.

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.
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.
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  $ESQ_{Total}$  will be at or below 1.
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.
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.

**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**

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.
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.
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.
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.
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?

**Specific Comments for the Multi-pathway Risk Assessment Protocol for the Radford Army Ammunition Plant Open Burning Grounds Air Modeling :**

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.
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.
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.

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.
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.
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.
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](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 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.

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.
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.

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.
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.
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.
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).
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.
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.

**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.

**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](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>

**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.