Laboratory and SDG#: TADenver 280-134177 AECOM Chemist: Jared DeSadier Date Verified: 3/30/2020 AECOM ITR: Savannah Wolfe

Guidance: DoD QSM Version 5.1 (January 2017)

Applicable QAPP: Cornhusker Army Ammunition Plant QAPP (Brice and AECOM, October 2018) Applicable Analytical Methods: 8330A, 353.2, 350.1, 351.2, RSK-175, 9060A, 2320B, 9056A, 9034

Sample Identification #	Date Collected	Date Received	Matrix	Analysis
EW7-PM29B-2-35	2/28/2020	2/29/2020	Water	Explosives (8330A), Nitrate, Nitrite (353.2), Ammonia (350.1), TKN (351.2), MEE (RSK-175), DOC (9060A), Sulfate (9056A) Sulfide (9034), Alkalinity (2320B)
EW7-PM28B-2-35	2/28/2020	2/29/2020	Water	Explosives (8330A), Nitrate, Nitrite (353.2), Ammonia (350.1), TKN (351.2), MEE (RSK-175), DOC (9060A), Sulfate (9056A) Sulfide (9034), Alkalinity (2320B)
EW7-PM29A-2-25	2/28/2020	2/29/2020	Water	Explosives (8330A), Nitrate, Nitrite (353.2), Ammonia (350.1), TKN (351.2), MEE (RSK-175), DOC (9060A), Sulfate (9056A) Sulfide (9034), Alkalinity (2320B)
EW7-PM28A-2-25	2/28/2020	2/29/2020	Water	Explosives (8330A), Nitrate, Nitrite (353.2), Ammonia (350.1), TKN (351.2), MEE (RSK-175), DOC (9060A), Sulfate (9056A) Sulfide (9034), Alkalinity (2320B)
EW7-PM27B-2-35	2/28/2020	2/29/2020	Water	Explosives (8330A), Nitrate, Nitrite (353.2), Ammonia (350.1), TKN (351.2), MEE (RSK-175), DOC (9060A), Sulfate (9056A) Sulfide (9034), Alkalinity (2320B)

1.0 Laboratory Case Narrative \ Cooler Receipt Form

Verification Criteria	Yes	No	N/A
Were any DoD QSM deviations noted in the laboratory case narrative?	X		
Were DoD QSM corrective actions followed if deviations were noted?	X		
Were any issues noted in the cooler receipt form?		X	

The case narrative indicated that some surrogate recoveries were outside evaluation criteria. This issue is discussed further in the ADR report.

The case narrative also indicated that DOC was detected in a method blank. This issue is discussed further in Section 6.0. The container for sample EW7-PM29B-2-35 contained headspace greater than 6mm for dissolved gases, and the RPD between the primary and confirmation column for some explosives samples was above evaluation criteria. These issues are discussed further in Section 8.0.

No other issues were noted in the case narrative or cooler receipt form.

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2.0 Sample Documentation

Verification Criteria	Yes	No
Were all samples documented correctly on the chain-of-custody (COC) and samples labels?	X	
Were all sample identifications (IDs) documented correctly on sample labels?		
Did samples listed on COCs match the sample labels?		
Were samples relinquished properly on the COC?	X	

3.0 Initial Calibration

Method 8330A Initial Calibration Criteria					
Instrument:		CHHPLC_X3			
Date of Calibration:		3/4/2020			
	Yes	No	N/A		
Was at least a five point calibration completed for all analytes prior to sample analysis and one option below?	X				
Option 1: RSD for each analyte $\leq 20\%$?	X				
Option 2: If linear least squares regression was used was the $r^2 \ge 0.99$?			X		
Option 3: If non-linear regression was used was the coefficient of determination $r^2 \ge 0.99$?			X		
If non-linear regression was used were 6 points used for second order and 7 points for third order?			X		

Method 8330A Initial Calibration Criteria					
Instrument:		CHHPLC_X3			
Date of Calibration:	3/4/2020				
	Yes	No	N/A		
Was at least a five point calibration completed for all analytes prior to sample analysis and one option below?	X				
Option 1: RSD for each analyte $\leq 20\%$?	X				
Option 2: If linear least squares regression was used was the $r^2 \ge 0.99$?			X		
Option 3: If non-linear regression was used was the coefficient of determination $r^2 \ge 0.99$?			X		
If non-linear regression was used were 6 points used for second order and 7 points for third order?			X		

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Method 8330A Initial Calibration Criteria					
Instrument:		CHHPLC G2 LUNA			
Date of Calibration:		3/3/2020			
	Yes	No	N/A		
Was at least a five point calibration completed for all analytes prior to sample analysis and one option below?	X				
Option 1: RSD for each analyte $\leq 20\%$?	X				
Option 2: If linear least squares regression was used was the $r^2 \ge 0.99$?			X		
Option 3: If non-linear regression was used was the coefficient of determination $r^2 \ge 0.99$?			X		
If non-linear regression was used were 6 points used for second order and 7 points for third order?			X		

Method 8330A Initial Calibration Criteria						
Instrument:		CHHPLC_G2_LUNA				
Date of Calibration:		3/3/2020				
	Yes	No	N/A			
Was at least a five point calibration completed for all analytes prior to sample analysis and one option below?	X					
Option 1: RSD for each analyte $\leq 20\%$?	X					
Option 2: If linear least squares regression was used was the $r^2 \ge 0.99$?			X			
Option 3: If non-linear regression was used was the coefficient of determination $r^2 \ge 0.99$?			X			
If non-linear regression was used were 6 points used for second order and 7 points for third order?			X			

Method RSK-175 Initial Calibration Criteria					
Instrument:		VGC J			
Date of Calibration:		04/15/2019			
	Yes	No	N/A		
Was at least a five point calibration completed for all analytes prior to sample analysis and one option below?	X				
Option 1: RSD for each analyte $\leq 25\%$?	X				
Option 2: If linear least squares regression was used was the $r^2 \ge 0.99$?	X				
Option 3: If non-linear regression was used was the coefficient of determination $r^2 \ge 0.99$?			X		
If non-linear regression was used were 6 points used for second order and 7 points for third order?			X		

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Method 9056A Initial Calibration Criteria					
Instrument: WC			om7		
Date of Calibration:		3/11/2020			
	Yes	No	N/A		
Was a minimum of three standards and a calibration blank used for ICAL?	X				
Was $r^2 \ge 0.99$?	X				

Method 350.1 Initial Calibration Criteria			
Instrument:	W	/C_Alp	3
Date of Calibration:		3/5/2020	
	Yes	No	N/A
Was a minimum of three standards and a calibration blank used for ICAL?	X		
Was $r^2 \ge 0.99$?	X		

Method 353.2 Initial Calibration Criteria					
Instrument: WC_			o 2		
ate of Calibration: 3/2/20		3/2/202)20		
	Yes	No	N/A		
Was a minimum of three standards and a calibration blank used for ICAL?	X				
Was $r^2 \ge 0.99$?	X				

Method 351.2 Initial Calibration Criteria				
Instrument:	W	C_Asto	ria	
Date of Calibration:			3/11/2020	
	Yes	No	N/A	
Was a minimum of three standards and a calibration blank used for ICAL?	X			
Was $r^2 \ge 0.99$?	X			

Method 9060A Initial Calibration Criteria			
Instrument:	W	C_SH	I 3
Date of Calibration:	3	3/4/2020	
	Yes	No	N/A
Was a minimum of three standards and a calibration blank used for ICAL?	X		
Was $r^2 \ge 0.99$?	X		

Method 9060A Initial Calibration Criteria			
Instrument:	W	C_SH	I 3
Date of Calibration:	3.	3/17/2020	
	Yes	No	N/A
Was a minimum of three standards and a calibration blank used for ICAL?	X		
Was $r^2 \ge 0.99$?	X		

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Guidance: DoD QSM Version 5.1 (January 2017)

Applicable QAPP: Cornhusker Army Ammunition Plant QAPP (Brice and AECOM, October 2018) Applicable Analytical Methods: 8330A, 353.2, 350.1, 351.2, RSK-175, 9060A, 2320B, 9056A, 9034

4.0 Initial Calibration Verification [(ICV) Second Source]

Method 8330A ICV Criteria (Filename)	03040015.D		D
Instrument:	CHHPLC_X3		
Date of Initial Calibration Verification:	3/4/2020		
	Yes No N/		
Was the ICV analyzed after each calibration?	X		
Was the ICV for all analytes within \pm 15% of the true value?	X		

Method 8330A ICV Criteria (Filename)	03040033.D		D
Instrument:	CHHPLC_X3		
Date of Initial Calibration Verification:	3/4/2020		
	Yes	N/A	
Was the ICV analyzed after each calibration?	X		
Was the ICV for all analytes within \pm 15% of the true value?	X		

Method 8330A ICV Criteria (Filename)	03	03030015.D		
Instrument:	CHHPLC_G2-LUNA			
Date of Initial Calibration Verification:	3	3/3/2020		
	Yes	N/A		
Was the ICV analyzed after each calibration?	X			
Was the ICV for all analytes within \pm 15% of the true value?	X			

Method 8330A ICV Criteria (Filename)	0.	03030024.D		
Instrument:	СННР	CHHPLC_G2-LUNA		
Date of Initial Calibration Verification:		3/4/2020		
	Yes	No	N/A	
Was the ICV analyzed after each calibration?	X			
Was the ICV for all analytes within \pm 15% of the true value?	X			

Method RSK-175 ICV Criteria (Filename)	04	4151911	.D
Instrument:		VGC_J	
Date of Initial Calibration Verification:	4/15/2019		9
	Yes	No	N/A
Was the ICV analyzed after each calibration?	X		
Was the ICV for all analytes within \pm 25% of the true value?	X		

Method 9056A ICV	WC_IonChrom7		
Date of Initial Calibration Verification:	3/11/2020		0
	Yes	No	N/A
Was the ICV analyzed after each ICAL, prior to the beginning of a sample analysis?	X		
Was the ICV for all analytes within \pm 10% of the true value?	X		

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Method 350.1 ICV Criteria	WC_Alp 3		3
Date of Initial Calibration Verification:	3/5/2020)
	Yes	No	N/A
Was the ICV analyzed after each ICAL, prior to the beginning of a sample analysis?	X		
Was the ICV for all analytes within \pm 10% of the true value?	X		

Method 353.2 ICV Criteria	WC_Alp 2		
Date of Initial Calibration Verification:	3/2/2020)
	Yes	No	N/A
Was the ICV analyzed after each ICAL, prior to the beginning of a sample analysis?	X		
Was the ICV for all analytes within \pm 10% of the true value?	X		

Method 351.2 ICV Criteria	W	WC_Astoria		
Date of Initial Calibration Verification:	3.	3/11/2020		
	Yes	No	N/A	
Was the ICV analyzed after each ICAL, prior to the beginning of a sample analysis?	X			
Was the ICV for all analytes within \pm 10% of the true value?	X			

Method 9060A ICV Criteria	WC_SHI3		I3
Date of Initial Calibration Verification:	3/4/2020		
	Yes	No	N/A
Was the ICV analyzed after each ICAL, prior to the beginning of a sample analysis?	X		
Was the ICV for all analytes within \pm 10% of the true value?	X		

Method 9060A ICV Criteria	WC_SHI3			
Date of Initial Calibration Verification:	3/	3/17/2020		
	Yes	No	N/A	
Was the ICV analyzed after each ICAL, prior to the beginning of a sample analysis?	X			
Was the ICV for all analytes within ± 10% of the true value?	X			

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5.0 Continuing Calibration Verification (CCV)

Method 8330A CCV Criteria (Filename)	030	03040044_6.D		
Instrument:	СН	CHHPLC_X3		
Date of Calibration Verification:		3/5/2020		
	Yes	No	N/A	
Was the CCV analyzed daily before sample analysis?	X			
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X			
Was the CCV for all analytes within \pm 15% of the true value?	X			

Method 8330A CCV Criteria (Filename)	030	03040056_8.D		
Instrument:	СН	CHHPLC_X3		
Date of Calibration Verification:		3/5/2020		
	Yes	No	N/A	
Was the CCV analyzed daily before sample analysis?	X			
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X			
Was the CCV for all analytes within \pm 15% of the true value?	X			

Method 8330A CCV Criteria (Filename)	03050017_8		_8	
Instrument:	CHHPI	CHHPLC_G2_LUNA		
Date of Calibration Verification:	3	3/5/2020		
	Yes	No	N/A	
Was the CCV analyzed daily before sample analysis?	X			
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X			
Was the CCV for all analytes within \pm 15% of the true value?	X			

Method 8330A CCV Criteria (Filename)	0305	30.D	
Instrument:	СННРІ	CHHPLC_G2_LUNA	
Date of Calibration Verification:	3	3/6/2020	
	Yes	No	N/A
Was the CCV analyzed daily before sample analysis?	X		
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X		
Was the CCV for all analytes within \pm 15% of the true value?	X		

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Method 8330A CCV Criteria (Filename)	03	03050035_6	
Instrument:	CHHP	CHHPLC_G2_LUNA	
Date of Calibration Verification:		3/6/2020	
	Yes	No	N/A
Was the CCV analyzed daily before sample analysis?	X		
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X		
Was the CCV for all analytes within \pm 15% of the true value?	X		

Method RSK-175 CCV Criteria (Filename)	0.	035F2801.D		
Instrument:		VGC J		
Date of Calibration Verification:		3/5/2020		
	Yes	No	N/A	
Was the CCV analyzed daily before sample analysis?	X			
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X			
Was the CCV for all analytes within \pm 25% of the true value?	X			

Method RSK-175 CCV Criteria (Filename)	0:	052F4501.D	
Instrument:		VGC J	
Date of Calibration Verification:		3/6/2020	
	Yes	No	N/A
Was the CCV analyzed daily before sample analysis?	X		
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X		
Was the CCV for all analytes within \pm 25% of the true value?	X		

Method RSK-175 CCV Criteria (Filename)	00	063F5601.D	
Instrument:		VGC J	
Date of Calibration Verification:		3/6/2020	
	Yes	No	N/A
Was the CCV analyzed daily before sample analysis?	X		
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X		
Was the CCV for all analytes within \pm 25% of the true value?	X		

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Method RSK-175 CCVRT Criteria (Filename)	0	004F0401.D	
Instrument:		VGC J	
Date of Calibration Verification:		3/9/2020	
	Yes	No	N/A
Was the CCV analyzed daily before sample analysis?	X		
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X		
Was the CCV for all analytes within \pm 25% of the true value?	X		

Method RSK-175 CCV Criteria (Filename)	0	021F1401.D	
Instrument:		VGC J	
Date of Calibration Verification:		3/9/2020	
	Yes	No	N/A
Was the CCV analyzed daily before sample analysis?	X		
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X		
Was the CCV for all analytes within \pm 25% of the true value?	X		

Method RSK-175 CCVRT Criteria (Filename)	0	001F0101.D	
Instrument:		VGC J	
Date of Calibration Verification:		3/10/2020	
	Yes	No	N/A
Was the CCV analyzed daily before sample analysis?	X		
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X		
Was the CCV for all analytes within \pm 25% of the true value?	X		

Method RSK-175 CCVRT Criteria (Filename)	RT Criteria (Filename) 018F1401.D		1.D
Instrument:	VGC_J		J
Date of Calibration Verification:	3/10/2020		20
	Yes	No	N/A
Was the CCV analyzed daily before sample analysis?	X		
Was the CCV analyzed every 10 field samples and at the end of the analysis sequence?	X		
Was the CCV for all analytes within \pm 25% of the true value?	X		

Method 9056A, Instrument: WC_IonChrom7, All CCVs on 3/11/2020				
Was a CCV analyzed after every 10 field samples and at the end of the analysis sequence?	X			
Were the CCVs for all analytes within \pm 10% of the true value?	X			

Method 350.1, Instrument: WC_Alp 3, All CCVs on 3/5/2020			
Was a CCV analyzed after every 10 field samples and at the end of the analysis sequence?	X		
Were the CCVs for all analytes within \pm 10% of the true value?	X		

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Method 353.2, Instrument: WC_Alp 2, All CCVs on 3/2/2020	Yes	No
Was a CCV analyzed after every 10 field samples and at the end of the analysis sequence?	X	
Were the CCVs for all analytes within \pm 10% of the true value?	X	

Method 351.2, Instrument: WC_Astoria, All CCVs on 3/11/2020	Yes	No
Was a CCV analyzed after every 10 field samples and at the end of the analysis sequence?	X	
Were the CCVs for all analytes within \pm 10% of the true value?	X	

Method 9060A, Instrument: WC_SHI3, All CCVs on 3/4/2020				
Was a CCV analyzed after every 10 field samples and at the end of the analysis sequence?	X			
Were the CCVs for all analytes within \pm 10% of the true value?	X			

Method 9060A, Instrument: WC_SHI3, All CCVs on 3/17/2020	Yes	No
Was a CCV analyzed after every 10 field samples and at the end of the analysis sequence?	X	
Were the CCVs for all analytes within \pm 10% of the true value?	X	

6.0 Blank Samples

Blank Criteria	Yes	No	N/A
Were method blanks analyzed with every preparatory batch?	X		
Were target analytes detected $> \frac{1}{2}$ the LOQ and $> 1/10$ the amount measured in any sample or $1/10$ the regulatory limit (whichever is greater)?		X	
Were target analytes detected in method, trip or calibration blanks?	X		

Blank ID	Parameter	Analyte	Concentration	LOQ	Units
MB 280-488988/2-A	DOC	DOC	0.869	1.0	mg/L

Analytical data that were reported nondetect or at concentrations greater than five times (5X) the associated blank concentration did not require qualification.

7.0 Sensitivity

Sensitivity Criteria	Yes	No	N/A
Was the laboratory sensitivity consistent with project (QAPP) requirements?	X		
Did all analytes meet sensitivity requirements?	X		

8.0 Additional Qualifications

Additional Qualification Criteria	Yes	No	N/A
Were common laboratory contaminants detected?		X	
Was professional judgment used to qualify data (if yes, list below)?	X		

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The container for sample EW7-PM29B-2-35 contained headspace greater than 6mm for dissolved gases. Qualification of data is shown in the table below.

Sample ID	Analysis	Analyte	Qual
EW7-PM29B-2-35	RSK-175	Methane	J

The RPD between the primary and confirmation column for some explosives samples was above evaluation criteria. Qualification of data is shown in the table below; results were reported from the primary column unless otherwise noted.

Sample ID	Analysis	Analyte	RPD	Qual
EW7-PM29B-2-35	Explosives	2-amino-4,6-dinitrotoluene	113.7	J
EW7-PM29B-2-35	Explosives	2-nitrotoluene	193.8	J
EW7-PM28B-2-35	Explosives	2-nitrotoluene	192.8	J
EW7-PM29A-2-25	Explosives	HMX	180.5	J
EW7-PM29A-2-25	Explosives	2-amino-4,6-dinitrotoluene	118.3	J
EW7-PM29A-2-25	Explosives	2-nitrotoluene	193.3	J
EW7-PM28A-2-25	Explosives	HMX	171.6	J
EW7-PM28A-2-25	Explosives	RDX	141.5	J
EW7-PM28A-2-25	Explosives	4-amino-2,6-dinitrotoluene	88.5	J
EW7-PM27B-2-35	Explosives	2,4,6-trinitrotoluene	93.6	J
EW7-PM27B-2-35	Explosives	4-amino-2,6-dinitrotoluene	159.4	J
EW7-PM27B-2-35	Explosives	2-amino-4,6-dinitrotoluene	80.3	J

9.0 Completeness

Completeness Criteria		No	N/A
Were any data rejected during the verification process?		X	
Were any samples lost, broken, or in any other manner in not verified?		X	
Were requested sample analyses performed, the correct analyte lists used, and correct sample preparation and analyses methods and units utilized?			