# U.S. Army Corps of Engineers New England District 

FINAL<br>REMEDIAL INVESTIGATION REPORT AREA OF CONTAMINATION (AOC) 57

VOLUME II OF III APPENDICES A THROUGH D

CONTRACT DACA-31-94-D-0061
DELIVERY ORDER NUMBER 0001
U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT CONCORD, MASSACHUSETTS

FINAL
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VOLUME II OF III APPENDICES A THROUGHD

CONTRACT DACA-31-94-D-0061
DELIVERY ORDER NUMBER 0001

Prepared for:
U.S. Army Corps of Engineers

New England District
Concord, Massachusetts

Prepared by:
Harding Lawson Associates
Portland, ME
Project No. 45001
Task No. 0914403

June 2000

## EXPLORATION LOGS




| SOLL BORNTG LOC |  |  | Study Araa: $A 0 C 57$ |
| :---: | :---: | :---: | :---: |
|  |  |  | Boring No.: $578-95-02 \mathrm{x}$ |
| Client: USATHAMA |  | Project No. $9144-02$ | Protection: $D$ |
| Contractor: D.C. Maher | Date Started: $9 / 27 / 95$ |  | Completed: $9 / 27 / 9$ |
| Method: $4 / 2^{\prime \prime}( \pm D) 454$ | Casing Size: | 12 | Pi Meter:TE 580 A 0 VM |
| Ground Elev.: | Soil Drilled: | 19 ft | Total Depth: $19^{1}$ |
| Logged by: sjm | Checked by: |  | $\overline{7}$ Below Ground: $16.92^{\prime}$ |

Screen:
(ft.) Riser:
(ft.) Diam:
(ID) Material:
Page 1 of: 2




NOE: PID battery Iow; urable to measme porm for $19-21$
























SOIL. BORING LOG

| Client: U'S Armi Irvigumeritai Contert Froject No. 9144-02 |  |  | Protection: $\quad 2$ |
| :---: | :---: | :---: | :---: |
| Contractor:D.L.Maler Date St | Date Started: $10.5-95$ |  | Completed: $12-5-95$ |
| Method: $6^{5 / 8 "(I D) ~ H 54 s ~ C a s i n g ~}$ | Casing Size: $6^{\prime \prime}$ steel |  | PIMeter: TE SCOB OUN? |
| Ground Elev.: | Soil Drilled: $14^{\prime}$ |  | Total Depth: $14^{\prime}$ |
| Logged by:S. Moytuornenj Checke | Checked by: |  | $\geq$ Below Ground: 3.17' |
|  | Diam: $4^{\prime \prime}$ (ID) | $\text { Material: } \operatorname{sch} 4 / 240$ | Page 1 of: 2 |

PIPTH NOT TOSCALE


$\qquad$

| Stedy tec 57 |
| :---: |
| Boring No.: 574-95-18,4 |
| Pratection: T) |
| Completed: irl, is |




PXPIH NOT 70 SCALE












Site: $\frac{A \cdot 557}{5-75}$ Client: $A=$ Project No. dur -:2 1 of 2

Test Pit $57=-45-4 x$ Date q, 18-45 Time $13: 0$ End $13: 40$

Coordinates $\quad$ SKETCH MAP OF TEST PIT SITE APp $\rho \%$


1. Jefe Jerosson(ABB-ES
2. Tim Singer (ENPRC)
3. 
4. 

(NO


SCALE $1^{\prime \prime}=5^{\prime}$ FT.
NOTES: $\qquad$
$12 f t$ long french
P1D Exon stockituerails $=$ backing
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

Profile Along Test Pit: $\frac{57 E-95-01 x}{57}$
site:

North vel (sima as souls) silly sind


NOTES: $\qquad$
Samples collated
A fixitsicering- 0-1s

* Perdiscres ring son ph cobectad Cranderybrom lens. $z^{\prime \prime} 3^{3 \prime}$ thence at


orabitionsimple collected at $6^{\circ}$
REFERENCE: FIELD BOOK, Pg. 5-7
ATTACHMENTS
signature:

NOTES:

$$
\text { SCALE } 1^{\prime \prime}=10^{\prime} \mathrm{FT} .
$$

Site: $\quad A C C 5$ Client: $\frac{A E C}{A-1}$ Project No.: $9144-022^{1 \text { of } 2}$
Test Pit Date Coordinates

| $P\left\|D \pm 6^{\prime \prime}\right\| 2-2 \mid=R_{a c k} \operatorname{cosen} 3$ |
| ---: |
| 11 |

$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

TEST PIT RECORD
Profile Along Test Pit: 57E-95-02X
Site: AOS. 57
North

 to micicera thetic (simple


SCALE 1" $^{\prime}$ $\qquad$

DEPTH (FT). $\qquad$
NOTES:

$\qquad$
$\qquad$
(arsed is-
$E^{\prime}$
$0 v か=B \therefore j \cos +35^{-1}$

* $6^{\prime \prime}$ dun $s$ en giles were collodion ito





$$
\text { gradation- evileLledE } 5
$$

REFERENCE: FIELD BOOK, Pg. Pg 5 -7
ATTACHMENTS Nine
signature:


wire not 2 :

Site: $A O C 57$ Client: AEC Project No.: $4144-02$ 1 of 2 Test Pit $\xrightarrow{572-95-03 x}$ Date $9-10,-95$ Time $15: 25$ End $16: 00$
Coordinates

$$
(6)=-14 W \Leftrightarrow 3 m-32-2 x
$$

SKETCH MAP OF TEST PIT SITE


NOTES:

$$
\text { Soil: zxicanad d in } 3 \text {, } 1914
$$

$$
\begin{gathered}
\text { ad stockpiled saperatile } \\
a-1 \text { ft }
\end{gathered}
$$

$$
1-5+h
$$

$$
s-1 i s t
$$

Senile then backilhed back in level
 after test pit complete. Th. 2xcau<itad an 9-ie-85

Crew Members:

1. Take Jacobson (ABBEs)
2. Tin Sager (EnPRO)
3. 
4. 
5. 
6. 

Monitor Equipment:
PI Meter
Explosive Gas
Avail. Oxygen
OVA


Other


Photogoraphs, Roll
None 2
Exposure
$\operatorname{Asin}$

Profile Along Test Pit: $\quad 575-95-03 x$
Site: $\qquad$ $A C C 57$

North wall (same a. 3 South wail)
SKETCH MAP OF TEST PIT PROFILE


NOTES: $\qquad$ $=K 4-5 ゙ y \operatorname{sinpl}-5^{1}$



$$
H_{2 a d} \text { pace }=B_{i=c} \operatorname{kgj}_{5},-d
$$

$$
\begin{gathered}
g r a d=1 \text { on } x-J l e \\
c=1=i k d \leq 5
\end{gathered}
$$

REFERENCE: FIELD BOOK, Pg.
ATTACHMENTS Mn -x
All sindilisa from $0-1$ fit dent by collecting ionporjites fora norths? south wallis; sean invar levels by
 SIGNATURE:


TEST PIT RECORD


SKETCH HAP OF TEST PIT SITE


NOTES:


$$
5-1264
$$

Monitor Equipment:
PI Meter
Explosive Gas
Avail. Oxygen
OVA
Other

$\qquad$
$\qquad$
Photogoraphs, Roll Nisei
Exposure

Profile Along Test Pit: $-57 E-95-04 x$
Site :_AOC57
West walt (All walls simitar)
SKETCH MAP OF TEST PIT PROFILE



SCALE $1^{\prime \prime}=$ $\qquad$
 DEPTH (FT). $\qquad$
NOTES: $\qquad$
(A) silty sind; wall graded; is-2ci/,
 damp; vas vil y loos ie; Topi disk brown contains some cigurici (roots,
(B) medium sims; poorly gradin; minimal Sins 2; drop; loose, light how, modeled with
 reddish cringe; SP
Duplicate sample collected

$$
a t 5 \text { for off-sile araitas }
$$

REFERENCE: FIELD 800K, Pg. 8 (sin
ATTACHMENTS Nita SIGNATURE:


Site: $A O C 57$ 575-95-05x Client: AEC $\qquad$ Project No: $9144-02$ 1 of 2

Test Pit Date 9-19-95 Time 9:10 End 4:50

Coordinates

SKETCH MAP OF TEST PIT SITE


SCALE 1" = Nine $\qquad$ FT.

NOTES: $\qquad$
Test Pit Trench approx: maturely 15 st long $i 13$ feat dap sidewalls caved in. Could not dig much deeper thin $13 G_{4}$
Excaraiked in 3 insets
$0-15 t ; 1-G F j$ nd 6-13st.
Backfilled tare lifts to their respective lacatrous.

Crew Members:

1. Jake Jacobson (ABB-ES)
2. Tim Sager (ENPRO)
3. 
4. 
5. 
6. 

Monitor Equipment:
Pl Meter
Explosive Gas
Avail. Oxygen
OVA


Other


Profile Along Test Pit: $-57 E-95-0.5 x$
Site: AC 57


SCALE $1=5 \quad 5 \quad$ FT. Vertical $1^{\prime \prime}=$ 1' morizatal $^{\prime}$
DEPTH (FT)
NOTES: $\qquad$
(A) silty scad, well gaia;
bravo j simp






40,5
$\qquad$
(B) Medium sand; poorly graded

Gradatim take, $\in^{\prime}$ no observable Site; ; moist;

REFERENCE: FIELD BOOK. Pg. Pis i, nose; 1 inuit brow $\rightarrow$ modeixid
 with rubbish F range whits;
$S P$


Site: $\qquad$ Client: AEC $\qquad$ Project No.: $9144-02$ 1 of 2
Test pit $575-95-06 X$ Date $9-19-95$ Time Lie: 35 End Ho: RD 5


SCALE 1" $=$ None
$\qquad$ FT.

NOTES: Test pit Trench approx is st. lone mad llfeet deep il ft.
$\frac{\text { Excavated in }}{0-1 \operatorname{sit} ; 1-651}$ $6-1181$.
Bactifilizd buick to their respective beations.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

Profile Along Test Pit: $-57 E-95-06 \mathrm{X}$
Site: $\qquad$ AC 57

East wall (wrest) wall sinilor)
SKETCH MAP OF TEST PIT PROFILE


SCALE $1^{*}=$ $\square$
5
FT. $v e=t i \operatorname{cai}$
DEPTH (FT). $\qquad$ (walls continued to celkepar
NOTES:


(A) Silty sind; val gradid;
$20-25 \%$ fins w/ some gravel
up to $1^{\prime \prime}$ dicmaler; damp; very
loose; dork brown; sm
contains some roots. Modeled
(A) Silty sind; val gradid;
$20-25 \%$ fins w/ some gravel
up to $1^{\prime \prime}$ dicmaler; damp; very
loose; dork brown; sm
contains some roots. Modeled
(A) Silty sind; val gradid;
$20-25 \%$ fins w/ some gravel
up to $1^{\prime \prime}$ dicmaler; damp; very
loose; dork brown; sm
contains some roots. Modeled with blacker ashier soil below identified as (B)
$\qquad$
(c) Madimsond; poorly graded
 no observed Sims; moist; loose;

Gradation sample collactade eric andes. light brow modeled with reddish orange \& white; $S P$

REFERENCE: FIELD BOOK, Pg. $\qquad$ eng
ATACHMENTS Now SIGNATURE:

$\qquad$



Coordinates
SKETCH MAP OF TEST PIT SITE


NOTES: $\qquad$




Excavated in approximate!,
3 lifts $0-3 f t ; 4 f t-\frac{55 f}{2} ;$ and 5 to $>8 t$. Backfilwd back to juxir respecting locations
$\qquad$

$\qquad$
$\qquad$
$\qquad$
$\qquad$

Profile Along Test Pit: $-57 E-95-07 \times$
Site: $\qquad$ ADC 57

SKETCH MAP OF TEST PIT PROFILE


DEPTH (FT).
NOTES: $\qquad$
(A) Silly sind; well grades;
$\qquad$
$\qquad$ brown sm
$\qquad$ fuel odor detiziled;
$\qquad$
$\qquad$
(c) Medium sand; poorly Graded moist Lo wet light begun to white. $\mathrm{Fe}_{2} \mathrm{e}$ dor detected
$\qquad$
$\qquad$
$\qquad$


REFERENCE: FIELD 8OOK, Pg.
ATTACHMENTS


ATMACHMENT No ri
SIGNATURE:


Site: $\qquad$ client: $A=C$ $\qquad$ Project No.: $9144-02{ }^{1 \text { of } 2}$
Test Pit 57E-95-09x Date $9-20-95$ Time $8=0$ Coordinates

SKETCH MAP OF TEST PIT SITE cy:3nchater

Excocxted i- 3 lifts 2-1it $1-54$ on d 5 ta 65 Soil hackifive to sejpastius location


NOTES: $\qquad$ inciting and heft do .p to
-

Crew Members:

1. Jake Jacobson (ABB-ESS)
2. Tim Slager (ENPRO)
3. 
4. 
5. 

$7 x$
6.

Monitor Equipment:
PI Meter
Explosive Gas Avail. Oxygen OVA Other


Exposure No-

Profile Along Test Pit: $-57 E-95-0 . \times$
Site: $\qquad$

$$
\text { Souty.wall (soil layers simior on }_{\text {east }}
$$

SKETCH MAP OF TEST PIT PROFILE



SCALE $1^{\prime}=\frac{5}{5}$ FT. Virtical; $1^{\prime \prime}=1^{\prime}$ hopizolfol
DEPTH (FT). $\qquad$ Growd maker pimentre e'
NOTES:
(A) siliysend; wall gridid; $15-20$, fixes w/ $5 \%$ grave in to abrot $1^{\prime \prime}$ dinatai; donp; vury bosix; durk brown; strines rarid; SM; soil contains sone roots 2
d2bris (piziz is rung2r;

$$
\operatorname{dim} 2 r(3 \cot +2)
$$

(B) Sami as above (A; ancept that soll also upporis tiz zontaiz black orgenje materizal. Septie odor detactad. Sori is rery
 Very moist; black; lenzi is


* septie edor datacted

Grain size unalysen cilectade
REFERENCE: FIELD 800K. Pg. $11-12$

ATTACHMENTS $N_{\Delta u}$
signature:

(S) medion anaty 1 foct thick

Mo, Ancerviote sins; wity, loose; light brown ; Sóp

## TEST PIT RECORD

Site: ACC 57 Test Pit $\quad 57 E-9.5-04 x$ Date $9-20-95$ Time $9: 15$ End $9: 45$
Coordinates
To $\begin{gathered}\text { Bar } \\ \uparrow\end{gathered}$
SKETCHIMAP OF TEST PIT SITE


NOTES:
Surface debris (gree burlap) and sheatmatal notes mityin $6 t_{0} 8$ fest of test pit

$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

## Crew Members:

1. Ja ak Jacobsur (ABB-Es $)$
2. Tim Slager (ENPRO)
3. 


5.
6.

Monitor Equipment:
$\begin{array}{lll}\text { Pl Meter } & \text { N } & N \\ \text { Explosive Gas } & Y & \Phi \\ \text { Avail. Oxygen } & Y & \$ \\ \text { OVA } & Y & \$ \\ \text { Other } & & \end{array}$
Other


Profile Along Test Pit: $-57 E-95-0.9 x$
Site: AOC57

SKETCH MAP OF TEST PIT PROFILE
Typical all walls


SCALE 1" = $\qquad$
DEPTH (FT). $\qquad$ FT. vartical; $1^{\prime \prime}=1^{\prime}$ horizotfol


NOTES: $\qquad$ 10-15\% 首ines wis-iongravel up to cisost " $^{\text {" dianatar ; donp; ver }}$
 round; sin; costais soma rosts, Apprax 1 to $1 \%+t$

(B) Silty send; inellgrachd; /0-150, finis io/ S24ig graval
wp to $1 \frac{1}{2}$ "dioneler; veiydry (dusty);
 rovidi Sm
(D) SBtack ergais layze $x 1$ fot Fhick sibyi Soilisvary
colnesiva; vera moist; black
String sepluic edori no fual odordetacted
(c) Medium sumd; poorly gradad
some roots cos corganic matror notedj very wety very loosu; ligh bरgN: if fow ; SP



Coordinates


SCALE $1^{\prime \prime}=$ None $\qquad$ FT.

NOTES: Reit $0, r \sim 10^{\prime}$ Long and $3^{i}$ level excouated to io betome note Started to collapse. Hale um bucklilat Innecti rita after logging
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

Crew Members:
Mike Lounsity
2. Tim Slager (ENPRO)
3.
4.
5.
6.

Monitor Equipment:
PI Meter Explosive Gas
Avail. Oxygen OVA Other


Photogoraphs, Roll None
Exposure $\qquad$

Profile Along Test Pit: $-57 E-95-10$
Site: $\qquad$

SKETCH MAP OF TEST PIT PROFILE
bicule


SCALE $1^{\prime \prime}=$ as shown 3par
DEPTH (FT).
NOTES: $\qquad$ to io' bitome Sicle Wri!) wese caving fin
S-1-Burk Brown Sitty Somel, Dry - Topi-1 and sund. offisite cinel onibie Sianie Culieital
5-1 Tan Rechion- Rine Sund, ver amiton


Pry-onsite anel offíste Sande cultecter
S] Browin thediun - fite Sond, vey cunfien $D_{\text {f }}$ - AAmp. onste SAmpe cultated

REFERENCE: FIELD BOOK, Pg.

SIGNATURE: $\qquad$
$\qquad$ ,

Site: $A O C 57$ Client: AEC Project No.: $9144-02$
Test Pit 57E-95-11 Date 9-19-95 Time 1315 End $13 y^{-}$
Coordinates
SKETCH MAP OF TEST PIT SITE

$$
\text { SCALE } 1 \text { " }=\text { None }
$$ FT.

NOTES: $\qquad$
$\frac{\text { Tejtpitn } 8^{\prime} \text { Long anal }}{3^{\prime} \text { wide excavital }}$

$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

2. Tim Slager (ENPRO)
3.
4.
5.
6.

Monitor Equipment:
Pl Meter Explosive Gas Avail. Oxygen OVA


Other $\qquad$


Exposure


Profile Along Test Pit: $-57 E-95-i 1$
Site: AOC57

SKETCH MAP OF TEST PIT PROFILE


SCALE $1^{\circ}=$ aS ShGMFI. DEPTH (FT).
NOTES:
 at $\varepsilon \times 1>1106$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
signature: $\qquad$
REFERENCE:FIE:D BOOK, Pg.
 $10^{\text {ste. }}$ AT None A.ITACTMENTS g, m路


TEST PITRRECORD
Profile Along Test Pit: $-57 E-95-12 x$
Sits: $\qquad$ ADC 57

SKETCH MAP OF TEST PIT PROFILE
Typical all walls


SCALE ${ }^{\prime \prime}=\frac{5}{5} \quad$ FT, Vertical; $1^{\prime \prime}=1^{\prime}$ horizo.tiol
A* $\operatorname{DEPTH}(F T)$ - $\frac{-13}{13}$ Sides began to cave in soil type
NOTES:
(A) 5:1ry sand; well graded; $10-15 \geqslant-4$ firs in 5-10\% gramil; dry; vary looser; dort to med iva brow sm; many tres roots
$\qquad$
(13) Black i layer; septic end strong Fiuelador rested ( 2.7 ppm wy Pl about 1 (it down in tran ib) Soil very whesive; very moss:
(c) Madiv, to fine sand; poorly
 graded; very whit; loose light to yellowish brown; sP
 Grai-size $e$ ow' and G $\boldsymbol{y}^{\prime \prime}$

* Seel odor detected $11-12$

ATTACHMENTS None
$\qquad$ SIGNATURE:


$$
\begin{aligned}
& \text { filled the pit fo the } \\
& \text { app os binate } 7 \text { il eva }
\end{aligned}
$$



Profile Along Test Pit: $-57 E-95-13 x$
Site: AOC57

SKETCH MAP OF TEST PIT PROFILE
Typical all walls

|  |  |  | (A) darfabrow- |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |
|  |  |  | (B) |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

SCALE $1^{\prime \prime}=$ $\qquad$ FT. Vertical; $1^{\prime \prime}=1^{\prime}$ horizontal
DEPTH (FT)._ $\quad$ _ sidewalls collapsed; water frickling in at abojt $6^{\circ}$
NOTES: $\qquad$

(A) Silty sand; well graded; 20 to $25 \%$ fines; damp; very loose; dark brown of some black organic material; Sm; mary ports Approx 254 thick
(B) Medive sind turning finer wits depth; poorly graded; wait; 100 in in spots u. $/$ tight consolidated chuaks in other areas; light brain to tom; $S P$
$\qquad$
-

No observable black organic layer was fount in this pit.

REFERENCE: FIEID BOOK, Pg. $\qquad$ 13
$\qquad$
SIGNATURE:
R0 gower were hates of organise material
Groundwater observed
to be seeping in $\approx 6 \mathrm{Ft}$.

SKETCH MAP OF TEST PIT SITE


No wind


NOTES:
 6 ft dep where under $b_{2}$ an to pour in.
At $y^{i} /$ fart $_{2}$ below grade water was stating to Skip in
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

Crew Members:

1. Jake Jacobson (ABB-ES)
2. Tim Slager (ENPRC)
3. 
4. 
5. 
6. 

Monitor Equipment:
Pl Meter
Explosive Gas
Avail. Oxygen
OVA
Other

$\qquad$
$\qquad$
Photogoraphs, Roll Noe Exposure

Profile Along Test Pit: $-57 E-95-14 x$
Site: ADC 57

SKETCH MAP OF TEST PIT PROFILE No topsoil


- leaicit e lowbrust
$\left.\begin{array}{|l|l|l|l|l|l|}\hline & & \text { (A) } & \begin{array}{c}\text { MeJivgit brown } \\ \hline\end{array} & \text { sand }\end{array}\right]$

SCALE $1=\frac{5}{6}$ FT. Vertical; $1^{\prime \prime}=1^{\prime}$ horizontal

Sol dasisnatia
NOTES:
A


NOTE
(A) Medium sand poorly graded damp; very loose; light to yellow is brown; sp
(B)
approximately 2 ff be lou ground
surface Septic odor not wd
(c) Similar to (A) except wit.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

REFERENCE: FIELD BOOK, Pg.

$$
14-15
$$

ATTACHMENTS Non

SIGNATURE:


Site: $A O C 57$ Client: $\triangle A E C$ $\qquad$ Project No.: $9144-\mathrm{ClOf}^{2}$ Test pit $-57 E-95-15 x$ Date $9-21-95$ Time $8: 50$ End $9=30$ Coordinates


SKETCHUMAP OF TEST PIT SITE


NOTES: $\qquad$ Exca-ated to $58 t$ where. grox-stwater entered trans

Soil back i: lind into finch
 which it was excaivectos

Crew Members:

1. Jake Jacobson (ABB-ECS
2. Tim Slager (ENPRO)
3. 
4. 
5. 
6. 

Monitor Equipment:


Profile Along Test Pit: $57 E-95-15 x$
Site: ADC. 57

SKETCH MAP OF TEST PIT PROFILE
Typical all walls


SCALE $1^{\prime \prime}=\frac{5}{5} \mathrm{ST}^{\text {FT }}$ Vertical; $1^{11}=1^{\prime}$ horizontal
DEPTH (FT) $\qquad$
NOTES: $\qquad$
(A) Silly send; well graded dry to damp; very loose;
$\qquad$
(B) Blast layer; foal odor Small; $5 p p, 7$ noted in ind trench; Layer is appioxinataly
 below grade; soilvoy conisivio ad moist; appear to contain. organic material (decoyed ing j)
(Ci Medium to fine Sound; poorly. graded; very whit; loose;
 REFERENCE: FIELD BOOK, Pg. $16-17$ ATTACHMENTS Nod signature:
 15antbrioum to white SP

Site: $\qquad$ Client: $A F C$ $\qquad$ Project No: $\frac{9144-021 \text { of } 2}{}$ Test Pit $-57 E-95-16 x$ Date $9-21-95$ Time $10: 05$ End $10: 35$ Coordinates


NOTES: $\qquad$ Test pit approximately
$\frac{10 \text { feet long. } z x \text { caviled to }}{5 \text { feet where groundwater seeped }}$ in. Oil sheen noted on wo groundwaterestering trench. Soil backcsilled into french within respective 10 cation from which it was axcaratel

TEST PIT RECORD
Profile Along Test Pit: $-57 E-95-16 x$
Site: $\qquad$
Typical all walls
SKETCH MAP OF TEST PIT PROFILE


$$
\text { SCALE } 1=5 \text { FF. Vertical; } 1^{\prime \prime}=1^{\prime \prime} \text { horizontal }
$$

DEPTH (Ti) $\frac{5 \mathrm{FF}}{5 \mathrm{~F}}$. Soil $\mathrm{t}_{\text {ye }}$
Notes: $\frac{\text { (A) silty sand; wall graded }}{10.15 \% \text { F is }} 5$

$$
\begin{align*}
& 10-15 \% \text { fie } ; \text {; } 5-10 \geqslant n \text { gravel }  \tag{B}\\
& \text { up to } 3 / 4^{\prime} \text { to } 1^{11} \text { dicander }
\end{align*}
$$ loose; dark brawn; SM; many roots

(B) Black layer; fuel odor noted (3ppom Gram stacipiw) sail very moist containing ergioncs (roots).
Linsinected
(c) Medium sound; poorly graded veiny wet; loose; light brown to whits; fuel odor detected. simple may have sari collected

Gradatiorsimpla

REFERENCE: FIELD BOOK. Pg. 17
ATTACHMENTS Now

balks twa water table.
water bugs coming in

$$
a t \approx 5 s^{\prime}
$$



NOTES: $\qquad$

$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

Profile Along Test Pit: $\quad$ 57E-95-17x
Site: $\qquad$
North wall - Similar to soutiowall
SKETCH MAP OF TEST PIT PROFILE


NOTES: $\qquad$
(A) Silty sound; poorly giadast

loose; dense roots; dark brown; sm

odor (7ippon indre, 4) very
cohesive; containjoryanic materiel) almost mastic like consistency;
Appeased to be approximately isis to 1 st minims at $t_{2}$ eos t end of thru. torch


FEFERENCE: FIELD BOOK. Pg. $17=18$
ATTACHMENTS
 gravel; poorly graded; vic wet
white. strong fuel odor
detected. Supple may
hare bee, coilested brow vertus table, water began
 ABB Environmental Services, Inc.

Site: $A O C 57$ Client: $A F C$ Project No.: $9144-02 \quad 1$ of 2 Test Pit $-57 E-95-18 x$ Date $9-21-95$ Time $13: 00$ End $13: 30$ Coordinates


NOTES: $\qquad$
Test pit approximately 10 ft dong
Excavated to 3 feet Oulhere groundwater was encountered Soil backeilled into trench within respective location from which it was excavated.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$


## Crew Members:

1. Jake Jacobson (ABB-ES)
2. Tim Slager (ENPRC)
3. 
4. 
5. 
6. 

Monitor Equipment:
PI Meter
Explosive Gas
Avail. Oxygen
OVA


Other


TEST PIT RECORD
Profile Along Test Pit: $-57 E-95-10 \mathrm{X}$
Site: AOC57
Typical
allualls
SKETCH MAP OF TEST PIT PROFILE


$\qquad$
$\qquad$
(A) Blacklayer; no Euelodor

(C) coostorimedium sind; Moll graded; very wet; loose;
light brown to whiter than


Grai-sizecolisoted e $z^{\prime}$
(B); grain size sioghliy ioniser than (B)

REFERENCE: FIELD BOOK. Pg. $\qquad$
ATTACHMENTS Nome SIGNATURE:


Site:


Client: $A E C$ Project No.: $9144-i 2^{1}$ of 2 Test pit $57 E-95-19 x$ Date $9-21-95$ Time $14: 00$ End 14:30 Coordinates


NOTES: $\qquad$
Test pit approximately
Crew Members:

1. Jake Jacobson (ABB-ESS)
2. Tim Slager (ENPRO)
3. 
4. 
5. 
6. 

Monitor Equipment:
Pl Meter
Explosive Gas
Avail. Oxygen
OVA
10 feet long Excaval ed
to $3 / 2$ दे Set where ground water was encounterd.

Soil back filled into trench within respective locating
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

TEST PIT.RECORD
Profile Along Test Pit: $\quad 57 E-95-19 x$
Site: _ ABC 57

Typical all walls
SKETCH MAP OF TEST PIT PROFILE


SCALE 1: $=\frac{5}{31 / 2} f^{F}$ Vertical; $1^{\prime \prime}=1^{\prime}$ hoizochal
DEPTH (FT).
NOTES: $\qquad$
silty some; poorly graded

very loose; Medimbrows;
numerous roots
(13) Black layer; no noticeable septic or fuel odor.
$\qquad$ very moist.

(c) Medium sand; poolly graded;
vary wet. Sample collected above water level.; loose; light ta yellowish brow; SP

REFERENCE: FIELD BOOK, Pg. $\qquad$ $18-19$

ATTACHMENTS
Nova:


Site:
A OC 57 Client: $A E C$ Project No.:9144-0 Z2 oi 2
Test Pit
57E-95-20X Date $9-21-95$ Time 15:00 Coordinates

SKETCH MAP OF TEST PIT SITE


SCALE 1" = Note FT.
NOTES:
Test pit approximately 10 feet long, Excavated to to ft where groundwater was ancon tared, Top 5 feet of material seems to be fill material. (charcoal broquets found at least 2 St below grade.

No black organic layer
was observed.
$\qquad$
$\qquad$
$\qquad$
$\qquad$

## Crew Members:

1. Jake Jacobson (ABB-ENS)
2. Tim Slager (ENPRO)
3. 
4. 
5. 
6. 

Monitor Equipment:
PI Meter
Explosive Gas
Avail. Oxygen
OVA


Other


Profile Along Test Pit: $-57 E-95-20 X$
Site: $\qquad$

SKETCH MAP OF TEST PIT PROFILE


SCALE 1" $=5$ FT. Vertical; $1^{\prime \prime}=1$ 'horizontal
DEPTH (FT). $\qquad$
NOTES: $\qquad$

(A) fnediva to fine send; poorly





REFERENCE: FIELD 800K Pg .
ATTACHMENTS


$$
\begin{gathered}
\text { Note: No black ergmic } \\
\text { layer was noted } \\
\text { in this } p \text { is }
\end{gathered}
$$



Site: $\qquad$ ADC 57 client AEC 9-22-95 Time Project No.: $9144-02^{1 \text { of } 2}$

Test Pit $\qquad$ 57 $\qquad$

SKETCH MA OF TEST PIT SITE


SCALE $1^{\prime \prime}=$ No re FT.

longe Approximately 3 to if Sp. appears to bi Sill. Danes such as bricks, nails, ash, glass, iron ware noted. Greer light powdery material surrounding the chou, of what apperrest to be metal was collected and simplest. Below four feat was clean smadiui to fine sand. Excavation want $t_{0} 10$ st. As groundwater was ancountrost

Profile Along Test pit:-57E-95-21X EP 1<1 TP $4^{2012}$ Site: AOC. 57

West well (typical of all mails)
SKETCH MAP OF TEST PIT PROFILE stael strapping


NOTES:
(A) Ash, some charcoal; silty sod dart bozen nark; steal stappent
(iB) Medina sind, poos) grade dep; light brown trace of
(c) bitt: contains some dieristinailsib of cinders, ash, brick glass, nails; iras object

found with light gran material
surconding it This grac-matrin) REFERENCE: FIELD BOOK. pg. was simple.
(D) Medium to fin a sind; trace offïus $d r_{n}$; RI roose; light brown to on oropgebrown; Appear: to be nestle material).

Sita: $A O C 57$ client: $A F C$ Project No.: $9144-022^{1 \text { of } 2}$ Test Pit 57E-95-22x Date $9-22-95$ Time $9: 20$ End 10:10 Coordinates


NOTES:
Test pit appososimately 10 Kt log g. Trench excavated partly inly a shall mound (appion $20 f+$ high) at the edge of the embarkment.
A crushed rusted 55 gallon duma
sat onto of this mood on the
grand surface Pit execrated to asset 1054 bags No grand under encountered The tip approximate 4 ios Foot la poe oppose to con some debris (brick; ash; y loss, nails)
$\qquad$

$\qquad$
$\qquad$

Crew Members:

1. Jake Jacobson = (ABB-ES)
2. Tim Slager (ENPRO)
3. 
4. 
5. 
6. 

Monitor Equipment:
PI Meter
Explosive Gas
Avail. Oxygen
OVA


Other $\qquad$


TEST PIT RECORD
 Site: AOC 57
$\qquad$


SCALE $1^{\prime \prime}=\quad 5$ DEPTH $(\mathrm{FT})$. $\quad-\quad \mathrm{O}$

FT. vartical; $1^{\prime \prime}=1^{\prime}$ horizortill
NOTES:
NOTES:
(A) Siltysand; weligaded is is to $20^{\circ} \beta$ fines; vary loose; verydry; derk brown; sM ; appeass to be fill maherial contain.t sone piesesof brick coal; 3 bottlos, chuaks of quwa ont some ash.
(B) Cleim Mediun to Fine sand; poorly groidd; $5-10 \%$ Fines; vey foase; very dry; SP.
$\qquad$
No grovaduater enconitured


Bothon of Excavalitiv,
No grounducitar encouriterad


Equipment a Vehicle Stg y ark SKETCH MAP OF TEST PIT. SITE


SCALE 1 " = None FT.
NOTES: $\qquad$
$\qquad$
10 ft . No gios-dumador zeounteried Sons debris found in the top 5 ft. of soil.

Crew Members:

1. Jana Jacobson (ABB-E-S)
2. Tim Slager (ENPRO)
3. 
4. 
5. 
6. 

Monitor Equipment:
Pl Meter
Explosive Gas
Avail. Oxygen
OVA
Other $\qquad$
$\qquad$
Photogoraphs, Roll None
Exposure
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

Profile Along Test Pit: $-57 E-95-23 x$ EP $C$ TP-2
Site: $A O C 57$

Typiculall walls
SKETCH MAP OF TEST PIT PROFILE


SCALE $1^{\prime}=-5$
FT. vertical; $1^{\prime \prime}=$ 1' horizontal $^{\prime}$
DEPTH (FT). $\qquad$
NOTES: $\qquad$
(A) Silty sind; inieil grads? 15-200\% fires very 100 eg ; very din, dark bromic; SM
Soil contains sone debris: 20 incl bolt; vehicle goer; mabel strapping; soma cherciocl
(B) Cleon radium to $C_{i n}$ sind;

poorly gradaej s~iogefines;
very loose dry to dem with depth; 5 Sp

Non gromsumote' encorntinas
REFERENCE: FIELD BOOK, Pg.
ATTACHMENTS Nus SIGNATURE:


TEST PITRECORD
Profile Along Test Pit: $-57 E-95-24 x \quad E P / C \quad T P-1 \quad 2$ ot 2 Site: AOC 57
 SKETCH MAP OF TEST PIP PROFILE


$$
\text { SCALE } 1^{\prime}=5 \quad 5 \text { vi vertical; } 1^{\prime \prime}=1^{\prime} \text { horizon al }
$$

NOTES:
(A) $\approx 6^{\prime \prime}$ vogatatise topsoil
(B) Silty son; well gradad;

$$
10-i 5 \% / \text { Sinew/ } 5 \% \text { gravel; }
$$ dry; loose; dark brown; sm; uppers to be fill material; pocket of coal found at north end of trench approx, lately $1 y_{2}$ ts $2 \frac{1}{2}$ ft

druse. A venice transmission was fort in this zone as well.
(C) Same or similar soil as above (B) except dorkerin color and
 had on fuel oil smell). Sepia collat signature:
(1) Medium sand decreasing to

Find send vito depth
$\longrightarrow$ Gasoline odor detected; poorly
graded damp; loose; yellowish brown changing to grey with
depth $\frac{A P \cos ^{2}}{2}$
$\qquad$ Nae

TEST PIT RECORD
EPIC


Crew Members:

1. Jiko Jacobsor (ABB-ES)
2. Tim Slager (ENPRO)
3. 
4. 
5. 
6. 

Monitor Equipment:
PI Meter
Explosive Gas
Avail. Oxygen
OVA
Other
$\qquad$
Photogoraphs, Roll None

An appionimatz $6^{\prime \prime}$ to $1 f$ f thick layes of soilswas wown wot approxi atoly 4 fiVbelongrade. Mediven smod Snalive matl) bebo inpproximatily Sfte had a gasoline ador
P,D $248 p p=$ (naad jpaid).
$\qquad$
$\qquad$

TEST PIT RECORD


Froilie Along Test Pic: $\quad 575-05-n \leq Y$
Site: $\qquad$ ADC 57

## SKETCH MAP OF TEST PIT PROFILE



SCALE $1=\frac{5}{\text { DEPTH (FT) }} \frac{12}{12}$ (g min vertical; $1^{\prime \prime}=1^{\prime \prime}$ horizerfal




SKETCH MAP OF TEST PIT SA $150^{1}$ to $57 E-95-03 x$


NOTES: $\qquad$
$\qquad$
Test pitt upproxinedely 1057


A thin $\left(1\right.$ to $2^{\prime \prime}$ thick layer)
Crew Members:

1. Taka Jacobson (ABB-ENS)
2. Tim Slager (ENPRO)
3. 
4. 
5. 
6. 

Monitor Equipment:
Pl Meter
Explosive Gas
Explosive Gas
Avail. Oxygen
OVA
Other $\qquad$
$\qquad$
Photogoraphs, Roll None Exposure coal ash $t$ eon) (indars is preinit an the approximate syr foot lewis.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

TEST PIT RECORD
Profile Along Test Pit: $-57 E-95-26 x$
Site: AC 57

Typical Profile - Allinalls
SKETCH MAP OF TEST PIT PROFILE


SCALE $1^{*}=$ $\qquad$ FI. vertical; $1^{\prime \prime}=1^{\prime}$ horizontal
NOTES: $\qquad$ fines w/ 5-10\% gravel; dry; loose; madiwn brown; SM
(B) Thin ( $1^{\prime \prime}+02^{\prime \prime}$ thick lager) of coal asir; cinder
(c) Silly send well greed; $15-20 \%$ fins w/ $5-10 \%$ gravel; dry
$\qquad$
(D) Clean Miadivn sons; poorly
 grader; damp; loose; yellowish brown to gray with depty; SP

REFERENCE: FIEID BCOK Pg. $\qquad$
22
ATTACHMENTS $N \cdot g n$

SIGNATURE:


Site: $A O C 57$ client: $A E C$ Project No.: $9144-02{ }^{1 \text { of } 2}$ Test Pit $-57 E-95-27 x$ Date $9-25-95$ Time -1 10.00 End $10: 40$ Coordinates

SKETCH MAP OF TEST PIT SITE


NOTES:
$\frac{\text { Sxcorvation approximately } 10 \mathrm{ft} \text { long. }}{\text { and } 12 \mathrm{ft} \text { deep } \mathrm{No} \text { groundwater }}$
Sxcorechin-appsoximately 10 ft long.
and 12 ft dep No groundwater
encombard
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$ enemband

Profile Along Test Pit: $-57 E-95-27 \times$
Site: $\qquad$ AOC 57

Typical all walls
SKETCH MAP OF TEST PIT PROFILE

|  |  |  | (2) |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  | (12) |  |  |  |
|  |  |  | (D) |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

SCALE $1=-5$
Fr. Vertical; $1^{\prime \prime}=1^{\prime}$ morizoltal
DEPTH (FI). $\qquad$
NOTES:
(A) Silty $\sin d ;$ wall g;aded; $10 \cdot 15^{\circ} \%$ fines w/ $5-10 \%$ gravil ; dry; ionse; madiva bionain; SM
(B) Thin $\left(\approx 3^{\prime \prime} t_{\text {hick layes }}\right)$ of dark brown to blask sois - may contrin snza cond asl. Nu cindous cv: $2=0$

(c) S:lty sana wall giadaj; 15-2un

domp; light broun to radd.sh brown; sm
(D) Clean mediun sand; pooly
grabed; trace of gravel; tam

to jeflow.sn bonwa; sp; west.
No jovaduatar ancounterad


SKETCH MAP OF TEST PIT SITE


Crew Members:

1. Jacobson/ ABB
2. Slater/Enpro
3. 

1
4.
$x_{2}$
5
5

Monitor Equipment:
Scale $1^{\prime \prime}=$ N $_{0}$ Side $F T$.
NOTES: $\qquad$
Gecplyitcil anomallz reported
earlier was fou -d to be two
truck sides to a truck bed $\approx 12^{\circ} \operatorname{long}$
$\approx 11 / 2$ wide made of steel. See po $z$ Other metal debris noted.

PI Meter
Explosive Gas


TEST PIT RECORD
Profile Along Test Pit: $\quad$ ThE- $96-28 x$
Site: $A O C-57$
WEST WALL*

SKETCH MAP OF TEST PIT PROFILE


SCALE $1^{-}=$ $\qquad$ FT. 1 Block $55^{-1}$ maria a vertical
notes: $\qquad$
c 3 General Soil Layers
(A) Silty sind; poorly gradus; $15-20 \%$ fines; dry; loose; light tans; SM
Fill $\rightarrow \frac{\text { Mididgraded sand; } 10 \% \text { fines; damp; }}{\text { Mativen bosun; Medium dense; swish }}$
some trace gravel $(5 \%)$; dork brown

with lenses of darkribrav-soil. Debris
anted: (1) Aroophaylyy was (2) $12^{\prime} \operatorname{lon} \operatorname{gig} x 11_{2}^{\prime}$ wide steal trick bed sides or tail gales
(2) O:1 Filter
(3) 5 gal steal bucket
(4) $2^{\prime \prime} \times 8^{\prime \prime}$ Boards $\approx 4$ +0. $5^{\circ} 1079$

REFERENCE: FIELD BOOK, Pg.
debris noled-hack sem blade
attachments rubber bells (Can) stael sheatín
stealstrapping, brick,



* Note: "Cast pro wall profile similar excect caal/iinder layer was not as evident.
* OGf-site soil samples collected @ location S-3


Project No.: $9144-0 \theta$
1 of 2 Test Pit $57 E-96-29 x$ Date 8-20-96 Time 8:45 End 11:20


NOTES: $\qquad$
Test Pit 57E-96-29x dug west for 10 feet and then northwest for another 10 feet. Test pit dept was to approximately 10 ft bogs.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

## Crew Members:

1. Jacobson/ ABB
2. Slater / Empro
3. 
4. 
5. 
6. 

Monitor Equipment:
$\begin{array}{lll}\text { Pl Meter } & \bigotimes & \mathrm{N} \\ \text { Explosive Gas } & \mathrm{Y} & \mathrm{N} \\ \text { Avail. Oxygen } & \mathrm{Y} & \mathrm{N} \\ \text { OVA } & & \mathrm{Y} \\ \mathrm{N} \\ \text { Other } & & \end{array}$

$\qquad$
Site:
57E-96-29X
Along Test Pit: AOC-57

SOUTH WALL (Noty wall simila) sketci wang resipr rhorle



 DEPTH (FT). $\qquad$
notes: $\qquad$
(A) Top soil: Silty send; poorly gradod; $15 \%$ fiws dry, looin; lioghtan; Sn -

appraximate 6" fuicik la yer of saudupt with petrolzua like sdor ( $P$ io fron Stackpile measiond : 13 ppm )-
 samdust Lense notat at wast and
(4) Corcrete debris (bsoker slab)
attachments
(5) Metal sicraps, wiresieve
signatue: RRO2an,
$\qquad$
(c) Fine to mediu-sand; poolly gradel; madim dense reddishbrowe tunnizy gray w/fapty; wete $>25 t$; $s p$

* Septic odor noled fron sampiz s-3; slightsaptic in s-7 ** s-s collected from the sawdust layer for Pill madspace

E

## TEST PIT RECORD

Site: $A O C 57$ Client: USAEC Project No.: $9144-088^{1 \text { of } 2}$ Test Pit $57 E-96-30 X$ Date $\frac{8-20.96}{}$ Time 13:15 End 15:45
Coordinates


NOTES:
Trensin excavated is a generally
soutberidirection to assess extant
of contamination, Visual and PID measurements indicating diminishing in potential sortanimandis seemed to occur approximately 25 feet from the $57 \times-95-24 \times$ stake - Contamination seeped fo be most prevalent below a Sound dust (wood chip) layer located at the appsorint 5 it bes level.

Depots of fest pit mums $\geqslant 10$ fast bogs

Crew Members:

1. Jacobson/ ABB
2. Slater / Enpro
3. 
4. 

$5.03 x$
6.

Monitor Equipment: | Pl Meter | $Q$ | $N$ |
| :--- | :--- | :--- |
| Explosive Gas | $Y$ | $N$ |
| Avail. Oxygen | $Y$ | $N$ |
| OVA | $Y$ | $N$ |
| Other | $Y$ | $N$ |

$\qquad$


Profile Along Test Pit: $\quad 5>E-96-30 x$
Site: $\qquad$ $A O C-57-30 X$
(N)

SKETCH i MÁP OF TEST PTI PPGFILE
East wall


NOTES: $\qquad$
(A) Top soil-sillysiod; poorly graded; Lo \% files
(B) Well grad sand; Yowliws; $5 \%$ gravely med brail $3: 25$

(C) Fill Layer; Sand; will graded;

$\qquad$
(D) Fire to median sand; posily grader; medium dense; gray until the last half ( $\approx 20 \mathrm{fes})$

REFERENCE: FIELD BOOK. Pg. $\qquad$ $9-10$

ATTACHMENTS Nov e
$\qquad$
SIGNATURE:
turned a light brown to reddish brown oj $5 P$

* S-5 collected in Dork ingrown layer w/ some wood rips
** 5-3 Off-ste lab sample Ex 573006 also cullectad from this pocitron
Note: Sawdust layer had a petroleum like odor but did not axhibit ABB Environmental Services, inc. 9312005S L 3 signisicats PID levels above background ( 1 to 2 ppi)

Site: $\frac{A O C .57}{57 E-96}$ Client: USAEC Project No.: $9144-08{ }^{1 \text { of } 2}$ Time 8:55 End $10: 45$ Coordinates Date ez)

SKETCH MAP OFTESTPIT SITE


NOTES:
Test Pit dug in a southeast worst direction te define adige of contoinudad oren. Contamination spars to diminish approxizalch 25 fret southeast of the 57 Effs: $24 x$ stake.

Depth of Test Pit $\times 10 \mathrm{ft}$.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

TEST PIT RECORD
Profile Along Test Pit: $5>E-96-31 x$
Site: $A O C-57$
(N)

IF if Northeast Wall (Smith te sw il)
OLES

(A) $y_{1} V$ $\square$


NOTES:
Top $\operatorname{soin}-$ silty send; parl grady
$15 \%$ fin es; trace of $1 / 2{ }^{\prime}$ to $1^{\prime \prime}$ gravel;
losiz;dry; SM
(B) Fill Material) - Misc debris noted
$\qquad$

(C) Approx i' $^{\prime}$ trick lager of dot stained silty sons.


REFERENCE: FIELD BOOK, Pg.

$$
11-14
$$

(1) Light brown sand - Fine to Madivn sand; poorly graded; inedina dense Faddish brows af lours depths then turning gray.


* OKE-site confirmatory collected at this location too. (see sp-3)

Project Ert Devens
Project No. 09144.02

Study Area ACC 57
Boring No. 57m-95-01x Date Installed $9 / 22 / 95$

Driller K REGAN (D.L. MAHER) Drilling Method H.S.A. $\left(65 / \beta^{\prime \prime} I_{D}\right)$ Development Method Dedicated subme coble

Field Geologist G. GuLLETS


Stick-up of Casing Above Ground Surface: 2.54 FEET Type of Surface Seal/ Other Protection: gavel pad \&y Type of Surface Casing: $\qquad$
ID of Surface Casing: $\qquad$ CINCH

Diameter of Borehole:_ $\quad 10$ SCH
$\qquad$
Type of Riser Pipe:_ SCH 40 PVC
Type of Backfill: $\qquad$ Depth of Top of Seal:_ $\&$ FEET (bags) Type of Seal: BENTCNITE PELLET Depth of Top of Sand:_13FEET (bogS)
Depth of Top of Screen:_ 19 FEET (bagS) Type of Screen: Slot Size $\times$ Length: O.OIO INCH - 10 FEET ID of Screen: $\qquad$ 4 NCH (20-40)
Type of Sandpack:


Depth of Bottom of Screen: $\qquad$ Depth of Sediment Sump with Plug:_N|A

Death of Bottom of Borehole: $\qquad$

## MOTORING WELL CONSTRUCTOR DAGAN

Project Fort Sevens
Study Area ADC 57
Boring No. $57 M-95-02 x$
Date installed $9-29-95$
Field Geologist S. Montramery

Project No. $9144-02$ -

DrillerD.L. MAHEE - B. Burns Drilling Method $61 / 4^{\prime \prime}(I D) H S A$ Development Method Dedicated seldom.


Type of Surface Seal Other Protection: Q avi pad
Type of Surface Casing: steel

ID of Surface Casing: $\qquad$

Diameter of Borehole: $\qquad$ $+$

Riser Pipe 10: $\qquad$

Type of Backiil:


Depth of Top of Seal:


Type of Seal: $\qquad$
Depth of Top of Sand: $\qquad$ 9 '

Depth of Top of Screen: 14

Type or screen: Schedule 40 PVC
Slot Size $x$ Length: $0.010^{i 1}$ machine slot $\times 10^{1}$
10 of Screen:
み゙
Type of Sandpack: $20-40$ silica sand
Depth of Bottom of Screen:-24


Depth of Bottom of Borehole: $\qquad$

## MONTORING WELL CONSTRUCTION DIAGRAM

Project Eon Devens
Project No. 9144.02

Study Area AOC 57
Boring No. 57M-95-0 $3 \times$ Date Installed $10-3-95$ Field Geologist


Ground
Elevation Elevation




Project Fort Devens
Project No. $\quad$ Ca 14 -02

Study Area AOC 57
Boring No. 57M-95-C4B
Date Installed 1013195

Driller K BEGAN Drilling Method $\frac{\mathrm{H}}{\mathrm{H}}$ Drilling Method $\frac{\text { H.S.A. }(65 / 8 \text { ID }}{\text { Development Method Dedicated subvene }}$ de

Field Geologist $\qquad$ $G$ Gulseth

Stick-up of Casing Above Ground Surface .a. 50 feet

Type of Surface Seal/ Other Protection: gavel pad 4 Type of Surface Casing: Procover

1D of Surface Casing: $\qquad$ 6 NCH

Diameter of Borehole: $\qquad$
$\qquad$

Riser Pipe ID: $\qquad$ 41 NCH

Type of Riser Pipe: $\qquad$
Type of Backfill: $\qquad$ Benton :te/Cement Grout

Depth of Top of Seal: $\qquad$
Type of Seal: $\qquad$ Bentonite Pellet

Depth of Top of Sand: $\qquad$
Depth of Top of Screen: $\qquad$
Type of Screen: $\qquad$ SCH 40 PVC

Slot Size $x$ Length: 0.010 iNCH - 10 FEET
ID of Screen: 4 NeH

Type of Sandpack: $\# 00 \leq A N D$
Depth of Bottom of Screen: $\qquad$
Depth of Sediment Sump with Plug: 28.91 FEET
Depth of Bottom of Borehole: $\qquad$

## MONITORING WELL CONSTRUCTION DIAGRAM

Project Font Devons Project No. 0,14

Study Area $A D C 5$ Boring No. $5=1,-95-05 x$ Date installed $16-3-25$

Driller $\square$ $i .1$ Drilling Method $10 \cdot \frac{12}{2} \cdots \leq 4$ Development Method Dedicated subome os



Diameter of Borencle $\qquad$
Riser Pipe 10:_ i." $^{\prime}$
Type of Riser Pipe: Scivituig it FVC
Type of Eackill:
 6
Depth of Top of Seal
Type of Seal:

$\square$
Depth of Top of Screen:
type of screen: Efudeto w FVC

ID of Screen: $\qquad$

Type of Sandpack: 20 - 40 silica $\leq a n d$


Depth of Bottom of Borehole $\qquad$

Project Fort Devens
Project No. 09144.02

Study Area AOC 57 Boring No. $57 \mathrm{M}-95-06 \mathrm{X}$ Date Installed $10 / 4 / 95$

Driller K. REGAN(D.L. MAHER) Drilling Method H.S.A. $\left(6^{5} / 8^{4}\right.$ ED) Development Method Dedicated subme is

Field Geologist G.GULSETH pump


Elevation


Stick-up of Casing Above Ground Surface: 2. 21 FT
Type of Surface Seal Other Protection: gand ped of m
Type of Surface Casing: PROCOVER
ID of Surface Casing: $\qquad$
Diameter of Borehole: $\qquad$ 10 INCH $\qquad$
Riser Pipe ID: $\qquad$ 4 iNCH

Type of Riser Pipe: $\qquad$ SCH 40 PVC

Type of Backfill: $\qquad$ Bentonite Grout

Depth of Top of Seal: $\qquad$ 4 FEET

Type of Seal: $\qquad$ Bentonite Pele

Depth of Top of Sand: $\qquad$ 8 FEET

Depth of Top of Screen: $\qquad$ 11.87 FEET

Type of Screen: SCH 40 PVC
Slot Size $\times$ Length: 0.010 INCH -10 FEET
ID of Screen: $\qquad$
Type of Sandpack: \#OOSAND (20/40)
Depth of Bottom of Screen: $\quad 21.87$ FEET
Depth of Sediment Sump with Plug: 22.04 F $\in \in T$
Depth of Bottom of Borehole: 23 FEET
Project For Devons
Project No. $9144-02$

Study Area $\frac{\triangle C C 57}{\text { Boring No. } \frac{57 M-95-07 x}{10-5-95}}$
DrillerD.L.MAHER - B. Burns
$\qquad$
Date Installed Drilling Method $65 / 8^{\prime \prime}$ (ID) HSAs
Development Method Dedicated sulamencsibld pump sing
$\qquad$


Stick-up of Casing Above Ground Surface: $\qquad$ 1.5 FT.

Type of Surface Seal Other Protection: gavel fad Type of Surface Casing: $\qquad$ ID of Surface Casing: $\qquad$ Diameter of Borehole: $\qquad$ Riser Pipe ID: Type of Riser pipe: Schedule 40 PVC


Depth of Top of Seal:-


Depth of Top of Sand:

$\qquad$


Depth of Bottom of Borehole:


Project Fort Devens
Project No. $9144-C 2$
Study Area AOC 57
Boring No. 57:4-95-c8A Date installed $10-10-95$
Field Geologist $\frac{\text { S. Mantromaty }}{1}$
 Development Method Dedicated sulonuersike pump si


Type of Seal: 1/4"hentraite pellets

Depth of Top of Sand: $\qquad$ $2 f$

Depth of Top of Screen: $\qquad$ -
 10 of Screen: $4^{\text {: }}$ Type of Sandpack: $70-4 / n$ silica sand Depth of Bottom of Screen: $\qquad$ $13 \therefore$

Depth of Sediment Sump with Plug:-
Depth of Bottom of Borehole: $\qquad$

Project Eon Devons
Project No. 914402

Study Area $10 C 57$
Boring No. $57 \mathrm{M}-95-08 \mathrm{~B}$ Date Installed $10-10-95$

Field Geologist


Driller D.L.MAHER - B. Burns Drilling Method $65 / 8^{\prime \prime}( \pm 0)$ HSAs Development Method Dedicated oubmenoi


Stick-up of Casing Above Ground Surface: $2,9^{\prime}$
Type of Surface Seal Other Protection: gavel pad
Type of Surface Casing: $\qquad$ ${ }^{6}$
ID of Surface Casing: $\qquad$
Diameter of Borehole: $\qquad$

Riser Pipe ID: $\qquad$ Schedule 40 PVC
 Type of Seal: $\frac{1 / 4^{N} \text { bentonite pellets }}{13:}$ Depth of Top of Sand: $\frac{13^{\circ}}{15^{\prime}}$
Depth of Top of Screen: $\frac{15^{\prime}}{\text { Type of Screen: Scluedile } 40 \text { PVC }}$
$\qquad$
10 of Screen:
$\qquad$
Type of Sandpack:
Depth of Bottom of Screen: $28^{\prime}$


Depth of Bottom of Borehole: $\qquad$

## MONITORING WELL CONSTRUCTION DIAGRAM

Project Fort Devons
Project No. $09144-08$

Study Area AOC 57
Boring No. $57 m-96-09 x$ Date Installed 8.28 .96

Driller $\qquad$ Drilling Method 4.25" HSA Development Method Pump of Sure
$\qquad$


Ground Elevation


Type of Surface Seal Other Protection: Gravel Pad Type of Surface Casing: STEEL STAND PIPE ID of Surface Casing: $\qquad$ Diameter of Borehole: $\qquad$ Riser Pipe ID: $\qquad$ 2"

Type of Riser Pipe: $\qquad$ SCHD. 40 PUS

Type of Backfill: $\qquad$ Depth of Top of Seal: $\quad 3.0^{1} \mathrm{bg} 5$ Type of Seal: $\qquad$ Depth of Top of Sand $\qquad$ Depth of Top of Screen: $\frac{12 \cdot 8^{\prime} \log 5}{\log }$ Type of Screen:-SCHD. 40 PUS Slot Size $\times$ Length: $\qquad$
ID of Screen: $\qquad$
Type of Sandpack: $\qquad$
Depth of Bottom of Screen: $\qquad$
$22.8^{\prime} \log 5$
Depth of Sediment Sump with Plug:-23.0' lg 5
Depth of Bottom of Borehole:
$23.0^{1} \mathrm{la} 5$

MONITORING WELL CONSTRUCTION DIAGRAM PROJECT OPERATIONS PLAN FORT DEVENS, MASSACHUSETTS


Study Area 57
Boring No, 57 7 - $56-101 x$ Data installed $8 / 36 / 95$

Driller $\qquad$
Drilling Method


Field Geologist $\qquad$ K. LAuren


Stick-up of Casing Above Ground Surface: $J^{\prime}$
Type of Surface Seal Other Protection: (ERZENJ
Type of Surface Casing:_STELC- 5 CuT
ID of Surface Casing: $\qquad$
Diameter of Borehole: $G^{\prime \prime}$
Riser Pipe ID:


Type of Riser Pipe:


Type of Backfill:


Depth of Top of Seal:


Type of Seal: $\qquad$ RULES

Depth of Top of Sand: $\qquad$
Depth of Top of Screen:_ $3^{\prime}$
Type of Screen: $\qquad$
Slot Size $\times$ Length: $\qquad$

ID of Screen: $\qquad$ $2^{\prime \prime}$

Type of Sandpack: $\qquad$
Depth of Bottom of Screen: $\qquad$
Depth of Sediment Sump with Plug: $13^{\prime}$

Depth of Bottom of Borehole:
$13^{\prime}$

MONITORING WELL CONSTRUCTION DIAGRAM

Project Fort Devons
Project No. 9/44. 08

Study Area
Boring No. Date Installed $\qquad$ 57 $573-96-11 x$

Driller $\qquad$
Drilling Method $\qquad$

Field Geologist $\qquad$ il. Wisen


Stick-up of Casing Above Ground Surface: $2.5^{\prime}$

Type of Surface Casing: $5, E \in C$

ID of Surface Casing: $\qquad$
Diameter of Borehole: $\qquad$
$\qquad$
Type of Riser Pipe: $\qquad$

Type of Backfill: $\qquad$
Depth of Top of Seal: $\qquad$
Type of Seal: Ponsentat R<lleJJ
Depth of Top of Sand: $\qquad$
Depth of Top of Screen:_
Type of Screen: $\qquad$ Sic

Slot Size $\times$ Length: $\qquad$ $0.01 \times 10$

10 of Screen: $\qquad$

Type of Sandpack: $\qquad$ va 2

Depth of Bottom of Screen: $\qquad$ $12^{\prime}$

Depth of Sediment Sump with Plug: $12^{\prime}$

Depth of Bottom of Borehole: $\qquad$ 12"

MONITORING WELL CONSTRUCTION DIAGRAM PROJECT OPERATIONS PLAN FORT DEVENS, MASSACHUSETTS


Driller $\qquad$
$\qquad$

Drilling Method Development Method

Field Geologist K.whsen


Stick-up of Casing Above Ground Surface: 3.0 0
Type of Surface Seal Other Protection: Gravel Pars
Type of Surface Casing: STEEL

ID of Surface Casing: $\qquad$
Diameter of Borehole:___ $E^{\prime \prime}$
$\qquad$
Type of Riser Pipe: $\quad \rightarrow$ —

Type of Backfill: $\qquad$ $N / N$

Type of Seal: BCVTCNTK PELLETS' Depth of Top of Sand:_i.5 Depth of Top of Screen:____ $2^{\prime}$
$\qquad$


Depth of Bottom of Screen: $12^{\prime}$

Depth of Sediment Sump with Plug:___ Depth of Bottom of Borehole:___

MONITORING WELL CONSTRUCTION DIAGRAM PROJECT OPERATIONS PLAN FORT DEVENS, MASSACHUSETTS


Driller NHB
Drilling Method $\qquad$ Development Method Pump + Suit

Field Geologist $\qquad$ $k^{\prime}$ wider


Stick-up of Casing Above Ground Surface: $\qquad$ 2.6

Type of Surface Seal Other Protection: $\qquad$ Paris Type of Surface Casing:_ STEEL

ID of Surface Casing $\qquad$
Diameter of Borehole: $\qquad$ Riser Pipe ID: $\qquad$
Type of Riser Pipe: $\quad \sim /$

Type of Backfill: $\qquad$
Depth of Top of Seal: GROunD sc.RFACE
Type of Seal: $\qquad$ BKNTENTE PELLETS Depth of Top of Sand :_5 Depth of Top of Screen:_ $2^{\prime}$
$\qquad$
ID of Screen:

Type of Sandpack:


Depth of Bottom of Screen: $\qquad$
Depth of Sediment Sump with Plug: $12^{\prime}$
Depth of Bottom of Borehole: $\quad 12^{\prime}$

MONITORING WELL CONSTRUCTION DIAGRAM
PROJECT OPERATIONS PLAN FORT DEVENS, MASSACHUSETTS
Project Fort Devens Project No. $\qquad$

Study Area Boring No. $5+7-9=-015$
Date installed $10-11-95$

Driller D.L.MASEE E, BARE Development Method
 * ie djayram for associate l


Stick-up of Casing Above Ground Surface: 1.55
Type of Surface Sal Other Protection:
Type of Surface Casing: $\qquad$
10 of Surface Casing: $\qquad$
Diameter of Borehole: $\qquad$ Riser Pipe $10: \quad!^{\prime \prime}$
Type of Riser pipe: Sledtile to P, ©


Type of Seal:


Depth of Top of Sand: $\qquad$ $9=1$

Depth of Top of Screen:-
Type of Screen: Sicinatuin in Fir
 ID of Screen: $\qquad$ Type of Sandpack: $20-140$ mira sand

Depth of Bottom of Screen: $\qquad$ $1 \leq i$
Depth of Sediment Sump with Plug: $\frac{n^{\prime}}{15}$
Depth of Bottom of Borehole:-_




 Stick-up of Casing Above Grouñd Surface: 1.55

Type of Surface Seal Other Protection: ocainel ado
 1D of Surface Casing: $\qquad$
$\qquad$
Diameter of Borehole:
Riser Pipe ID: $\qquad$
Type of Riser pipe: Scluthle ti: PK
 Depth of Top of Sand: $\qquad$ $15^{3}$
Depth of Top of Screen:_工.ri'
Type of Screen: Siletule if, Dir

Depth of Bottom of Screen:- $\bar{T}, i^{2}$ ?
Depth of Sediment Sump with Plug: $\frac{\pi / t}{\%}$
Depth of Bottom of Borehole: $\qquad$

Project Fort Devens
Project No. 9144.03
Field Geologist


Study Area AOC 57
Arse 2 Driller $\qquad$
Boring No. 57P.98.02x Date Installed 5.26 .98


Drilling Method Haws Aucle
Development Method $\qquad$
$\qquad$


Stick-up of Casing Above Ground Surface: 2.05
Type of Surface Seal/ Other Protection: NON $\varepsilon$
Type of Surface Casing:_Now
ID of Surface Casing:_Non
Diameter of Borehole: $\frac{(2 \pi}{-1 \prime \prime} 3^{\prime \prime} 0.8$.
Riser Pipe ID: $\qquad$
Type of Riser Pipe:_Sch 410 PrC
Type of Backfill: $\qquad$
Depth of Top of Seal: $\qquad$
Type of Seal: $\qquad$ —

Depth of Top of Sand:_non
Depth of Top of Screen: 0.3' BeS
Type of Screen:1" 10 0.010" ShOt Prc sen 40
Slot Size $\times$ Length: $2^{\prime} \times 0.010^{\prime \prime}$ stor
ID of Screen: ," ID
Type of Sandpack:-Non
Depth of Bottom of Screen: $\qquad$
Depth of Sediment Sump with Plug: 2.3' BGS
Depth of Bottom of Borehole: $2.3^{\circ}$

## Project Fort Devens Project No. 9144.03

 Study Area A OC 57 ares 3 Driller HLA Boring No. 57P.98.03x Date Installed 5.26 .98Drilling Method Haws glucose Development Method Now r
Field Geologist $\qquad$ 12 ustad


Project Fort Devens Study Area AOC 57 Arcs 3 Driller $\qquad$ HL

Project No. 9144.03

Field Geologist $\qquad$ RTurais

Boring No. 57P.98.04X Date Installed 5.26 .98

Drilling Method HANNOAUGR Development Method $\qquad$ N/A
$\qquad$ _

Stick-up of Casing Above Ground Surface: $2.81^{\circ}$
Type of Surface Seal Other Protection: NA

Type of Surface Casing:_N/
ID of Surface Casing:_NA

Diameter of Borehole: $\quad 3^{\prime \prime}$
Riser Pipe ID: $\qquad$
Type of Riser Pipe: $5<\mu \quad 40$ PrC

Type of Backfill: $\qquad$ NATIVE

Depth of Top of Seal:__NA

Type of Seal: $\qquad$
Depth of Top of Sand:_NA
Depth of Top of Screen: 2 GS
Type of Screen: Sem 40 Pro
Slot Size $\times$ Length: $3^{\prime} \times 0.01^{\prime \prime}$
ID of Screen: $\qquad$

Type of Sandpack:_NA
Depth of Bottom of Screen:-5'BGS
Depth of Sediment Sump with Plug: $5^{\prime \prime}$ BES
Depth of Bottom of Borehole:- $5^{\prime}$ BS GS

## GEOPHYSICAL INVESTIGATION DATA AND ANALYSIS

### 1.0 Introduction

Geophysical surveying was completed over AOC 57 at the former Fort Devens in Ayer, MA. Geophysical work was conducted in two separate areas in September 1995 and August 1996. Several geophysical techniques were employed at AOC 57 to screen for the presence or absence of buried waste at the site.

### 2.0 Equipment and Survey Methodology

Four types of geophysical surveys were conducted at AOC 57 and include an EM-61 Time Domain Metal Detection survey, an EM-31 electromagnetic ground conductivity survey, a GEM gradiometer survey, and a ground-penetrating radar survey. A Geonics, Inc. EM-61 High Resolution Time Domain Metal Detector was used to determine the presence of ferrous as well as non-ferrous metallic wastes. A Geonics, Inc. EM-31 Electromagnetic Ground Conductivity instrument was used to detect the presence of conductive wastes. A GEM-19 gradiometer was used to measure deviations in the earth's magnetic field to determine the presence of ferrous objects. A GSSI System III GPR unit equipped with a 500 megahertz antenna was used to profile selected electromagnetic and magnetic anomalies.

Prior to geophysical surveying a 50 by 50 foot grid was established using a tape and compass. Pin flags and blaze orange marking paint were used to identify grid nodes. Data was collected with reference to the preestablished survey grid by pacing. EM-31 and EM-61 surveys were conducted concurrently along survey lines spaced ten feet apart. EM-61, EM-31, and gradiometer measurements were collected every five feet along each survey line. GPR data was collected along selected lines in order to profile EM-31 and EM-61 anomalies. EM-31 and EM-61 data was collected with data loggers. Data was downloaded to a computer and processed using various geophysical software applications.

### 3.0 Results

The lateral extent of geophysical surveying is shown on the attached Figures. EM-31, EM-61, and gradiometer surveying indicated the presence of several anomalies across the

## APPENDIX C

survey areas. The most prominent anomalies are contemporaneous with the escarpment which parallels the drainage area bordering the southern portion of the site. This suggests that whatever materials were dumped in this area appear to have disposed of just over the edge of the bank. Surface debris was observed along the escarpment and included motor vehicle parts, glass, concrete with rebar, and razor wire. Test pitting was conducted at selected locations of high amplitude EM anomalies that could not be attributable to the presence of surfacial metallic objects or debris.




QUALITY CONTROL RESULTS AND ASSESSMENT
D-1 1993 ON-SITE AND OFF-SITE LABORATORY DATA
D-2 1996 ON-SITE LABORATORY DATA
D-3 1996 OFF-SITE LABORATORY DATAD-4 1998 OFF-SITE LABORATORY DATA (SUPPLEMENTAL RI)
D-5 1999 OFF-SITE LABORATORY DATA (AREA 3 SOIL REMOVAL)

## D.1.0 INTRODUCTION

This Data Quality Report (DQR) provides a detailed data quality assessment for off-site analytical data generated during site investigations conducted at Fort Devens during the fall 1995 at Areas of Concern (AOCs) 57, 63AX, and 69W. The DQR also addresses data collected in February of 1996, during the Round 2 Groundwater sampling event at AOCs 57, 63AX and 69W. The data quality assessment for the Round 2 Groundwater sampling event is presented separately within this report.

Samples collected during the investigations for off-site laboratory analyses were submitted to Environmental Science and Engineering (ESE), Gainesville, Florida. All laboratory data generated during the sampling programs were reviewed in terms of data quality objectives (DQOs) established in the Fort Devens Project Operations Plan (POP) (ABB-ES, 1995), published analytical methods (USEPA, 1988a; USEPA, 1989a) or applicable USEPA data validation guidelines (USEPA, 1988b; USEPA, 1989b). DQOs refer to a set of qualitative and quantitative statements that assess the data generated during the sampling and analysis phases of the project. The DQOs are defined by the parameters of precision, accuracy, representativeness, completeness, and comparability (PARCC). These parameters present an indication of the data quality, and the confidence that a particular compound may be present or absent in an associated environmental sample. This report describes the analytical methods performed at the on-site and off-site laboratories, and presents an assessment of data quality and usability for samples collected during the field investigations.

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## APPENDIX D

## D.1.1 OFF-SITE LABORATORY ANALYTICAL METHODS

Subsurface soil, sediment, groundwater, and surface water samples were collected during the 1995 Fort Devens Site Investigation. Groundwater samples were collected during the Round 2 sampling event. Samples were analyzed for chemical parameters on the Fort Devens Project Analyte List (PAL). The PAL and analytical methodologies are outlined in the Fort Devens POP (ABB-ES, 1995). The analyses performed are summarized on Table D-1.

The USEPA has recently identified two general levels of analytical data quality, Screening with Definitive Confirmation and Definitive Data, which replace the former five levels of data quality (USEPA, 1993). All off-site laboratory data are considered Definitive Data.

The contract laboratory which completed analyses of all off-site analytical samples was Environmental Science and Engineering (ESE), Gainesville, FL. All analyses run by the contract laboratory were completed implementing the 1990 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) QA Program (USATHAMA, 1990). Method performance demonstration, data management, and oversight for USATHAMA analytical procedures are currently performed by the U.S. Army Environmental Center (USAEC). A discussion of AEC-certified methods used by ESE Laboratories for samples collected at Fort Devens is provided in Section 7.0 of the Fort Devens POP (ABB-ES, 1995) and methods are listed in Table D-1. This table includes a description of the methods used as well as equivalent EPA methods, where they exist. The USAEC method numbers (i.e., method JS16) are specific to the project and to the particular laboratory

## APPENDIX D

performing the analyses. For some analyses standard USEPA methods are used. These methods are also indicated on Table D-1.

A detailed discussion of the USAEC laboratory QA program is presented in Section 3.0 of this RI. The laboratory must document proficiency using each of the methods by meeting USAEC performance protocols. Once the laboratory has demonstrated this proficiency, they become certified to perform that particular method. It is through this certification process that certified detection limits (CRLs) are established. CRLs for USAEC methods and reporting limits (RLs) for standard USEPA methods are presented in Appendix B of the Fort Devens POP (ABB-ES, 1995).

## APPENDIX D

## D.2.0 OFF-SITE LABORATORY QUALITY CONTROL BLANK RESULTS

A quality control review was completed for off-site QC blanks including method blanks, rinse blanks and trip blanks which were analyzed at an off-site laboratory. Blank samples provide a measure of contamination that may have been introduced into a sample set either (1) in the field while samples were being collected or transported to the laboratory, or (2) in the laboratory during sample preparation and analysis. This discussion is intended to provide an evaluation of data generated at this laboratory based on method blank and field quality control blank data.

## D.2.1 METHOD BLaNKS

Method blanks were analyzed at the laboratory with each lot of samples to evaluate if sample processing and analysis resulted in sample contamination. Method blanks were performed for both water and soil samples for the following chemical classes: inorganics, VOCs, SVOCs, pesticides/PCBs. Method blanks were also analyzed using USEPA methods for hardness, alkalinity, TOC, TPHC, TDS, and TSS.

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## D.2.1.1 Inorganics

Four aqueous method blanks were analyzed by the laboratory for PAL inorganics during the 1995 Field Investigation. During the Round 2 Groundwater sampling event three aqueous method blanks were analyzed. All results for aqueous method blanks were below the respective CRLs indicating there was no inorganic contamination introduced at the laboratory.

Three soil method blanks were analyzed in association with field samples from the 1995 Fort Devens Investigation. Several elements were detected in soil method blanks. The frequency and concentration ranges of elements detected in these blanks are summarized in Table D-2. All results for mercury, selenium, arsenic thallium, antimony, silver, beryllium, cadmium, copper, chromium, cobalt, sodium, nickel, lead, vanadium, and zinc were below the CRLs.

Soil method blank analyses were conducted by the laboratory using a USAEC approved soil as the matrix. A Rocky Mountain Blend soil type was used. The high frequency and concentrations of many of the inorganics are due to background levels inherent in this soil and are consistent with previous data collected from analysis of this soil blend. As a result; elements reported for soil method blanks are not believed to represent laboratory introduced contamination.

Based on soil and aqueous method blank results, significant inorganic contamination was not introduced during laboratory handling and analysis.

## APPENDIX D

## D.2.1.2 VOCs

Method blanks were run with each lot of water and soil samples to determine if VOCs were introduced during laboratory handling and analysis.

Seven aqueous method blanks were analyzed for VOC contamination during the 1995 Field Investigation. No target compound results were above CRLs with the exception of acetone, methylene chloride, and chloroform. The concentration and frequency of detection for these compounds are shown in Table D-3.

Acetone and methylene chloride are considered common laboratory contaminants (USEPA, 1988b) and were likely introduced during laboratory handling.

Chloroform is commonly produced in chlorinated drinking water supplies. The source of the chloroform in method blanks could potentially have been the off-site laboratory. These results indicate that low concentrations of acetone, methylene chloride, and chloroform may have been introduced during laboratory handling. Field samples collected at Fort Devens during the 1995 Site Investigation with detections of these compounds at similar concentrations may not be representative of site conditions.

Three aqueous method blanks were analyzed for VOC contamination during the Round 2 Groundwater sampling event. No results for target VOCs were above CRLs.

Ten method blanks were analyzed for VOCs in soil during the 1995 Field Investigation. No method blank compound results were at concentrations above the CRLs with the exception of toluene. Toluene was detected in two out of ten

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method blanks at concentrations ranging from $0.00096 \mu \mathrm{~g} / \mathrm{g}$ to $0.001 \mu \mathrm{~g} / \mathrm{g}$. Theses results indicate that low concentrations of toluene may have been introduced during laboratory handling. Field samples collected at Fort Devens during the 1995 Field Investigation with similar concentrations of toluene may not be representative of site conditions.

## D.2.1.3 SVOCs

Five aqueous method blanks were analyzed for SVOC contamination during the 1995 Field Investigation and three during the Round 2 Groundwater sampling event. The concentrations and frequency for compounds detected in aqueous method blanks are outlined in Table D-4. With the exception of diethyl phthalate and bis(2-ethylhexyl)phthalate, no target SVOCs were reported at concentrations above CRL values. Phthalates are referenced as common laboratory contaminant by the USEPA (USEPA, 1988b). Concentrations of diethyl phthalate and bis(2ethylhexyl)phthalate reported in Fort Devens field samples may have been introduced as laboratory contamination. Dioctyl adipate (hexanedioic acid), dioctyl ester, and toluene, which are tentatively identified compounds (TIC) or non-target SVOCs, were also detected in method blanks.

Twelve method blanks for soil were analyzed for SVOC contamination during the 1995 Field Investigation. The concentrations and frequency for compounds detected in soil method blanks are outlined in Table D-5. No target SVOC results were at concentrations above CRLs with the exception of di-n-butyl phthalate. Di-n-butyl phthalate is considered a common laboratory contaminant by the USEPA (USEPA, 1988b) and was likely introduced during laboratory

## APPENDIX D

sample handling and extraction. Samples with similar concentrations of this compound are not considered representative of site conditions.

## D.2.1.4 Pesticides/PCBs

Five aqueous method blanks and seven soil method blanks were analyzed for pesticide compounds and PCB during laboratory sample preparation and analysis during the 1995 Field Investigation. In addition, three water method blanks for PCBs and four water blanks for pesticides were analyzed for the Round 2 Groundwater sampling event. No pesticides/PCBs target compounds were at concentrations above CRL values, indicating no laboratory sample contamination occurred.

## D.2.1.5 TPHC

Several analytical methods were used to measure and characterize petroleum hydrocarbons in aqueous method blanks. During the 1995 Field Investigation, five water method blanks were analyzed for total petroleum hydrocarbons (TPHC) by USEPA Method 418.1; four soil method blanks were analyzed for TPHC as diesel, gasoline and aviation gasoline by modified USEPA Method 8015; and six soil method blanks were analyzed for TPHC using USEPA Method 9071 to extract the soils followed by a method 418.1 analysis. One soil method blank analyzed by USEPA Method $9071 / 418.1 \mathrm{had} 23 \mu \mathrm{~g} / \mathrm{g}$ of TPHC reported. All other method blank results form the 1995 Field Investigation were below the corresponding RLs.

Two water method blanks were analyzed for TPHC by Method 418.1 during the Round 2 Groundwater sampling event with results below the RLs.

Based on method blank results, the off-site laboratory is not believed to be a significant source of TPHC contamination for the Fort Devens field samples; however, low concentrations (approximately $23 \mu \mathrm{~g} / \mathrm{g}$ ) of TPHC in soils may represent laboratory contamination..

## D.2.1.6 USEPA Methods for Water Quality Parameters

Method blanks were analyzed using USEPA methods for the following parameters: nitrate and nitrite-nitrogen, kjeldahl-nitrogen, anions (chloride and sulfate), total phosphate, hardness, alkalinity, TOC, TDS, and TSS.

Four water method blanks were analyzed during the 1995 Field Investigation and two during the Round 2 Groundwater sampling event for nitrate and nitrite nitrogen using USEPA Method 352.1. No blanks had concentrations above the CRL of $10 \mu \mathrm{~g} / \mathrm{L}$. Nitrogen was also analyzed using the kjeldahl method for organic nitrogen, USEPA Method 351.2. Three water method blanks were analyzed in association with the 1995 Field Investigation and two for the Round 2 Groundwater sampling event. All results were less than the RL of $183 \mu \mathrm{~g} / \mathrm{L}$.

Four water method blanks (three during the 1995 Field Investigation and one during the Round 2 Groundwater sampling event) were analyzed for total phosphate by USEPA Method 365.2. All results were less than the CRL of $13.3 \mu \mathrm{~g} / \mathrm{L}$.

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## APPENDIX D

Anions in water (bromide, chloride, fluoride, and sulfate) were evaluated using ion chromatography, USEPA 300 Series Methods (USEPA, 1983). During the 1995 Field Investigation, one method blank was analyzed for bromide and fluoride, and four method blanks were analyzed for chloride and sulfate. Three additional water method blanks were analyzed in association with Round 2 Groundwater sampling event. All results for these method blanks were less than the corresponding CRLs.

During the 1995 Field Investigation, five water method blanks were analyzed for total dissolved solids (TDS) and total suspended solids (TSS) using USEPA Methods 160.1 and 160.2, respectively. One method blank contained TDS at $17000 \mu \mathrm{~g} / \mathrm{L}$ and TSS at $8000 \mu \mathrm{~g} / \mathrm{L}$. The TDS and TSS concentrations for all other method blanks were below the RLs of $10,000 \mu \mathrm{~g} / \mathrm{L}$ and $4,000 \mu \mathrm{~g} / \mathrm{L}$, respectively. Four water method blanks were analyzed during the Round 2 Groundwater sampling event for TDS and TSS. One blank contained TDS at $16,000 \mu \mathrm{~g} / \mathrm{L}$ compared to the RL of $10,000 \mu \mathrm{~g} / \mathrm{L}$. TSS was detected in two method blanks at $6,000 \mu \mathrm{~g} / \mathrm{L}$ and $7,000 \mu \mathrm{~g} / \mathrm{L}$ compared to the RL of $4,000 \mu \mathrm{~g} / \mathrm{L}$. These results indicate that low concentrations of TDS and/or TSS may be reported due to laboratory processing.

Two aqueous method blanks were analyzed for hardness (USEPA Method 130.2) during the 1995 Field Investigation and four during the Round 2 Groundwater sampling event. All method blank results for hardness were below the RL of $1,000 \mu \mathrm{~g} / \mathrm{L}$.

Three water method blank samples were analyzed for alkalinity (USEPA Method 130.1) during the 1995 Field Investigation, and three during the Round 2 Harding Lawson Associates

Groundwater sampling event. Three of these method blanks had alkalinity reported at $1,000 \mu \mathrm{~g} / \mathrm{L}$ compared to the RL of $5,000 \mu \mathrm{~g} / \mathrm{L}$.

Four soil method blanks were analyzed during the 1995 Field Investigation for total organic carbon (TOC) concentrations using USEPA Method 9060. The TOC concentrations for these blanks were below the CRL of $360 \mu \mathrm{~g} / \mathrm{g}$.

Based on method blanks results for samples analyzed by USEPA methods, the data collected during the Fort Devens Site Investigation was not significantly impacted by laboratory contamination.

## D.2.2 Field Quality Control Blanks

Field quality control blanks which were analyzed at the off-site laboratory include, rinse blanks, and trip blanks. Results from analyses of the field quality control blanks were used to evaluate the potential for contamination of samples during collection and shipment and processing at the off-site laboratory.

## APPENDIX D

## D.2.2.1 Rinse Blanks

Rinse blanks were used to evaluate the potential for field sampling (e.g., insufficient cleaning of sampling equipment) cross contamination of site samples. Rinse blanks were collected by pouring previously analyzed deionized water over sampling equipment (i.e., split-spoons, trowels, and shelby tubes) and into sample containers. Dedicated sampling equipment was used for the Round 2 Groundwater sampling event so collection of rinse blanks was not done. The rinse blanks collected during the 1995 Fort Devens Investigation were analyzed for the following chemical classes: inorganics, VOCs, SVOCs, and pesticides. Rinse blanks were also analyzed by USEPA methods for TOC and TPHC.

Inorganics. Six rinse blanks were analyzed for PAL elements during the 1995 Field Investigation. PAL elements were not detected at concentrations above the CRLs with the exception of mercury, lead, iron, potassium, and manganese. The concentration range and frequency of detection for these elements is shown in Table D-6. Detections of these elements may represent residual contamination left on the sampling equipment prior to the rinse blank collection. In general, the rinse blank data indicate that decontamination procedures were effective in the removal of residual inorganic contamination from the sampling equipment.

VOCs. Six rinse blanks were analyzed for VOCs during the 1995 Field Investigation. The concentration range and frequency for VOCs detected in rinse blanks above the CRL are shown in Table D-7.

The USEPA considers methylene chloride and acetone common laboratory contaminants (USEPA, 1988b). These compounds were detected in the method

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blanks as well as the rinse blanks, indicating they may represent laboratory contaminants. Fort Devens field samples with detections of these compounds at similar concentrations should be considered laboratory related contamination.

Detections of carbon tetrachloride, chloroform, and 1,1,1-Trichloroethane in Fort Devens Field samples at concentrations similar to those detected in rinse blanks (Table D-7) may be related to field sampling or decontamination procedures.

SVOCs. Six rinse blanks were collected during the 1995 Field Investigation and analyzed for SVOCs. The concentration range and frequency of detection for semivolatile compounds detected in rinse blanks is shown in Table D-8. With the exception of bis(2-ethylhexyl) phthalate and benzyl alcohol, all results for target SVOCs were at concentrations below CRLs. The presence of low concentrations of benzyl alcohol in Fort Devens field samples may be attributed to field sampling activities and not representative of actual site conditions. The USEPA Region I considers phthalates as common laboratory contaminants (USEPA, 1988b). Phthalates were detected in the method blanks as well as the rinse blanks indicating that they were likely introduced as laboratory contamination.

Several SVOC TICs including N,N-diethyl-3-methylbenzamide (N,N-diethyl-mtolumide), and benzyl adipate were detected in one rinse blank. Six additional unknown non-target SVOCs were detected in the rinse blanks at concentrations ranging from $4 \mu \mathrm{~g} / \mathrm{L}$ to $10 \mu \mathrm{~g} / \mathrm{L}$; however, most of these unknown constituents were also detected in the method blanks indicating that the contamination was laboratory related.

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Pesticides/PCBs. Four rinse blanks were analyzed for pesticides and PCBs during the 1995 Field Investigation. All results for pesticides and PCBs were below CRLs. The lack of pesticides and PCBs detected indicates there is no evidence of cross contamination during field sampling.

USEPA Methods. During the 1995 Field Investigation, three rinse blanks were analyzed for TOC and all results were at concentrations below the RL of $1000 \mu \mathrm{~g} / \mathrm{L}$. Six rinse blanks were analyzed for TPHC. Concentrations of TPHC in all blanks were below the RL of $100 \mu \mathrm{~g} / \mathrm{L}$. These data indicate contamination of TOC and TPHC during field sampling did not occur.

## D.2.2.2 Trip Blanks

Trip blanks are analyzed to assess the potential for cross contamination of VOCs during sampling, transit, and storage. The trip blank consists of a VOA sample container filled at the contract laboratory with DI/carbon filtered water and shipped to the site with the other VOA sample containers. Trip blanks were included with each shipping container of field VOC samples.

Sixteen trip blanks were collected and analyzed in association with samples analyzed for VOCs from the Fort Devens 1995 Site Investigation and two from the Round 2 Groundwater sampling event. Target VOCs and associated TICs detected in the trip blanks, including the frequency and range of concentrations are shown in Table D-9.

The USEPA considers acetone and methylene chloride common laboratory contaminants (USEPA, 1988b). Acetone, methylene chloride, and chloroform
were detected in the method blanks as well as the trip blanks indicating they were introduced at the laboratory. Fort Devens field samples with concentrations of these compounds in the range detected in trip blanks and method blanks, are not considered representative of site conditions at Fort Devens.

The presence of carbon tetrachloride and tetrachloroethene in trip blanks indicates that cross contamination may have occurred in shipment or handling of the field samples. However, no carbon tetrachloride or tetrachloroethene was detected in samples from AOC 63AX.

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## D.3.0 ACCURACY OF OFF-SITE LABORATORY DATA

Accuracy is a quantitative parameter that determines the nearness of a result to its true value. Accuracy measures the bias in a measurement system. The accuracy of each analytical method was evaluated based on percent recoveries for matrix spikes and/or surrogate standards.

A matrix spike is a sample of a particular matrix to which predetermined quantities of standard solutions of certain target analytes were added prior to sample extraction/digestion and analysis. Samples were spilt into replicates, one replicate was spiked and both aliquots were analyzed.

Accuracy was also evaluated using the recovery of surrogate standards in the volatile and semivolatile analyses. Surrogate standards are organic compounds which are similar to the analytes of interest in chemical composition, extraction, and chromatography, but which are not normally found in environmental samples. These compounds are spiked into all volatile and semivolatile samples prior to analysis.

Percent recovery of matrix spikes and surrogate spikes provide and indication of data accuracy and potential data bias from matrix related effects. Percent recovery was calculated using the equation shown in Section 3.3 of the Fort Devens POP (ABB-ES, 1995). The percent recovery for these QC samples were evaluated and are discussed below.

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## D.3.1 MATRIX Spikes

Soil, sediment, surface water and groundwater samples were used for matrix spike and matrix spike duplicate analysis. Spiked samples were analyzed for hardness, alkalinity, nitrate and nitrite-nitrogen, kjeldahl-nitrogen, sulfate, total phosphate, TPHC, TOC, PAL inorganics, and PAL pesticide/PCBs. Matrix spike and matrix spike duplicate (MS/MSD) samples were collected at a rate of one per twenty environmental samples. A summary of all MS/MSD data collected during the Fort Devens Site Investigations are presented in Table D-10 and Table D-11.

The spike data for all samples collected during 1995 Fort Devens Site Investigation were evaluated together, and are discussed below as one data set. Similarly, all groundwater spiked samples collected during the Round 2 Groundwater sampling event were evaluated collectively. The data have been segregated by method and by analytical parameter to show recovery trends of the individual spiked analytes. In the tables, matrix spikes have been paired with the corresponding matrix spike duplicates to make recovery comparisons. The average recoveries, and maximum and minimum recoveries for water samples (surface water and groundwater) and solid media (subsurface soil and sediment) are presented to measure trends for each particular method. The criteria used for interpreting MS/MSD data are taken from USEPA CLP analytical protocols (USEPA, 1988a; USEPA, 1989a) and the Fort Devens Project Operations Plan (ABB-ES, 1995).

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## D.3.1.1 Inorganics

Matrix spike analysis was completed for recoveries of PAL elements. USEPA CLP guidelines specify control limits of recovery for inorganic MS/MSD $75 \%$ to $125 \%$ (USEPA, 1988). The majority of PAL elements had recoveries within USEPA control limits. A subset of elements had recoveries outside these limits. Elements with at least one MS/MSD recovery outside USEPA CLP limits are presented in Table D-12.

Groundwater, 1995 Field Investigation. The following samples were spiked with target elements: one filtered and unfiltered groundwater sample from AOC 57; one unfiltered groundwater sample from AOC 69W; one filtered groundwater and two unfiltered groundwater samples from AOC 63AX. Elements with recoveries outside the USEPA CLP limits include mercury, arsenic, antimony, calcium, iron, and manganese.

For the elements arsenic, calcium, manganese, and iron, all matrix spike concentrations were low relative to concentrations already present in the sample. For example, the spike concentration for calcium was $10,000 \mu \mathrm{~g} / \mathrm{L}$ compared with sample concentration which was $52,800 \mu \mathrm{~g} / \mathrm{L}$. USEPA Region 1 data validation guidelines (USEPA, 1989b) specify spike concentrations be greater than four times the sample concentration for data qualification actions to reply. Since the spike concentration is insignificant relative to the sample concentration, an accurate matrix spike recovery cannot be measured. Based on these results, results for arsenic, calcium, and manganese in groundwater are not qualified in this RI.

Percent recoveries for mercury and antimony were slightly below the lower CLP control limit of $75 \%$ in a small subset of samples. Low recoveries for antimony and mercury were only observed in one or two of sixteen samples, respectively. Based on this data, mercury and antimony data for aqueous samples is not qualified.

Groundwater, Round 2. The following samples were spiked with target elements: one filtered and unfiltered groundwater sample from AOC $57,63 \mathrm{AX}$ and 69 W ; and one additional unfiltered groundwater sample from AOC 63AX. The majority of PAL elements had recoveries within USEPA control limits. A subset of elements had results outside these limits. Elements with recoveries outside the USEPA CLP limits include lead, selenium, arsenic, antimony and manganese.

Spike recoveries for arsenic in one out of fourteen samples were above the upper control limit of $125 \%$. The recovery in this sample was $135.7 \%$; however, the spiked sample duplicate recovery was acceptable (124.3\%). The low frequency of outlier recoveries for arsenic indicate there was minimal matrix related effects and no qualification of results was conducted.

For manganese, the matrix spike concentration was low relative to concentrations already present in the sample so matrix spike recovery cannot be measured.

Low spike recoveries were reported for lead and selenium in both the filtered and unfiltered sample and duplicate from AOC 57 (MXG302X2). These data suggest there may be some matrix interference in AOC 57 .groundwaters reported for lead and selenium. Lead and selenium were not detected in any samples. CRLs

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reported for these elements should be considered estimated and potentially biased low. Lead and selenium recoveries in the remaining ten samples evaluated were all acceptable.

The percent recoveries for antimony were low in several spiked samples. A total of six out of fourteen spiked samples had recoveries below the lower control limits. Outlier recoveries ranged from $39.5 \%$ in the sample and sample duplicate MXG302X2 and MDG302X2 to $74.9 \%$ in sample MXAX08A2. Antimony was not detected in any groundwater samples. Based on these data, antimony CRLs for aqueous samples are considered estimated and potentially biased low.

Surface Water. One surface water sample from AOC 57 (WX5705XX), including both filtered and unfiltered samples, was spiked with target elements. All elements had percent recoveries for MS/MSDs within the USEPA CLP limits with the exception of iron. The MS for iron in the filtered surface water sample had a recovery of $129 \%$; however, iron recovery for the filtered MSD was acceptable ( $118 \%$ ) and results are not qualified. Recoveries of iron in the unfiltered sample were acceptable. Overall, the inorganic spike data indicate that aqueous concentrations were not significantly influenced by matrix effects.

Soil. Five soil MS/MSD samples were analyzed for PAL inorganics; for lead analyses three matrix spike and matrix spike duplicate samples were analyzed by GFAA and two by ICP. The majority of PAL elements had recoveries within CLP limits. Elements for which at least one MS/MSD recovery was not within USEPA CLP limits are presented in Table D-13.

For the elements aluminum and iron, all matrix spike concentrations were low relative to concentrations already present in the sample. Since the spike concentrations were insignificant relative to sample concentrations, matrix spike recoveries were not assessed.

The elements mercury, selenium, lead (by GFAA), arsenic, manganese, and nickel in soil had MS/MSD recoveries above and below the USEPA CLP recovery range. The frequency at which the recovery was outside the USEPA CLP limits, and corresponding recovery ranges are shown in Table D-13.

For mercury, MS/MSD recoveries in soil sample EX571501 from AOC 57 were below the USEPA control limits; however, recoveries in the other eight spiked samples were within the control limits. Overall, mercury concentrations for soil samples are acceptable based on the MS/MSD recovery data, and qualification of the data was not conducted.

One selenium MS/MSD pair had recoveries just below the lower control limit, and two other pairs had recoveries above the upper control limit. Based on spike recovery data, positive detections of selenium in soil are considered estimated with no particular low or high bias.

The recovery of lead by GFAA ranged from $50 \%$ to $60 \%$ in two of the three MS/MSD pairs, slightly below the lower limit of $75 \%$. Recoveries in the third pair were $23.7 \%$ and $140.5 \%$. Recoveries of lead in the two pairs of MS/MSD analyzed by ICP were all acceptable. Results indicate lead results for soil analyzed by GFAA are estimated, and results may be biased low.

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Five out of ten spiked soil samples had arsenic recoveries above the USEPA control limit. One spiked soil sample (BXAX0206) was reported below the lower limit; however, the spike concentration in this sample was low relative to the concentration already present in the sample so recovery evaluations could not be made. The high recoveries of arsenic in $50 \%$ of the spiked soil samples indicate that there may be some matrix interference. Results for arsenic in soil samples should be considered estimated and potentially biased high.

Manganese recoveries were outside the control limit in seven out of the ten MS/MSD samples. However, with the exception of one sample (BX570319), all MS were low relative to the sample concentration making the comparison invalid. The recovery in the sample BX570319 (68.6\%) was just below the lower control limit of $75 \%$. Due to the low frequency of valid outlier recoveries of manganese, the soil matrix does not appear to have significantly impacted the data. Qualification of manganese data based on spike recoveries in soil was not conducted.

The recovery for nickel ( $128.3 \%$ ) in soil sample BXAX0206 was slightly above the upper control limit. All nine other MS/MSD recoveries ranged from $104 \%$ to $118 \%$. Based on theses results, recovery of nickel in soil does not appear to be impacted by the soil matrix. Qualification of nickel data for soil was not conducted.

Sediment. Two sediment MS/MSD samples were analyzed for PAL inorganics; for lead analyses one MS/MSD sample was analyzed by GFAA and one by ICP. The majority of PAL element recoveries were within CLP control limits.

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Elements for which at least one MS/MSD recovery was not within USEPA CLP limits are presented in Table D-14.

For the elements aluminum and iron, all matrix spike concentrations were low relative to concentrations already present in the sample. Since the spike concentration is insignificant relative to sample concentrations, an accurate matrix spike recovery was not evaluated.

The elements arsenic, antimony, and manganese in sediment samples had MS/MSD recoveries above and below the acceptable USEPA CLP recovery range. The frequency at which the recoveries were outside the USEPA CLP limits and the recovery ranges are shown in Table D-14.

The arsenic MS/MSD recoveries for one out of the two sediment samples were approximately $12 \%$, well below the USEPA control limits. The sample was DX2W0200 collected from AOC 69W. Due to the low MS recovery, positive results for arsenic in sediment samples from AOC 69W should be considered biased low, and non-detect results are unusable.

Percent recoveries for antimony in sediment samples were slightly above the upper USEPA control limit of $125 \%$ in two of the four samples. The recoveries in these samples were $126 \%$ and $126.7 \%$, indicating that matrix effects for sediment were minimal. All sediment results for antimony are considered acceptable based on the MS/MSD results for accuracy, and qualification of the data was not conducted.

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Manganese recoveries for MS/MSDs in sediment were acceptable in three of the four samples analyzed. The recovery in one MS for sample DXZW0200 from AOC 69 W was only $4 \%$, well below the USEPA control limit of $75 \%$. Due to the low MS recovery, positive results for manganese in sediment samples from AOC 69W should be considered biased low, and non-detect results should be considered unusable.

## D.3.1.2 Pesticides/PCBs

Pesticide and PCB compounds were spiked into groundwater, surface water, soil and sediment samples to evaluate matrix effects. Nine target pesticide and two PCB compounds were used for spiking including endosulfan I, endosulfan II, aldrin, dieldrin, endrin, heptachlor, isodrin, lindane, methoxychlor, 4,4'-DDT, aroclor 1016, and aroclor 1260. Percent recoveries for pesticides were compared to the USEPA CLP guidelines (USEPA, 1988) control limits. The USEPA CLP guidelines do not specify limits for spike recoveries of endosulfan I, endosulfan II, isodrin, methoxychlor, and PCBs. For these compounds, the surrogate recovery control limits of $30 \%$ to $150 \%$ specified in the USEPA CLP Guidelines (USEPA, OLM03.1 August 1994) were used as guidance in evaluating spike recoveries.

Groundwater, 1995 Site Investigation. Three groundwater samples, one from AOC 57, 63AX and 69W, were spiked with pesticides and PCBs. Recoveries were within USEPA limits for all spike compounds with the exception of aldrin in one of six spiked samples. A recovery of $121 \%$ was reported. This exceeds the upper control limit of $120 \%$. Due to the low frequency of recoveries out of limits no qualification of results is done.

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Groundwater, Round 2. Three groundwater samples, one from each of the AOCs $57,63 \mathrm{AX}$ and 69 W , were spiked with target pesticides. Two groundwater samples, one from AOC 63AX and one from AOC 69W were spiked for PCBs. The recoveries of all analytes were within USEPA limits.

Surface Water. One surface water sample from AOC 57 was spiked with target pesticides and PCBs. All spike recoveries were within the USEPA CLP control limits for aqueous samples. The aqueous MS/MSD recovery data for pesticides/PCBs indicate that there were no matrix effects and qualification of the data was not required.

Soil. Four MS/MSD soil sample pairs from AOC 57 were spiked with pesticide and PCB compounds. The majority of spike analytes were within recovery limits. Analytes for which at least one MS/MSD recovery was not within USEPA CLP limits are presented in Table D-15.

The recovery of endosulfan II in soil sample EX571502 exceeded the upper control limit in both the MS and MSD. However, recoveries of endosulfan II in the three other spiked sample pairs were within limits. Both MS and MSD spike recoveries for 4,4-DDT in sample EX571600 exceeded the upper control limits but recoveries in the remaining three soil samples were within control limits.

Spike recoveries for aroclor 1016 were acceptable; however, one of the spike recoveries for aroclor 1260 in sample EX571502, and both MS and MSD recoveries in sample EX571502 were above the upper control limit. The original

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analysis reported high aroclor 1260 concentrations relative to spike concentrations and no actions were taken for the high recoveries.

High recoveries of endosulfan II, 4,4-DDT, and Aroclor-1260 in soil indicate some matrix interference. There were no detects of endosulfan II in AOC 57 samples. Positive results for 4,4-DDT in soil samples collected at AOC 57 should be considered estimated and potentially biased high.

Sediment. Two sediment samples, one from AOC 57 and one from AOC 69W, were spike with target pesticides and PCBs. The percent recoveries of the spiked samples were compared to the USEPA CLP control limits and all recoveries were within the criteria range with the exception of 4,4-DDT. One out of the four reported recoveries for 4,4-DDT (166.7\%) exceeded the upper control limit of $134 \%$. Based on the low frequency of exceedances for recovery of 4,4-DDT qualification of sediment data was not conducted.

## D.3.1.3 USEPA Methods

Matrix Spike recoveries for USEPA methods water quality parameters were evaluated for groundwater and surface water. The matrix recoveries for soil and sediment were also evaluated for TOC, TPH as gasoline and diesel, and TPHC.

For water quality parameters of hardness, alkalinity, nitrate and nitrite-nitrogen, kjeldahl-nitrogen, sulfate, and total phosphate, the USEPA CLP control limits for inorganic matrix spikes ( $75 \%-125 \%$ recovery) were used for guidance.
Professional judgement was used when evaluating the organic parameters TOC

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and TPHC. The MS/MSD recoveries for these parameters were evaluated on a sample by sample basis and are discussed below.

Groundwater, 1995 Field Investigation. Five groundwater samples were spiked for hardness including three groundwater samples from AOC 57, one from AOC 63 AX , and one from AOC 69W. Hardness data for which at least one MS/MSD recovery was not within USEPA CLP limits are presented in Table D-16.

Four out of eight spike recoveries for hardness were well below the lower control limit of $75 \%$. The outlier recoveries were found in the samples MXAX02X1 and MXZW01X3 from AOCs 69 W and 63AX, respectively, and one of the two samples (MX5701X1) from AOC 57. Based on these results, there appears to be either significant matrix interference or other analytical performance issues resulting in low spike recoveries. With the exception of groundwater sample MXG302X1 in which acceptable hardness recoveries were reported, all hardness results for groundwater samples should be considered invalid.

For alkalinity three groundwater samples from AOC 57 and one groundwater sample from AOC 69 W were spiked for matrix evaluation. All spiked sample recovery results for alkalinity are within control limits. According to the data downloaded from IRDMIS, percent recoveries for alkalinity reported for Lot PJOW exceed the control limits. However, the high recoveries are believed to be erroneous due to a unit conversion error for two spiked samples in Lot PJOW. Corrective action for this discrepancy is currently ongoing.

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Spike sample recoveries for all other water quality parameters were within the established control limits indicating no matrix effects.

Groundwater, Round 2. Five groundwater samples were spiked for hardness including two groundwater samples from AOC 57, one from AOC 63AX and AOC 69W. Two sets MS/MSDs were analyzed for the sample from AOC 63AX. Hardness data for which at least one MS/MSD recovery was not within USEPA CLP limits are presented in Table D-16.

Two spike recoveries for hardness were well below the lower control limit of $75 \%$. The outlier recoveries were found in the sample MXAX03X2 from AOC 63AX. However, an additional spike and spike duplicate analysis for this sample was performed and results were within the control limits. Based on these results, there does not appear to be any significant matrix effects impacting the hardness data. All hardness results for groundwater samples remained unqualified.

For alkalinity, two groundwater samples from AOC 57 and one groundwater sample from AOC-69W were spiked for matrix evaluation. All recovery results for alkalinity are within the established guidelines.

Spike sample recoveries for all other water quality parameters were within the established control limits indicating no matrix effects. Spike recovery control limits for TPHC are not available; however, spike recoveries ranged from $89 \%$ to $97.9 \%$ and are considered acceptable.

Surface Water. One surface water sample from AOC 57 (WX5705XX) was spiked to evaluate matrix effects on the measurement of water quality parameters

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listed above. All results were within the established control limits indicating no matrix interference.

Soil. Two MS/MSD soil sample pairs from AOC 57 were spiked and analyzed for matrix effects on concentrations of TPH as diesel and gasoline by Modified USEPA Method 8015. The recovery range for these samples was $74.9 \%$ to $112.4 \%$. Based on these results, there does not appear to be any adverse effects on the TPHC data analyzed by USEPA Method 8015.

A total of seven spiked sample pairs were analyzed for matrix effects on TPH by USEPA Method $9071 / 418.1$. These samples included three soil samples from AOC 57, three from AOC 63AX, and one from AOC 69W. The majority of samples had percent recovery ranging from $71.0 \%$ to $128.6 \%$. The spike recoveries outside this range included one sample from AOC 57 (EX571502) which exhibiting relatively low recoveries of $29.2 \%$ and $43.7 \%$ in the MS and MSD, and one sample from AOC 63AX (AXE9503X) in which the MS had a relatively low recovery of $52.6 \%$. In general, spike recoveries for TPH by USEPA Method 9071 in all other soil samples indicated acceptable method performance. Low recoveries in samples EX571502 and AXE9503X may be attributed to sample homogeneity in the unspiked samples and are not likely an indication of poor method performance. Based on the spike recoveries for TPHC, qualification of the data was not conducted.

Four soil samples were spiked for TOC analysis, including two from AOC 57, and two from AOC 69W. The recovery of these spiked samples ranged from $77.5 \%$ to

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$132.3 \%$. Based on these results, there appears to be no matrix related effects on TOC concentrations in soil.

Sediment. Two pairs of sediment MS/MSD samples, one from AOC 57 and one from AOC 69 W , were analyzed for matrix effects on petroleum hydrocarbon concentrations. Recoveries ranged from $88.9 \%$ to $171.9 \%$ for TPH as diesel, and $84.2 \%$ to $162.3 \%$ for TPH as gasoline, indicating good method performance.

The spike recoveries of TPHC for USEPA Method 9071 were $4.3 \%$ and $51.4 \%$ in the MS and MSD in sample DX570500 from AOC 57. These spike recoveries are low in comparison the spike recoveries observed for the second sediment sample (DXZW0200) which were approximately $117 \%$ in the MS and MSD. Low spike recoveries in sediment sample DX570500 may be attributed to sample heterogeneity or from matrix interference. All positive sediment sample results for TPHC for AOC 57 sediments should be considered estimated and biased low, and all non-detect results should be considered invalid.

Matrix spike and MSDs were analyzed for two sediment samples from AOC 57 to evaluate matrix effects on TOC concentrations. The percent recoveries in sample DX570500 ranged from $83.9 \%$ to $125.0 \%$ indicating good accuracy within the matrix. Spike recoveries for the second sediment sample from AOC 57 (DX570900) were only $0.9 \%$ and $54.0 \%$. This sample had a high TOC concentration in the original sample which likely contributed to the low recoveries. No qualification of results was conducted.

## D.3.2 SURROGATE RECOVERIES

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In addition to matrix spikes, the recovery of surrogate standards were also used to assess matrix effects and accuracy of the analytical data. Surrogate standards were used for VOC and SVOC analyses and were added to all soil, sediment, surface water and groundwater samples prior to analysis.

## D.3.2.1 SVOC

The SVOC surrogate standards used to evaluate matrix effects and analytical accuracy included 2 -fluorophenol, phenol-D6, 2,4,6-tribromophenol, nitrobenzeneD5, 2-fluorobiphenyl, and terphenyl-D14. Recovery criteria for these surrogates, are taken from analytical USEPA CLP protocols (USEPA, 1988a) and the Fort Devens Project Operations Plan (ABB-ES, 1995) and are presented in Table D-17.

Interpretations on data usability were based on guidance outlined in the USEPA Region I Functional Guidelines for Data Validation (USEPA, 1988). According to this guidance SVOA sample results are qualified based on independent evaluations of surrogate recoveries for acid fraction compounds and base-neutral compounds. Each fraction has three surrogates. The acid fraction surrogates include 2-flourophenol, phenol-D6, and 2,4,6-tribromophenol. The base-neutral surrogate standards include nitrobenzene-D5, 2-flourobiphenyl, and terphenylD14. SVOA positive results are qualified as estimated if two or more surrogates in either the acid or base-neutral fraction are outside the recovery limits. Positive results are qualified as estimated and negative (non-detect) results are qualified as unusable (rejected) if any surrogate is less than ten percent recovery for the associated fraction.

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All SVOA samples were evaluated using the criteria outlined above. Sample results were identified as usable, estimated, or rejected based on the USEPA Region I Guidelines. Data bias was identified if trends in surrogate recoveries for individual samples indicated low or high bias.

Groundwater, 1995 Field Investigation. All SVOC results for groundwater samples meet USEPA surrogate standard recovery guidelines.

Groundwater, Round 2. All surrogate standard recovery data is within USEPA guidelines. Based on surrogate standard recoveries, qualification of sample data was not conducted.

Surface Water. Surface water samples with two or more surrogate standards from acid fraction with recoveries outside the acceptable QC limits included samples from AOC 57 sample (WX5704XX, WX5705XX ,WX5706XX, WX5710XX). Surrogate recoveries above the control limits for 2-fluorophenol and phenol-D6 were observed for these samples. No acid fraction compounds were detected in any of the surface water samples and no qualification of results was conducted.

Soil. Soil samples with two or more surrogate standards from the acid fraction with recoveries outside the acceptable QC limits included AOC 57 samples EX570405 and BX570200. High outlier recoveries for 2-fluorophenol and phenolD6 were reported for these samples. Soil sample EX572404 had two surrogate standards in the base-neutral fraction (2-fluorobiphenyl and nitrobenzene-D5) with high recoveries. No acid fraction compounds were detected in these samples and no qualification of results was conducted. No base neutral fractions

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compounds were reported in these two samples, and no qualification of results was conducted.

All soil samples spiked with SVOC surrogate standards had recoveries above the $10 \%$ minimum recovery criteria with the exception of 2,4,6-tribromophenol in sample EX571602. All non-detect results in the acid fraction of this sample are rejected and considered unusable.

Sediment. All sediment samples had recoveries of surrogate standards within the USEPA CLP limits. All SVOC surrogate results for sediment samples are within guidelines.

## D.3.2.2 VOCs

Surrogate standards used for volatile organics include 1,2-dichloroethane-D4, 4bromoflourobenzene, and toluene-D8. The criteria used for interpreting surrogate data are taken from analytical USEPA CLP protocols (USEPA, 1988a) and the Fort Devens Project Operations Plan (ABB-ES, 1995) and are presented on Table D-18. Interpretations on data usability were based on guidance outlined in the USEPA Region I Functional Guidelines for Data Validation (USEPA, 1988). According to the guidelines, positive results and quantitation limits are considered estimated values if one or more surrogate standard per sample is outside the recovery limits. If any surrogate standard is recovered at less than ten percent, positive results are considered estimated values and non-detect results are rejected and considered unusable.

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All VOC samples were evaluated using the criteria outlined above. Sample results were identified as usable, estimated, or rejected based on the USEPA Region I Guidelines. Data bias was identified if trends in surrogate recoveries for individual samples indicated low or high bias.

Groundwater, 1995 Field Investigation. The surrogate recoveries for groundwater samples at AOCs 57, 69W and 63AX were evaluated for matrix effects and accuracy of the analytical data. All samples had recoveries within CLP ranges with the exception of those discussed below.

Five groundwater samples from AOC 57 (MX5702X1, MX5703X1, MX5705X1, MX5706X1, MDG307X1), one sample from AOC 69W (MXZW12X3), and three samples from AOC 63AX (MXAX03X1, MXAX07X1, MXAX08X1) had surrogate recoveries for 1,2-dichlorobenzene-D4 above the CLP criteria. Positive results for VOCs in these samples should be considered estimated, and possibly biased high; however, no positive detections were reported in samples MX5702X1, MX5705X1, MX5706K1, MD6307X1, and MX1X08X1. Sample MXAX03X1 had only chloroform reported, which was likely a contaminant (see Section 2). Positive results for ethylbenzene, tetrachloroethene, toluene, xylenes, and chloromethane reported in MX5703X1, MXZW12X3, and MXAX07X1 are considered estimated and potentially biased high.

Groundwater samples, MXAX08B1 and MXAX09X1 from AOC 63AX, had surrogate recoveries for toluene-D8 and 4-bromoflourobenzene below the lower control limits for these standards. Based on these results, positive results and CRLs reported for volatile organics, these samples should be considered estimated, and biased low values.

Groundwater, Round 2. The surrogate recoveries for groundwater samples at AOCs 57, 69 W and 63AX were evaluated for matrix effects and accuracy of the analytical data. All samples had recoveries within CLP ranges with the exception of those discussed below.

Four groundwater samples from AOC 63AX (MXAX02X2, MXAX03X2, MXAX04X2, and MXAX08B2) and six samples from AOC 69W (MXZW10X4, MXZW11X4, MXZW14X4, MXZW15X2, MXZW18X2, and MDZW11X4) had surrogate recoveries for 1,2-dichlorobenzene-D4 above the CLP criteria. Positive results for VOCs in these samples should be considered estimated, and biased high; however, no positive detections, or only low concentrations of toluene ( $<1.2 \mu \mathrm{~g} / \mathrm{L}$ ) were reported in all samples with the exception of MXZW10X4. The concentration of ethyl benzene reported in MXZW10X4 is estimated and potentially biased high.

Surrogate recoveries for toluene-D8 and 4-bromoflourobenzene ranged from $86 \%$ to $106 \%$, and $88 \%$ to $100 \%$, respectively. All recoveries were within the control limits.

Surface Water. The recovery of surrogate standard 1,2-Dichloroethane-D4 in surface water samples WX5704XX and WX5705XX from AOC 57 exceed the upper control limit. No VOCs were reported in WX5704XX. Positive results reported for 1,2-dichloroethene, tetrachloroethene, and trichloroethene in surface water sample WX5705XX are considered estimated and potentially biased high. The recoveries for all other surrogate standards in surface water samples were within the established guidelines.

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Soil. The recoveries of surrogate standards toluene-D8 and 4bromoflourobenzene in soil sample BXZW0107 from AOC 69W exceeded the upper control limit. Positive concentrations of ethylbenzene and xylenes in this sample are estimated and possibly biased high. The surrogate recovery for toluene-D8 in one sediment sample from AOC 69W (RXZW3006) also exceeded the upper control limit. Positive results for toluene, xylene, and styrene should be considered estimated, and potentially biased high. All other VOC surrogate standard recoveries for soil samples were acceptable.

Sediment. Several surrogate recoveries reported for sediment samples from AOC 57 were above the upper control limits. These sediment samples include DX570500, DX570502, DX570600, DX570800, DX570900, and DX571000. Only acetone and low concentrations of toluene ( $<0.01 \mu \mathrm{~g} / \mathrm{g}$ ) were reported in these samples. Because acetone represents possible laboratory contamination, and concentrations of toluene were so low, no qualification of these results was conducted. All other VOC surrogate standard recoveries for sediment samples were acceptable.

VOC surrogate recovery data indicate some matrix related effects. As indicated some sample results should be considered estimated with potential high and low bias, but overall the accuracy of the GC/MS method used for VOC analyses was acceptable.

## D.4.0 PRECISION

Precision is a measure of the reproducibility of the analytical resalts under a given set of conditions. It is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is measured as the relative percent difference (RPD) between a sample and its duplicate, as is calculated for field duplicate samples, and matrix spike/matrix spike duplicate samples. The following equation is used to calculate the RPD.

$$
R P D=100 \times \frac{D_{1}-D_{2-}}{0.5\left(D_{1}+D_{2}\right)} 1
$$

$D_{1}$ and $D_{2}$ are the reported concentrations for sample duplicate analyses.

When measuring precision for organic analyses, the RPDs of the field duplicates are compared to established review criteria. The RPDs for field duplicates are compared to the acceptance criteria of $50 \%$ RPD for soil matrices and $30 \%$ RPD for water matrices (USEPA, 1988b). The criteria for RPDs for organic compounds in field duplicates did not apply in cases where: 1.) the results are non-detect and; 2.) the compounds detected are common lab contaminants. In cases where one organic result is non-detect, the CRL value was used to calculate the RPD. The acceptance criteria for inorganic analysis for field duplicate samples only applies to analytes that are greater than 5 times the CRL (USEPA, 1989b).

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Precision is also evaluated by comparison of MS and MSD results. The USEPA CLP control limits were used to evaluate duplicate precision between MS and MSDs. In cases where USEPA CLP control limits for spikes are not available, such for inorganics and various USEPA analytical methods, the control limits for field duplicates listed above were used as guidance.

A discussion of the RPDs for field duplicates is presented below in Section 4.1, and the RPDs for MS/MSDs are presented in Section 4.2.

## D.4.1 OFF-Site Laboratory Field Duplicate Results

Duplicate samples from AOCS 57, 63AX, and 69W at Fort Devens were collected to measure the sampling and analytical precision for analyses performed at the off-site laboratory. The duplicate samples were analyzed for the following Fort Devens PAL analytes: inorganics; VOCs; SVOCs; pesticide and PCBs. Aqueous field duplicate samples were also analyzed for various water quality parameters including hardness, alkalinity, sulfate, phosphate and nitrogen. Soil and sediment field duplicate samples were also analyzed for TOC and TPHC.

All field duplicate data collected during the Fort Devens Site Investigations are shown in Table D-19 and Table D-20. The RPD has been calculated for each pair of field duplicates collected during the 1995 Fort Devens Site Investigation, and the Round 2 Groundwater sampling event.

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## D.4.1.1 Inorganics

'An analysis of the precision of the inorganic duplicate data was completed for each PAL element.

Groundwater, 1995 Field Investigation. The concentrations of inorganics in three groundwater samples and corresponding field duplicates were used to evaluate sampling and analytical precision for elements. One sample duplicate from each of the three AOCs (57, 63AX, and 69W) were collected. The RPDs of all inorganic groundwater concentrations for duplicates were below the USEPA Region I limits with the exception of iron. However, outlier RPDs for iron were only observed in one out of three sample duplicate pairs. Groundwater sample results for elements were not qualified based on duplicate results.

Groundwater, Round 2. The concentrations of inorganics in four filtered and unfiltered groundwater samples duplicate pairs were used to evaluate precision for elements. One sample duplicate pair from each of the three AOCs (57, 63AX, and 69 W ) and one additional sample duplicate pair from AOC 57 were collected. Elements for which at least one outlier RPD was observed are shown in the Table D-21. Outlier RPDs were observed for arsenic, iron, and barium ; however, the frequency at which an outlier RPD was observed was low. Groundwater data for these elements were not qualified based on duplicate precision results.

Surface Water. One surface water sample and duplicate were collected and evaluated for precision. The RPDs of all inorganic concentrations were within the

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USEPA Region I limits. Surface water sample results for inorganics were not qualified.

Soil. One sample duplicate pair from each of the three AOCs (57, 63AX, and 69W) were collected. Elements for which at least one outlier RPD was observed are shown in the Table D-22. Outlier RPDs were observed for arsenic and potassium; however, the frequency at which an outlier RPD was observed was low. Soil sample data for these elements were not qualified based on duplicate precision results.

Sediment. Two sediment sample duplicate pairs, one from AOC 57 and one from AOC 69 W were collected and evaluated for precision. Elements for which the RPD was greater than the control limit $50 \%$ are shown in Table D-22. All outlier values were associated with sediment sample DX570300 from AOC 57. Based on the variability of results in this sediment sample, concentrations of mercury, manganese, sodium, and zinc in sediment samples from AOC 57 should be considered estimated.

## D.4.1.2 VOCs

Duplicate VOC sample results were evaluated to assess the sampling and analytical precision.

Groundwater, 1995 Field Investigation. Three groundwater sample duplicate pairs, one from each AOC, were collected. The majority of target compounds were non-detects in both analyses. Compound RPDs were within the USEPA Region I guidelines with the exception of ethylbenzene. Ethylbenzene was

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detected in sample MDZX12X3 from AOC 69 W at $6 \mu \mathrm{~g} / \mathrm{L}$; the corresponding sample duplicate MXZW12X3 was non-detect with a reporting limit of less than $\quad 0.5 \mu \mathrm{~g} / \mathrm{L}$. The resulting RPD was $169.2 \%$. High RPDs are commonly reported for samples with results at or near the reporting limits as in sample MXZW12X3. In general, the duplicate data indicate that there was good precision of the aqueous VOC concentrations, and qualification of the data was not conducted.

Groundwater, Round 2. Three groundwater sample duplicate pairs, one from each AOC, and one additional duplicate pair from AOC 57 were collected. The majority of target compounds were non-detects in both analyses. Compound RPDs were within the USEPA Region I guidelines with the exception of toluene. Toluene was detected in sample MX5701X2 from AOC 57 at $1.2 \mu \mathrm{~g} / \mathrm{L}$; the corresponding sample duplicate MD5701X2 was non-detect with a reporting limit of less than $0.5 \mu \mathrm{~g} / \mathrm{L}$. The resulting RPD was $82.4 \%$. High RPDs are commonly reported for samples with results at or near the reporting limits. In general, the field duplicate data indicate that there was good precision of the aqueous VOC concentrations and qualification of the data was not conducted.

Surface Water. The concentrations of one duplicate pair of surface water samples from AOC 57, WX5703XX, were assessed for precision. All surface water sample duplicate results were reported as non-detect indicating good precision for surface water VOC data.

Soil. One sample duplicate from AOCs 57, 63AX, and 69 W was collected. The majority of target compounds were non-detects in both analyses. .The RPDs for all duplicate groundwater results were below the USEPA Region I limits with the

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exception of toluene. The RPD for toluene in soil sample BXZW0100 from AOC 69 W was $127.1 \%$. Toluene results for sample BXZW0100 are considered estimated values. However, the frequency at which an outlier RPD was observed for toluene was only one out of three. Qualification of other sample results was not conducted based on duplicate results.

Sediment. Two sediment sample duplicate pairs, one from AOC 57 and one from AOC 69 W , were collected. All VOC results for sediment samples and sample duplicates were reported as non-detect. VOC results in sediment samples were not qualified based on duplicate results.

## D.4.1.3 SVOCs

Duplicate SVOC sample results were evaluated to assess sampling and analytical precision.

Groundwater. 1995 Field Investigation. Duplicates for one water sample from each AOC were collected. With the exception of phthalate esters, there were no target SVOCs detected in groundwater sample duplicate pairs indicating good agreement between results.

Groundwater, Round 2. Three groundwater sample duplicate pairs, one from each AOC, and one additional duplicate pair from AOC 57 were collected. The majority of target SVOCs were non-detects in both analyses. The RPDs of duplicate results were within the USEPA Region I guidelines with the exception of $1,3,5$ - trimethylbenzene. This compound was detected in sample MX5703X2 from AOC 57 at $30 \mu \mathrm{~g} / \mathrm{L}$, and the corresponding sample duplicate MD5703X2 at

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$20 \mu \mathrm{~g} / \mathrm{L}$. Results of $1,3,5$-trimethylbenzene in sample MX5703X2 is considered estimated. In general, the field duplicate data indicate that there was good precision of the aqueous SVOC concentrations and additional qualification of the data was not conducted.

Surface Water. One surface water sample from AOC 57 was collected. There were no target SVOCs detected in either sample indicating good agreement between the results.

Soil. Three duplicate soil samples, one from each AOC, were analyzed. The majority of target SVOCs were non-detect in both analyses. All RPDs were within USEPA limits.

Sediment. Two sediment samples, one from AOC 57 and one from AOC 69W, were analyzed in duplicate. For most target SVOCs concentrations were nondetect in both the sample and sample duplicate, and resulting in acceptable agreement between results. Target SVOCs detected include pyrene and fluoranthene. The sample duplicate RPDs for fluoranthene in sample DXZW0100 and pyrene in sample DXZW0100 were $66.7 \%$, exceeding the precision control limit of $50 \%$. Based on these results, concentrations of PAHs reported in sediment samples should be considered estimated values.

## D.4.1.4 USEPA Methods

An analysis of duplicate results for a variety of water quality parameters obtained using standard USEPA methods was also conducted. Soil and sediment samples

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were also analyzed for TOC and TPHC. A discussion of precision between sample duplicates analyzed for these parameters is presented below.

Groundwater, 1995 Field Investigation. Three groundwater samples, representing one sample from each AOC, were collected. Hardness concentrations for groundwater sample MXAX03X1 and the sample duplicate MXAX03X1 from AOC 63AX were reported as $18,000 \mu \mathrm{~g} / \mathrm{L}$ and non-detect (less than $1000 \mu \mathrm{~g} / \mathrm{L}$ ). The RPD was $178.9 \%$, exceeding the control limit of $30 \%$. However the RPDs for the other two groundwater duplicate pairs ranged from $0 \%$ to $5.7 \%$ indicating excellent precision.

Additional parameters evaluated for precision in groundwater include alkalinity, sulfate, total phosphate, nitrate and nitrite-nitrogen, and nitrogen by the kjeldahl method. With the exception of nitrate and nitrite-nitrogen data, all results had RPDs within control limits. The RPD for nitrate and nitrite nitrogen in groundwater sample MXAX03X1 from AOC 63AX was $85.5 \%$. However the RPDs for the other two groundwater duplicate pairs ranged from $9.2 \%$ to $26.1 \%$, indicating acceptable precision. Based on these results, nitrate/nitrite concentrations from AOC 63AX groundwaters are considered estimated.

Overall, precision between groundwater samples for water quality parameters is considered acceptable, and additional qualification of the data was not conducted.

Groundwater, Round 2. Three groundwater duplicate samples, representing one sample from each AOC, and one additional sample from AOC 57 were collected. Hardness concentrations for groundwater sample MXAX04X2 and the sample duplicate MDAX04X2 from AOC 63AX were reported as $264,000 \mu \mathrm{~g} / \mathrm{L}$ and

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$6,800 \mu \mathrm{~g} / \mathrm{L}$. The RPD was $190 \%$, well above the RPD goal of $30 \%$. Based on these results, hardness results for AOC 63AX are considered estimated. The RPDs for the three groundwater duplicate pairs ranged from $5.8 \%$ to $7.8 \%$ indicating excellent precision.

Additional parameters evaluated for precision in groundwater include alkalinity, sulfate, total phosphate, nitrate and nitrite-nitrogen, and nitrogen by the kjeldahl method. With the exception of nitrate and nitrite-nitrogen data, and total phosphate data all results had RPDs within control limits.

The RPD for nitrate and nitrite-nitrogen in sample MXAX04X2 and sample duplicate MDAX04X2 from AOC 63AX was $38.7 \%$. The RPD in the sample duplicate pair MXZW11X4 and MDZW11X4 from AOC 69W was 198\%, also exceeding the control limit. Based on these results nitrate/nitrite results are considered estimated values. However, the RPDs for the other two groundwater duplicate pairs ranged from $3.8 \%$ to $8.7 \%$, indicating acceptable precision.

For total phosphate, two of the four sample duplicate pairs had outlier RPDs. The RPDs were $48.9 \%$ for sample duplicate pair MX5703X2 and MD5703X2 from AOC 57, and $52.2 \%$ for sample duplicate pair MXZW11X4 and MDZW11X4 from AOC 69W. Based on these results, phosphate results from AOC 57 and 69 W are considered estimated values. The remaining two field duplicates analyzed for total phosphate had RPDs of $0 \%$ and $2.2 \%$ indicating acceptable precision.

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Surface water. One surface water field duplicate sample from AOC 57, WX5703XX, was collected. Precision criteria for sulfate and alkalinity in this surface water sample were acceptable. The control limit of $30 \%$ RPD was exceeded for hardness, total phosphate, and nitrogen by the kjeldahl method.

The results for kjeldahl nitrogen for the sample and duplicate were $1430 \mu \mathrm{~g} / \mathrm{L}$ and $229 \mu \mathrm{~g} / \mathrm{L}$. The RPD for these results was $144.8 \%$. The results for total phosphate ranged from $24.8 \mu \mathrm{~g} / \mathrm{L}$ and $118 \mu \mathrm{~g} / \mathrm{L}$ between the sample and sample duplicate, with an RPD of $130.5 \%$. The RPD for hardness was $32.5 \%$. Positive results in surface water samples for nitrogen determined by the kjeldahl method, hardness, and total phosphate should be considered estimated.

Soil. One soil field duplicate sample from AOC 63AX (BXAX0410) was collected and analyzed for TOC. Three soil duplicate samples including BXAX0215 from AOC 63AX, sample BXZW0100 from AOC 69W, and sample EX570405 from AOC 57 were collected for TPHC (USEPA Method 9071/418.1). All RPDs for these parameters were within RPD goals demonstrating consistency for the method and matrix.

Sediment. Two sediment sample duplicate pairs, DXZW0100 and DDZW0100 from AOC 69W, and DX570300 and DD570300 from AOC 57, were evaluated for precision of TOC and TPHC data.

The TOC results for the sediment sample and duplicate from AOC 69 W were $12,400 \mu \mathrm{~g} / \mathrm{g}$ and $7,420 \mu \mathrm{~g} / \mathrm{g}$. The RPD of these results is $50.5 \%$, slightly above the $50 \%$ RPD limit. The TPHC results (USEPA method 9071/418.1) for this sample duplicate pair were $896 \mu \mathrm{~g} / \mathrm{g}$ and $360 \mu \mathrm{~g} / \mathrm{g}$, with an RPD of $85.4 \%$. Based

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on these duplicate results, TPH results for all AOC 69 W sediments should be considered estimated values. The RPDs for TOC and TPHC in the sediment sample from AOC 57 were within RPD goals and results for AOC 57 sediments were not qualified.

## D.4.2 Off-Site Laboratory Spike Duplicate results

All matrix spike duplicate data and the corresponding RPDs for the 1995 Fort Devens Site Investigation and Round 2 Groundwater sampling event are presented in Table D-10 and Table D-11. The RPDs for spike duplicates were calculated for TPH, TOC, inorganics, and pesticide/PCBs and compared to the USEPA CLP control limits (USEPA, 1988a) to determine precision of analysis. Samples with RPDs for spike samples outside control limits are discussed below.

## D.4.2.1 Inorganics

Elements were spiked into groundwater, surface water, soil and sediment samples to evaluate precision. The USEPA CLP guidelines do not specify limits for spike RPDs for elements. As a result, the RPD limits for laboratory duplicates of $25 \%$ in water samples and $35 \%$ in soil samples specified in the USEPA Region I Guidelines (USEPA, 1989b) were used as guidance.

Groundwater, 1995 Field Investigation. Two groundwater samples from AOC 57, MX5701X1 and MX5705X1, and one groundwater sample from AOC 69W MXZW10X3 were evaluated for precision based on spiked samples. Both filtered

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and unfiltered samples were included in this evaluation. The percent recoveries of iron for spike duplicates in sample MXZW10X3 were $105.0 \%$ and $55.5 \%$, with and RPD of $62 \%$. Iron results for groundwater from AOC 69 W are considered estimated. The RPDs for all other elements in spiked groundwater samples were within EPA limits.

Groundwater. Round 2. Three groundwater MS/MSD samples, one from each AOC, and one additional sample for AOC 69W were evaluated for precision based on spiked samples. Both filtered and unfiltered samples were included in this evaluation. The RPDs for all elements in spiked groundwater samples were acceptable indicating excellent method performance.

Surface water. Filtered and unfiltered fractions of surface water sample WX5705XX from AOC 57 were assessed for spike duplicate precision. The RPDs for all elements were within USEPA limits.

## D.4.2.2 Pesticides/PCBs

Pesticide and PCB compounds were spiked in duplicate into groundwater, surface water, soil and sediment samples to evaluate precision. Nine target pesticide and two PCB compounds were used including endosulfan I, endosulfan II, aldrin, dieldrin, endrin, heptachlor, isodrin, lindane, methoxychlor, 4,4'-DDT, aroclor 1016, and aroclor 1260. The USEPA CLP control limits for pesticide compounds used in the CLP methods are shown in Table D-23. The USEPA CLP guidelines do not specify limits for spike RPDs for endosulfan I, endosulfan II, isodrin, and PCBs. For these compounds, the RPD control limits for field duplicates of $30 \%$
in water samples and $50 \%$ in soil samples specified in the Region 1 USEPA guidelines (USEPA, 1988b) were used.

Groundwater, 1995 Field Investigation. Three groundwater samples, MX5701X1, MXAX02X1, and MXZW10X3, from AOC 57, 63AX and 69W, respectively, were spiked with target pesticides and PCBs. For the CLP spike compounds only aldrin and lindane in the groundwater sample from AOC 69 W exceeded the USEPA control limits. The RPD for lindane was $15.3 \%$ and aldrin was $32.5 \%$. All other pesticides and PCBs had spike RPDs less than $30 \%$ with the exception of methoxychlor in sample MXZW10X3 from AOC 69W. The RPD for methoxychlor ( $34.3 \%$ ) was only slightly above the USEPA duplicate RPD limit. These compounds were not detected in any groundwater samples and no qualification of results was conducted.

Groundwater, Round 2. Three groundwater samples, MXG302X2, MXAX03X2, and MXZW12X4, from AOC 57, 63AX and 69W, respectively, were spiked with target pesticides and PCBs. The RPDs for spiked PCBs in all three groundwater sample were within USEPA duplicate limits. For pesticides, eight out of the ten spiked compounds had RPD exceedances in groundwater samples from AOC 57 and 69 W . Based on frequency of RPD exceedances for pesticides in samples MXG302X2 and MXZW12X4, positive results reported in samples from AOCs 57 and 69 W should be considered estimated. The only positive detections were low concentrations of endosulfan II in sample EX5706X1 and heptachlor epoxide and gamma-chlordane in MXZW10X4. These concentrations are considered estimated. The RPDs for pesticides in sample MXAX03X2 from AOC 63W

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ranged from $2.2 \%$ to $5.8 \%$ indicating excellent precision for this sample. Qualification of the data from AOC 63 AX was not conducted.

Surface water. One surface water spiked sample, WX5705XX, from AOC 57 was evaluated for precision. All RPDs for this sample were within RPD limits indicating good method performance and sampling precision.

Soil. The RPDs of four spiked soil samples from AOC 57 (EX570506, EX571502, EX572500, BX570319) were used to evaluate precision. The RPDs for these samples were within RPD limits indicating acceptable method performance and sampling precision.

Sediment. The RPDs from two spiked sediment samples were used to evaluate precision. These samples include DX570500 from AOC 57 and DXZW0200 from AOC 69W. The RPDs for all pesticide and PCBs were within RPD limits with the exception of aroclor 1260 . The RPD for aroclor 1260 was $50.8 \%$, which is only slightly above the control duplicate control limit of $50 \%$. Overall, pesticide and PCB results for precision in sediment are acceptable and qualification of the data was not conducted.

## D.4.2.3 USEPA Methods

Precision for spiked samples was also evaluated for various water quality parameters including hardness, alkalinity, total phosphate, sulfate, nitrate and nitrite-nitrogen, and kjeldahl-nitrogen in water samples, and TPH and TOC in soil and sediment samples. USEPA CLP guidelines for evaluating spike duplicate RPDs are not available. The USEPA Region I control limits for field duplicates
$30 \%$ in water and $50 \%$ in soil were used to compare RPDs between spiked samples.

Groundwater, 1995 Field Investigation. Several groundwater samples were spiked in duplicate for the water quality parameters listed above to evaluate precision. All RPDs between the MS and MSDs were less than the $30 \%$ control limit indicating excellent method performance. The RPDs for hardness for both the filtered and unfiltered fraction in sample MXAX03X2 were reported as $139.2 \%$ However, evaluation of the raw data indicated the calculation of RPDs was erroneous, and the actual RPDs ranged from $1 \%$ to $29.9 \%$. Based on the MS/MSD results, qualification of water quality data is not required.

Groundwater, Round 2. Several groundwater samples were spiked in duplicate for the water quality parameters listed above to evaluate precision. All RPDs between the MS and MSDs were less than the $30 \%$ control limit with the exception of hardness in sample MXAX03X2 from AOC 63AX. The spiked sample concentrations for hardness in this sample and the sample duplicate were $4000 \mu \mathrm{~g} / \mathrm{L}$ and $1000 \mu \mathrm{~g} / \mathrm{L}$, with an RPD of $120 \%$. Based on these results hardness in samples from AOC 63AX are considered estimated values. The RPDs for hardness in the three other groundwater samples ranged from $0 \%$ to $2.4 \%$ indicating excellent method performance. The frequency of outlier RPDs. for hardness was low so qualification of the data was not required.

Surface water. Two surface water samples from AOC 57 including WX5703XX, and WX5705XX were spiked in duplicate for the water quality parameters listed

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above to evaluate precision. All RPDs between the MS and MSDs were less than the $30 \%$ control limit indicating acceptable method performance.

Soil. Soil samples from AOC 57 (EX570506, EX571502) were spiked in duplicate for TOC and TPHC (USEPA Modified Method 8015) to evaluate precision. Samples BX570122, BX570615 from AOC 57, and BXZW1607 from AOC 69W were also spiked in duplicate for TOC. All RPDs between the MS and MSDs were less than the $50 \%$ RPD limit indicating acceptable method performance.

Sediment. Sediment samples from AOC 57 (DX570500) and AOC 69W (DXZW0200) were spiked in duplicate for TOC, TPH as gasoline and diesel fuel (USEPA Method 8015) and TPHC (USEPA Method 9071/418.1) to evaluate precision.

Sample DX570900 from AOC 57 was spiked in duplicate for TOC and the results were $54.0 \mu \mathrm{~g} / \mathrm{g}$ and $0.9 \mu \mathrm{~g} / \mathrm{g}$. An RPD of $193.5 \%$ was calculated for these TOC results, exceeding the $50 \%$ control limit. This sample had high concentrations of TOC relative to spike concentrations and no actions were taken based on these RPDs. The two additional TOC duplicate sample pairs had RPDs of $30 \%$ and $50.2 \%$.

The RPDs of sediment samples for TPHC as gasoline and diesel fuel exceeded the $50 \%$ control limits in one of the two spiked sample pairs. These outlier RPDs were from sample DX570500 and ranged from $54.8 \%$ (TPH as gasoline) to $63.7 \%$ (TPH as diesel fuel). However, RPDs for the second sediment duplicate pair were $8.2 \%$ (TPH as diesel) and $0 \%$ (TPH as gasoline) indicating excellent
agreement between results. Based on duplicate spike data, TPH results for sediment samples overall are acceptable and do not require qualification.

The RPDs for spiked sediment samples for TPHC by USEPA Method 9071/418.1 exceeded the control limit in one of the two sample pairs. An outlier RPD of $169 \%$ was observed for sample DX570500. However, the RPD for the second sediment duplicate pair was $0 \%$ indicating excellent agreement between results. Based on duplicate spike data, TPHC (USEPA Method 9071/418.1) results for sediment samples were not qualified.

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## D.5.0 COMPARISON OF OFF-SITE AND ON-SITE ANALYTICAL RESULTS

This section discusses the results of a comparison of data generated from chemical analyses performed on soil samples collected during the 1995 AOC 57, 63AX, and 69W Remedial Investigations at Fort Devens, Massachusetts. A total of 36 split samples were collected between September 12, 1995 through October 2, 1995. The soil samples were split in the field and submitted for on-site and off-site volatile analysis and petroleum hydrocarbons. The purpose of collection of the split samples is to provide a comparison of the on-site data with the associated off-site data, in order to evaluate data quality and establish the on-site results as screening data with definitive confirmation (USEPA, 1993).

## D.5.1 ANALYTICAL METHODOLOGIES

The analytical methods used on-site were purge and trap gas chromatography (GC) analyses for volatile organic compounds (VOCs) in soil using a flame ionization detector (FID) for benzene, toluene, ethylbenzene, $m / p$-xylene, and $o$ xylene (BTEX), and chlorobenzene, and chlorinated VOCs using an electron capture detector (ECD) for 1,1-dichloroethene, trichloroethene, tetrachloroethene; 1,1,1-trichloroethane, carbon tetrachloride, and chloroform. The purge and trap GC field screening also provides an estimate of the concentration of non-target fuel hydrocarbons, or total petroleum hydrocarbons (TPH). The TPH concentration represents an estimate of total hydrocarbons present that are detected by the FID. The TPH analysis is reported as the total TPH response of peaks associated with the calibration of the FID with a JP-4 standard. The TPH
data are the primary means of identifying volatile fuel-related contamination in highly contaminated samples.

Soil samples were also analyzed at the on-site laboratory for semivolatile total petroleum hydrocarbons (TPH) using modified USEPA Method 3500 followed by analysis using USEPA Method 418.1.

The on-site field screening target compound data were evaluated using the USAEC off-site analytical GC/mass spectrometry (MS) method for VOCs. As discussed in Section D-2, this method is based on USEPA Method 8260 with subsequent certification by USAEC. Off-site TPH results were generated using USEPA Method 9071 to extract samples followed by analysis using USEPA Method 418.1 (USEPA, 1983; USEPA, 1986).

## D.5.3 Program Objectives

The objectives of the on-site soil field screening analytical program were to evaluate the downgradient, lateral, and vertical distribution of contamination in overburden soil, and identify critical samples for off-site laboratory analysis. For the purpose of this on-site/off-site data comparison action levels to evaluate the data sets were based on Category S-1 soils cleanup criteria outlined in the Massachusetts Contingency Plan (MCP) (MADEP, 1995). A summary of target compound action levels for each target compound evaluated using the on-site methods is outlined below:
Action Level ( $\mu \mathrm{g} / \mathrm{g}$ )
Benzene ..... 10
Toluene ..... 90
Ethylbenzene ..... 80
Total Xylenes ..... 500
1,1-Dichloroethene ..... 0,3
Chloroform ..... 0.1
1,1,1-Trichloroethane ..... 30
Carbon Tetrachloride ..... 1
Trichloroethene ..... 0.4
Tetrachloroethene ..... 0.5
TPH ..... 500

## D.5.4 Data Comparison and Evaluation

Comparability of the data was evaluated using two separate comparisons outlined in Section 4.6 of the POP (ABB-ES, 1995). The first comparison evaluates agreement based on detection of analytes relative to action levels. The second comparison evaluates data based on relative percent differences (RPDs) between split samples. Results of the on-site/off-site analyses are summarized on Table D-24.

## D.5.4.1 Comparison 1

In this comparison on-site and off-site results were organized into one of the four categories described below:

1. Both on-site and off-site analyses had the target compounds detected/non-detected at concentrations less than the action levels.

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2. Both on-site and off-site analyses had the target analytes detected at concentrations greater than action levels.
3. The target compounds were reported above action levels for on-site and the off-site data results were less than action levels.
4. The target compounds were reported above the action level off-site and the on-site results were less than the action levels.

A primary assumption of the comparison was that the off-site data represented the accurate definitive data when comparing results. Sample data which fall within categories 1 and 2 represent agreement between on-site and off-site analytical results. Sample data in category 3 suggested a high bias in the on-site results. Sample data in category 4 suggest a low bias in on-site results. The analytical goal of the program was to have over 95 percent of the results fall into categories 1, 2 and 3 .

The detection of target VOCs by the on-site laboratory relative to action levels was confirmed by the off-site laboratory. The majority of the soil samples fell within Category 1. One exception was the split sample result for EX570704 and EF570704, where one target compound (1,1-dichloroethene) fell into Category 3. This sample was analyzed at a 145X dilution and the 1,1 -dichloroethene detection was identified as possible laboratory contamination at the time of analysis in the field. 1,1,-Dichloroethene contamination was not observed in other field screening samples and no trend is apparent. The off-site results confirm that the on-site 1,1-dichloroethene detection was a false positive. Overall, these results

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indicate good comparison of on-site and off-site results for volatile organic compounds, and that the goals of the field program for usability of on-site results were met.

The results of all split sample analysis fell into Category 1 and Category 2 indicating complete agreement for the on-site and off-site analyses relative to action levels for fuel hydrocarbons. These data indicate that the on-site data are adequate for the evaluation of the distribution of hydrocarbons at the $500 \mu \mathrm{~g} / \mathrm{g}$ action levels.

## D.5.4.2 Comparison 2

For the second comparison, relative percent difference (RPD) values were calculated for associated on-site/off-site surface soil samples. Calculation of RPD is outlined in the POP (ABB-ES, 1995). RPD values were compared to USEPA Region I duplicate criteria of $50 \%$.

## VOCs

The majority of results were non-detects in both the on-site and off-site laboratory indicating consistent agreement with the absence of contamination for VOCs. RPDs for the majority of samples with VOCs detected exceeded the 50 RPD project goal. In many of the samples low concentrations of VOCs were reported at, or near, the reporting limit of the other split sample. Examples of this can be seen in samples BX570515, EX570200, EX571000, and EX571700. Detection limits for soils are in the low part per billion range and lack of quantitative agreement at these low concentrations are not interpreted to impact use of field

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screening results. .In some samples, concentrations of VOCs reported for the onsite screening analysis was much greater than concentrations reported in the offsite analysis. Example of these results can be seen in samples EX570704, EX570502, and RXZW3006. Affected compounds include BTEX and chlorobenzene. These results indicate high bias of on-site results by as much as two of three orders of magnitude, and the possibility of false positive reporting of additional target analytes. In all the above samples high concentrations of TPH was detected indicating the presence of fuel contamination at the sample location. The on-site method for BTEX and chlorobenzene utilized a single column GC/PID analysis for BTEX and chlorobenzene with no second column confirmation. It is highly likely that BTEX concentrations were over estimated due to interference from non-target fuel hydrocarbons. False positive identification of chlorobenzene may also have occurred due to interference with non-target fuel hydrocarbons. The off-site analysis was conducted using GC/MS confirmation of target analytes so interference from non-target hydrocarbon would not results in quantitative interferences or false positive identification of compounds.

It is important to note that evidence had also been published indicating the possibility of low bias off-site results due to loss of VOCs during sample collection and handling using bulk sampling procedures (Liikala, 1995). It is possible that concentrations reported at the on-site laboratory may be more representative of actual site conditions. However, for the purpose of this comparison, on-site results are considered potentially biased high.

## APPENDIX D

## TPH

In the majority of samples TPH was reported as a non-detect in both samples. RPDs of samples with detected TPH ranged from $7 \%$ to $200 \%$ with the majority of RPDs outside the $50 \%$ project goal. There was good correlation of split sample results relative to general concentrations reported. In all samples with detects reported, concentrations trends between high and low values agreed well. These results indicate that TPH data are adequate for determination of presence and absence of fuel contamination and the determination of the relative concentrations of contamination at the sites, however, reported concentrations should be considered estimated values.

## D.5.5 Conclusions

There was a strong qualitative and quantitative correlation between the on-site and off-site laboratories. The goal of 95 percent of on-site/off-site data characterized by conditions specified in categories 1,2 or 3 was achieved (ABB-ES, 1995), based on results presented in Comparison 1. The comparison results indicate that screening results provided adequate data to identify the presence or absence of contamination at action levels based on MCP Category S-1 soil cleanup criteria (MADEP, 1995).

Comparison 2 reviewed RPD results. An evaluation of RPDs indicates low concentrations of VOCs at, or near, the on-site laboratory reporting limits should be considered estimated values. Results for on-site analyses for the VOC target

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compounds BTEX and chlorobenzene at sample locations containing fuel contamination may be biased high and contain possible false positive identifications for these compounds. Bias is possibly a result of interferences with fuel-related compounds and limitations of the GC/PID used at the on-site laboratory. Off-site data generated using GC/MS analyses should be used to confirm the detections and concentration ranges of these compounds. The TPH results are adequate for qualitative and semi-quantitative uses, but reported concentrations should be considered estimated.

## REFERENCES

ABB Environmental Services, Inc. (ABB-ES), 1995. "Project Operation Plan Fort Devens, Massachusetts; Data Item A004/A006; May 1995.<br>Massachusetts Department of Environmental Protection (MADEP), 1995. "Massachusetts Contingency Plan"; Office of Environmental Affairs, Boston, Massachusetts, January 1995.<br>U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), 1990. Quality Assurance Program; USATHAMA PAM 11-41; Aberdeen Proving Ground, MD; January 1990.<br>U.S. Environmental Protection Agency (USEPA), 1983. "Methods for the Chemical Analysis of Water and Wastes"; Environmental Monitoring and Support Laboratory; USEPA 600-4-79-020; Cincinnati OH; March 1983.<br>U.S. Environmental Protection Agency (USEPA), 1986. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Remedial Response; Washington, DC; SW-846; November 1986.<br>\section*{U.S. Environmental Protection Agency (USEPA), 1988a. "Contract Laboratory Program Statement of Work for Organic Analyses"; February 1988.}<br>U.S. Environmental Protection Agency (USEPA), 1988b. "Region 1 Laboratory Data Validation Functional Guidelines For Evaluating Organic Analyses"; Hazardous Site Evaluation Division; November 1988.<br>U.S. Environmental Protection Agency (USEPA), 1989a. "Contract Laboratory Program Statement of Work for Inorganic Analyses"; July 1988, revised August 1989.<br>U.S. Environmental Protection Agency (USEPA), 1989b. "Region 1 Laboratory Data Validation Functional Guidelines For Evaluating Inorganic Analyses"; Hazardous Site Evaluation Division; February 1989.

U.S. Environmental Protection Agency (USEPA), 1993. "Data Quality Objectives Process for Superfund"; Office of Solid Waste and Emergency Response; EPA540-R-93-071; September 1993.

Table D-1
Summary of Analytical Parameters
aOC 57, 63AX, and 69W Remedial Investigation Fort Devens, Massachusetts

| PARAMETER | MATRIX (SOlH/WATER) | USAEC <br> Mentiod <br> NUMBER | EQUIVALENT USEPA <br> METHOD NUMBER | METHOD DESCRIPTION | LABORATORY/ ARMYCERTIFIED Reporting Limit |
| :---: | :---: | :---: | :---: | :---: | :---: |
| pH | Water | No Certified Method | 150.1 | Measured in Field | N/A |
| Temperature | Water | No Certified Method | 170.1 | Measured in Field | N/A |
| Turbidity | Water | No Certified Method | 180.1 | Measured in Field | N/A |
| Conductivity | Water | No Certified Method | 120.1 | Measured in Field Electrode | N/A |
| RedOX | Water | No Certified Method | SM 2580b | Measured in Field | N/A |
| Total Suspended Solids | Water | No Certified Method | 160.2 | Gravimetric | $4000 \mu \mathrm{~g} / \mathrm{L}$ |
| Total Dissolved Solids | Water | No Certified Method | 160.1 | Gravimetric | 10,000 $\mu \mathrm{g} / \mathrm{L}$ |
| Alkalinity | Water | No Certified Method | 301.0 | Titrimetric | $5000 \mu \mathrm{~g} / \mathrm{L}$ |
| Total Organic Carbon | Soil | No Certified Method | SW 9060 | Infrared | $360 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Water | No Certified Method | SW 9060 | Infrared | $1000 \mu \mathrm{~g} / \mathrm{L}$ |
| Nitrate/Nitrite | Water | TF22 | 351.2 | Colorimetric | $10 \mu \mathrm{~g} / \mathrm{L}$ |
| Hardness | Water | N/A | $\begin{aligned} & 130.2 \text { or } \\ & \text { SM2340B } \end{aligned}$ | Titration or Calculation | $1000 \mu \mathrm{~g} / \mathrm{L}$ |
| Anions | Water | TT10 | 300.0 | Ion Chromatography (Chloride, sulfate) | $\begin{gathered} \text { Chloride - } \\ 2,120 \mu \mathrm{~g} / \mathrm{L} \\ \text { Sulfate }-10,000 \mu \mathrm{~g} / \mathrm{L} \end{gathered}$ |
|  | Water | TF27 | 365.2 | Colorimetric Total Phosphorous | Phosphate $13.3 \mu \mathrm{~g} / \mathrm{L}$ |
| TKN (Kjeldahl) | Water | No Certified Method | 351.2 | Calorimetric | $183 \mu \mathrm{~g} / \mathrm{L}$ |
| Carbonate/ Bicarbonate | Water | No Certified Method | 310.1 | Titrimetric | N/A |
| Total Petroleum Hydrocarbons | Water | No Certified Method | 418.1 | Infrared | $100 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | No Certified Method | SW 9071/ 418.1 | Infrared | $21 \mu \mathrm{~g} / \mathrm{g}$ |
| Aluminum | Water | SS10 | 200.7 | ICP | $141 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $14.1 \mu \mathrm{~g} / \mathrm{g}$ |

Table D-1
Summary of Analytical Parameters
aOC 57, 63AX, and 69W Remedial Investigation Fort Devens, Massachusetts

| PARAMETER | MATRIX (SOIL, WATER) | USAEC <br> METHOD <br> NUMBER | Equivaient <br> USEPA <br> METHOD <br> Number | METHOD DESGRIPTION | LABORATORY/ ARMY-CERTIFIED REPORTING LIMIT |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Antimony | Soil | JS16 | SW 6010 | ICP | $3.8 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Water | SD28 | - | GFAA | $3.03 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD25 | $\bullet$ | GFAA | $1.09 \mu \mathrm{~g} / \mathrm{g}$ |
| Arsenic | Water | SD22 | 206.2 | GFAA | $2.54 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD19 | SW 7060 | GFAA | $0.25 \mu \mathrm{~g} / \mathrm{g}$ |
| Barium | Water | SS10 | 200.7 | ICP | $5.0 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $29.6 \mu \mathrm{~g} / \mathrm{g}$ |
| Beryllium | Water | SS10 | 200.7 | ICP | $5.0 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $1.86 \mu \mathrm{~g} / \mathrm{g}$ |
| Cadmium | Water | SS10 | 200.7 | ICP | $4.01 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $3.05 \mu \mathrm{~g} / \mathrm{g}$ |
| Calcium | Water | SS10 | 200.7 | ICP | $500 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $59.0 \mu \mathrm{~g} / \mathrm{g}$ |
| Chromium | Water | SS10 | 200.7 | ICP | $6.02 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $12.7 \mu \mathrm{~g} / \mathrm{g}$ |
| Cobalt | Water | SS10 | 200.7 | ICP | $25 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $15.0 \mu \mathrm{~g} / \mathrm{g}$ |
| Copper | Water | SS10 | 200.7 | ICP | $8.09 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $58.6 \mu \mathrm{~g} / \mathrm{g}$ |
| lron | Water | SS10 | 200.7 | ICP | $42.7 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $50.0 \mu \mathrm{~g} / \mathrm{g}$ |
| Lead | Soil | JS16 | SW 6010 | ICP | $6.62 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Soil | JD17 | SW 7421 | GFAA | $0.177 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Water | SD20 | 239.2 | GFAA | $1.26 \mu \mathrm{~g} / \mathrm{L}$ |

Table D-1
Summary of Analytical Parameters
aOC 57, 63AX, and 69W Remedial Investigation
Fort Devens, Massachusetts

| PARAMETER | MATRIX (SOM, WATER) | USAEC <br> Mettor <br> NUMBER | Equivalent <br> USEPA <br> METHOD <br> Number | MeTHOD DESCRIPTION | LABORATORY/ ARMY-CERTIFIED REPORTING LIMIT |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Magnesium | Water | SS10 | 200.7 | ICP | $500 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $50.0 \mu \mathrm{~g} / \mathrm{g}$ |
| Manganese | Water | SS10 | 200.7 | ICP | $2.75 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $0.275 \mu \mathrm{~g} / \mathrm{g}$ |
| Mercury | Water | SB01 | 245.1 | CVAA | $0.243 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JB01 | SW 7471 | CVAA | $0.05 \mu \mathrm{~g} / \mathrm{g}$ |
| Nickel | Water | SS10 | 200.7 | ICP | $34.3 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $12.6 \mu \mathrm{~g} / \mathrm{g}$ |
| Potassium | Water | SS10 | 200.7 | ICP | $375 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soll | JS16 | SW 6010 | ICP | $37.5 \mu \mathrm{~g} / \mathrm{g}$ |
| Selenium | Water | SD21 | 270.2 | GFAA | $3.02 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD15 | SW7740 | GFAA | $0.25 \mu \mathrm{~g} / \mathrm{g}$ |
| Silver | Water | SD23 | 272.2 | GFAA | $0.25 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD18 | SW 7761 | GFAA | . $025 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Water | SS10 | 200.7 | ICP | $4.6 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $2.5 \mu \mathrm{~g} / \mathrm{g}$ |
| Sodium | Water | SS10 | 200.7 | ICP | $500 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $150 \mu \mathrm{~g} / \mathrm{g}$ |
| Thallium | Water | SD09 | 279.2 | GFAA | $6.99 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD24 | SW846 7841 | GFAA | $0.5 \mu \mathrm{~g} / \mathrm{g}$ |
| Vanadium | Water | SS10 | 200.7 | ICP | $11.0 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $13 \mu \mathrm{~g} / \mathrm{g}$ |
| Zinc | Water | SS10 | 200.7 | ICP | $21.1 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $30.2 \mu \mathrm{~g} / \mathrm{g}$ |
| Semivolatile Organic Compounds | Water | UM18 | 625 | Extraction,GC/MS | See POP |
|  | Soil | LM18 | SW 8270 | Extraction,GC/MS | See POP |

Table D-1
Summary of Analytical Parameters
aOC 57, 63AX, and 69W Remedial Investigation Fort Devens, Massachusetts

| PARAMETER | Mathix (SOIL,WAIER) | USAEC <br> METHOD <br> NUMBER | Equivalent <br> USEPA <br> METHOD <br> NUMBER | METHOD DESCRIPTION | LABORATORY/ ARMY-CERTIFIED Reporting Limit |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Volatile Organic Compound | Water | UM20 | 624 | Purge and Trap, GC/MS | See POP |
|  | Soil | LM19 | SW 8240 | Purge and Trap, GC/MS | See POP |
| Pesticides/PCBs | Water | UH13 | 608 | Extraction, GC | See POP |
|  | Soil | LH10 | SW 8080 | Extraction, GC-EC | See POP |
| GRO | Water | No Certified Method | Modified 8015 | GC/FID | $400 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | No Certified Method | Modified 8015 | GC/FID | $8 \mu \mathrm{~g} / \mathrm{g}$ |
| DRO | Soil | No Certified Method | Modified 8015 | GC/FID | $8 \mu \mathrm{~g} / \mathrm{g}$ |

Notes:

| POP | $=$ | Project Operations Plan; Fort Devens, Massachusetts, Data Item A004/A006; U.S. Army Environmental Center; Aberdeen Proving <br> Ground, Maryland; May 1995. |
| :--- | :--- | :--- |
| SW | $=\quad$ EPA "Test Methods for Evaluating Solid Wastes", SW-846, September 1986 |  |
| GRO | $=$ | Gasoline Range Organics |
| DRO | $=$ | Diesel Range Organics |

Table D-2
Elements Detected in Soil Method Blanks
1995 AOC 57, 63AX, and 69W Remedial Investigation Fort Devens, Massachusetts

| Element | Frequency of Detiction | Concentation Range ( $0 \mathrm{~g} / \mathrm{g}$ ) | $\begin{gathered} \text { CRL } \\ (\mu \mathrm{g} / \mathrm{g}) \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| Aluminum | 3/3 | 482-520 | 14.1 |
| Barium | 3/3 | 8.73-9.51 | 29.6 |
| Calcium | 3/3 | 235-269 | 59.0 |
| Copper | 1/3 | 1.01 | 58.6 |
| Iron | 3/3 | 955-1030 | 50.0 |
| Lead ${ }^{1}$ | 3/3 | 0.756-0.816 |  |
| Potassium | 3/3 | 179-198 | 37.5 |
| Magnesium | 3/3 | 130-150 | 50.0 |
| Manganese | 3/3 | 21-28.9 | 0.275 |

${ }^{1}=\quad$ Results from GFAA. Lead was also analyzed by ICP but all results were below the CRLs.

Table D-3
vocs Detected in Method Blanks for Water
1995 AOC 57, 63AX, and 69 W Remedial Investigation Fort Devens, Massachusetts

| compound | FREQUENCY of Detection | Concentration Range (ug/) | $\begin{gathered} \text { CRL } \\ (\mu \mathrm{g} / \mathrm{L}) \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| Acetone ${ }^{1}$ | 1/7 | 17 | 13 |
| Methylene Chloride ${ }^{1}$ | 1/7 | 5.7 | 2.3 |
| Chloroform ${ }^{1}$ | 1/7 | 2.1 | 0.5 |

${ }^{1}=$ Data from method blanks analyzed during the 1995 Field Investigation.

Table D-4
sVoCs Detected in Water Method Blanks
-
1995 AOC 57, 63AX, 69W Remedial Investigation fort Devens, Massachusetts

| Compound | Frequency of Betection | Concemtration Range $(\mu \mathrm{g} / \mathrm{L})$ | $\begin{gathered} \mathrm{CRL} \\ (\mu \mathrm{~g} / \mathrm{L}) \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| Target SVOCs |  |  |  |
| Diethyl phthalate ${ }^{1}$ | 1/5 | 2.2 | 2 |
| bis(2-ethylhexyl) phthalate ${ }^{2}$ | 1/3 | 400 | 4.8 |
| SVOC TICs |  |  |  |
| Dioctyl adipate ${ }^{1}$ | 1/5 | 20 | Not determined |
| Toluene ${ }^{1}$ | 1/5 | 3 | Not determined |

${ }^{1}=$ Detected in method blanks analyzed during the 1995 Field Investigation.
${ }^{2}=$ Detected in method blanks analyzed during the 1996 Round 2 Groundwater sampling event.

Table D-5
SVOCs Detected in Method Blanks for Soil
1995 aOC 57, 63AX, 69W Remedial Investigation fort Devens, Massachusetts

| Compound | Frequency of DETECTION | Concentration Range ( $\mathrm{g} / \mathrm{g}$ ) | $\begin{aligned} & \text { CRL1. } \\ & (\omega \mathrm{g} / \mathrm{g}) \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| Target SVOCs |  |  |  |
| di-n-butyl phthalate ${ }^{1}$ | 1/12 | 0.08 | 0.061 |
| SVOC TICs |  |  |  |
| nonacosane ${ }^{1}$ | 1/12 | 0.3 | Not determined |

${ }^{1}=$ Detected in method blanks analyzed during the 1995 field investigation.

Table D-6

- Elements Detected in Rinse Blanks

1995 AOC 57, 63AX; 69W Remedial Investigation Fort Devens, Massachusetts

| Elifment | Frequency of Detection | concenimation Range (ug/L) | CRL (ug/L) |
| :---: | :---: | :---: | :---: |
| Mercury | 2/6 | 0.242-0.463 | 0.243 |
| Lead ${ }^{1}$ | 1/6 | 1.63 | 1.37 |
| Iron | 4/6 | 70.5-543 | 38.8 |
| Potassium | 1/6 | 755 | 375 |
| Manganese | 1/6 | 3.6 | 2.75 |

${ }^{1}=$ Lead analyzed by graphite furnace atomic adsorption

Table D-7

- Vocs Detected in Rinse blanks

1995 AOC 57, 63AX, 69W Remedial Investigation fort Devens, Massachusetts

| Compound | Frequency or Detection | CONCENTBATION range ( $н \mathrm{~g} / \mathrm{M})$ | $\begin{aligned} & \text { cRI } \\ & (\mathrm{Lg} / \mathrm{L}) \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| 1,1,1-Trichloroethane | 5/6 | 1.2-2.4 | 0.5 |
| Acetone | 2/6 | 18 | 13 |
| Carbon Tetrachloride | 1/6 | 1.2 | 0.58 |
| Chloroform | 3/6 | 0.59-1.7 | 0.5 |
| Methylene Chloride | 5/6 | 4-9.3 | 2.3 |

# 1995 AOC 57, 63AX, 69W REMEDIAL INVESTIGATION Fort Devens, Massachusetts 

| Compound | Frequency or betection | CONCENTRATION Range (ug/L) | $\begin{gathered} \text { CRI } \\ (\mathrm{gg} / \mathrm{l} \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| Target SVOCs |  |  |  |
| Bis (2-ethylhexyl) phthalate | 4/6 | 6.1 to 14 | 4.8 |
| Benzyl alcohol | 1/6 | 7.4 | 0.72 |
| SVOC TICs |  |  |  |
| N,N-diethyl-3-methylbenzamide | 1/6 | 9 | Not Determined |
| benzyl adipate | 1/6 | 40 | Not Determined |
| unknown non-target SVOCs | 1/6 to $3 / 6$ | 4-10 | Not Determined |

Table D-9
vocs Detected in Trip Blanks
1995 AOC 57, 63AX, 69W Remedial Investigation fort Devens, Massachusetts

| Compound | Frequency or Detection | Concentration Range ( $\mathrm{g} / \mathrm{L} / \mathrm{I})$ | CRL <br> $(\mu \mathrm{g} / \mathrm{L})$ |
| :---: | :---: | :---: | :---: |
| Target VOCs |  |  |  |
| Carbon Tetrachloride ${ }^{1}$ | 1/16 | 2.3 | 0.58 |
| Tetrachloroethene ${ }^{1}$ | 1/16 | 3.4 | 1.6 |
| Chloroform ${ }^{1}$ | 1/6 | 3.5 | 0.5 |
| Methylene Chloride ${ }^{1}$ | 9/16 | 2.5-5.6 | 2.3 |
| Methylene Chloride ${ }^{2}$ | 1/2 | 2.7 | 2.3 |
| Acetone ${ }^{2}$ | 1/2 | 14 | 13 |
| VOC TICs |  |  |  |
| Hexane ${ }^{1}$ | 1/16 | 6 | Not Determined |

${ }^{1}=$ Detected in trip blanks analyzed during the 1995 Field Investigation.
${ }^{2}=$ Detected in trip blanks analyzed during the 1996 Round 2 Groundwater sampling event.

TABLE D-10
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| $9 \cdot 2$ | － 2 zit | en | T9500． | ＞ | z5E0． | żeo | 56－520－8z | 56－d9s－tz | anan | $\tau て \tau+8 ъ \Omega \Omega$ | $0097 \angle 5 \times 8$ | yaosi | 0thl |  |
| $9 \cdot 81$ | 6.54 | on | 2980．0． | ＞ | z0¢0－ | $8660{ }^{\circ}$ | 56－ז20－02 | 56－d8s－tz | anan | 5it＋S5Aa | 205tLsx | yaosi | Othi |  |
| $9 \cdot$ ¢ | 5．T6 | nem | 19800． | ＞ | ヶ9¢0． | 86 ¢0． | 56－530－02 | 56－das－tz | anan | sti＋stad | z0stLsx | ycosi | OthI |  |
| 5.6 | $0 \cdot 26$ | 50 | 19400． | ＞ | tzzo | ＜oza＊ | 56－500－8t | 56－das－6I | атan | sot＊stia | 9050LSx9 | yaosi | 01H］ |  |
| 5.6 | $2 \cdot 62$ | פ® | 19800． | ＞ | £ヶ\％\％ | lozo | 56－520－81 | 96－das－6t | atan | sot＋stid | 9050L5x9 | yaosi | Othr |  |
|  | T－90\％ |  |  |  |  |  |  |  |  |  |  | unmixem |  |  |
|  | 5．79 |  |  |  |  |  |  |  |  |  |  | иппттит¢ |  |  |
|  | 6.58 |  |  |  |  |  |  |  |  |  |  | sat |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  | ＊＊＊＊＊＊＊ |  |  |
| $\varepsilon \cdot 5$ | ＋18 | sen | 85900. | ＞ | 9950 | sozo | 56－axs－0¢ | S6－485－โI | a0an | T6¢＊Sヶsa | 00zomzxa | Todh | ${ }^{\text {othr }}$ |  |
| E．s | － 58 | Don | 8โ900． | ＞ | slto． | sozo | 56－a85－0¢ | 56－d9s－tr | －${ }^{\text {dan }}$ | т6£＊5ヶла | 00zomzxa | тจah | OTHT |  |
| 0.4 | $0 \cdot 201$ | Don | 85900． | ＞ | 8970 | $6540^{\circ}$ | 56－520－80 | 56－395－EI | वxan | I6I＊Stsd | oosolsxa | TЈан | 0tht |  |
| $0 \cdot 1$ | －．90才 | mon | 8г900． | ＞ | ＜8v0． | $6540^{\circ}$ | 56－120－80 | 56－dxs－ET | axan | โ6โ＊S「ла | oosolsxa | Tכd | OTHT |  |
| －¢ | E． 69 | Dea | 8 ¢900． | ＞ | ＜9\％0． | trzo | 56－10N－90 | 56－das－Ľ | ©xan | Lpt－5ヶлa | 6tE0Lsxa | Toar | OtHT |  |
| －$\cdot \boldsymbol{\varepsilon}$ | E．6L | Dom | $85900^{\circ}$ | ＞ | 1650. | troo | 56－now－90 | 56－das－Lz | oxan | L？I＊Stsd | 6IE0L5x | TכdH | 0thi |  |
| － 01 | $8 \cdot \mathrm{E6}$ | Don | 8 8900． | $>$ | s6ta | 8020 | 56－500－8z | 56－dis－tz | andn | T2T＋Stso | 009TLSx | TDat | 0 OHI |  |
| C－0I | E．301 | dom | $85900 \cdot$ | ＞ | ＜tzo | $800^{\circ}$ | 56－500－8z | 56－das－tz | ansm | тzt＋b゙sa | 009tlsxa | Todh | OTHT |  |
| T•8z | 5．79 | ＋om | 8 8900． | $>$ | \％＜20． | s9zo－ | 56－120－02 | 56－dxs－Iz | and | sitastad | zostlsx | todi | OTHI |  |
| T．8z | L－s8 | 500 | 85900. | ＞ | ＜zzo． | s9zo． | S6－－200－02 | 56－485－5z | anan | Sti＋stad | zostlsx |  | OTHI |  |
| $\cdots$ | 9．9L | man | 85900. | ＞ | ＜sto | sozo－ | 56－500－8T | 56－485－6T | aun | sotastia | 905025xa | tode | Otht |  |
| $\cdots$ | － 28 | Den | 82900. | ＞ | 6950 | sozo | 56－520－8t | 56－das－6T | वum | sot＋sbia | 9090L5xa | тכ¢ | 0tht |  |
|  | 0.66 |  |  |  |  |  |  |  |  |  |  | unnuтxem |  |  |
|  | 5．t9 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 6.08 |  |  |  |  |  |  |  |  |  |  | bine |  |  |
| $6 \cdot 7$ | $6 \cdot$ 28 | oen | ＜5900． | ＞ | L9t0． | Fozo． | S6－ags－0¢ | 56－dys－II | adan | I6E＊Sba | 00zomzxa | Nมang | OTHI |  |
| $6 \cdot 2$ | E．78 | sen | L5900． | ＞ | z＜to． | 7020－ | 56－ags－ox | 56－¢95－tı | aban |  | 00zomzxa | Nтang | OTHT |  |
| $2 \cdot 5$ | ع． 69 | Den | Ls900． | ＞ | вгго． | 6s50． | 56－500－80 | 56－dxs－ยI | बxan | $\tau 6 \tau * 5 b \wedge a$ | 00solsxa | ndang | OLHT |  |
| z＇s | $0 \cdot \mathrm{EL}$ | ¢ | ＜s900． | ＞ | sezo． | 6spo | 56－520－80 | 56－895－દ์ | © ${ }^{\text {dan }}$ | T6T＋Sちsa | 0050L5xa | nades | 0 THT |  |
| L＇s | 2．78 | Den | L5900． | ＞ | عоzo | trzo | 56－10N－90 | 56－das－くz | axan |  | 6IE0Lsxa | nadas | 0 THI |  |
| L＇s | z．68 | sen | Ls900． | ＞ | stzo． | โъて＊ | 56－nck－90 | 56－das－Lz | axan |  | 6זE0Lsxa | nadang | OTHI |  |
| $\varepsilon \cdot 8 \tau$ | s．rb | sen | L5900． | ＞ | ssio． | 8020 | 56－520－82 | 56－895－tz | वnan | tet＋sbsa | 009 TLSx | ndang | 0 THI |  |
| ع． $8 \tau$ | 0.66 | sen | $45900{ }^{\circ}$ | 7 | 9070 | 80z0＊＊ | 56－500－82 | S6－ats－tz | वnan | 12t＊stad | 009tLSx | nadas | 0 THI |  |
| ady | Kresosey 7uosxod | 日于ج吅 | －nten <br> ordures teuf．5po |  | onres | $\begin{aligned} & \text { onten } \\ & \text { oypdd } \end{aligned}$ |  |  | 701 |  qет | zequma －Tcurs PLota SIWCTI | $\begin{aligned} & \text { Ouren } \\ & 7 \mathrm{BOII} \end{aligned}$ |  |  |
|  |  |  |  |  |  |  | asw／sw |  |  |  |  |  |  |  |
|  | ． |  |  |  |  | $\begin{gathered} \text { ( } \Lambda a) \text { YW } \\ 7 \text { Yoday } \end{gathered}$ | Fs is dnax 1ad 7xoa ：uo 10 人） | ュetrejen อรฺุจัด |  |  |  |  |  |  |


| Method Description | IRDMIS Method Code | Test Name | IRLMIS <br> Field <br> Sample <br> Number | Lab Number | Lot | Sample Date | Analyais Dato | Spike Value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | LH10 | ISODR | BX570319 | DV4S*147 | UPXD | 27-sEP-95 | 06-NOV-95 | . 0361 |
|  | LH10 | ISODR | DX570500 | DV4S*191 | UFRD | 13-SEP-95 | 08-0CT-95 | . 0668 |
|  | LH10 | ISODR | DX570500 | DV4S*191 | UPRD | 13-SBP-95 | 08-OCT-95 | . 0688 |
|  | LH10 | ISODR | DXZwo200 | DV4S*391 | UPQD | 11-s8P-95 | 30-SEP-95 | . 0305 |
|  | LH10 | ISODR | DXZw0200 | DV4S*391 | UPQD | 12-SEP-95 | 30-SBP-95 | . 0305 |
|  |  | ********** |  |  |  |  |  |  |
|  |  | avg |  |  |  |  |  |  |
|  |  | minimum |  |  |  |  |  |  |
|  | LH10 | LIN | EX570506 | DV4S*105 | UPTD | 19-3EP-95 | 18-OCT-95 | . 0205 |
|  | LH10 | LIN | RX570506 | DV4S*105 | UFTD | 19-SBP-95 | 18-OCT-95 | . 0205 |
|  | LH10 | LIN | EX571502 | DV4S*115 | UFUD | 21-SBP-95 | 20-OCT-95 | . 0265 |
|  | LH10 | LIN | EX571502 | DV4S*115 | UPUD | 21-SEP-95 | 20-OCT-95 | . 0265 |
|  | LH10 | LIN | EX571600 | DV4S*121 | UFVD | 21-SEP-95 | 28-OCT-95 | . 0208 |
|  | LH10 | LIN | Ex571600 | DV4S*121 | UFVD | 21-SEP-95 | 28-OCT-95 | . 0208 |
|  | LH10 | LIN | BX570319 | DV4S*147 | UTXD | 27-SEP-95 | 06-NOV-95 | . 0241 |
|  | LH1O | LIN | BX570319 | DV4S*147 | UPXD | 27-3BP-95 | 06-NOV-95 | . 0241 |
|  | LH10 | LIN | DX570500 | DV4S*192 | UPRD | 13-SEP-95 | 08-OCT-95 | . 0459 |
|  | LH10 | LIN | DX570500 | DV4S*191 | UPRD | 13-SEP-95 | 08-OCT-95 | . 0459 |
|  | LH10 | LIN | DXZW0200 | DV4S*391 | UPQD | 11-sBP-95 | 30-SBP-95 | . 0204 |
|  | LH10 | LIN | DXZNO200 | DV4S*391 | UPQD | 11-SEP-95 | 30-S8P-95 | . 0204 |
|  |  | ********* |  |  |  |  |  |  |
|  |  | minimum |  |  |  |  |  |  |
|  |  | maximum |  |  |  |  |  |  |
|  | LH10 | MEXCLR | EX570506 | DV4S*105 | UFTD | 19-SBP-95 | 18-OCT-95 | . 205 |
|  | LH10 | MEXCLR | EX570506 | DVAS*105 | UFTD | 19-SBP-95 | 18-OCT-95 | . 205 |
|  | LH10 | MEXCLR | EX571502 | DV4S*115 | UPUD | 21-S8P-95 | 20-OCT-95 | . 265 |
|  | LH10 | MEXCLR | EX571502 | DV4S*115 | UFUD | 21-SBP-95 | 20-OCT-95 | . 265 |
|  | LH10 | MEXCLR | EX571600 | DV4S*121 | UFVD | 21-SBP-95 | 28-OCT-95 | . 208 |
|  | LH10 | MBXCLR | EX571600 | DV4S*121 | UFVD | 21-SEP-95 | 28-OCT-95 | . 208 |
|  | LH10 | MEXCLR | BX570319 | DV4S*147 | UFXD | 27-SEP-95 | 06-NOV-95 | . 241 |
|  | LH10 | MEXCLR | BX570319 | DV4S*147 | UFXD | 27-SEP-95 | 06-NOV-95 | . 241 |
|  | LH10 | MEXCLR | DX570500 | DV4S*191 | UFRD | 13-SEP-95 | 08-OCT-95 | . 459 |
|  | LH10 | MEXCLR | DX570500 | DV4S*191 | UFRD | 13-38P-95 | 08-OCT-95 | . 459 |

Chemical Quality Control Report
Installation: Fort Dovens, MA (DV) Group 4 Sites
Ms/MsD

| Method Dascription | IRDMIS Method Code | Test Name | TRDNIS <br> Field <br> Sample <br> Number | Lab Number | Lot | Sample Date | Analysis Date | Spike Value | Value | $<$ | $\begin{array}{r} \text { Original } \\ \text { Sample } \\ \text { Value } \end{array}$ | Units | Percent Recovery | RPP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | LH10 | MEXCLR | DXZW0200 | DV4S*3.91 | UFQD | 11-SBP-95 | 30-38P-95 | . 203 | . 176 | < | . 0711 | veg | 86.7 | 13.3 |
|  | LH10 | MEXCLR | DXZW0200 | DV4S*391 | UPQD | 11-SEP-95 | 30-3BP-95 | . 203 | . 154 | $<$ | . 0711 | UGG | 75.9 | 13.3 |
|  |  | avg |  |  |  |  |  |  |  |  |  |  | 76.8 |  |
|  |  | minimua |  |  |  |  |  |  |  |  |  |  | 33.6 |  |
|  |  | maximum | . |  |  |  |  |  |  |  |  |  | 101.5 |  |
|  | LH10 | PPDDT | EX570506 | DV4S*105 | UFTD | 19-SBP-95 | 18-OCT-95 | . 0205 | . 0112 | $<$ | . 00707 | veg | 54.6 | 4.6 |
|  | LH10 | PPDDT | EX570506 | DV4S*105 | UFTD | 19-SBP-95 | 18-OCT-95 | . 0205 | . 0107 | $<$ | . 00707 | UGG | 52.2 | 4.6 |
|  | LH10 | PPDDT | BX571502 | DVAS*115 | UPUD | 21-SEP-95 | 20-OCT-95 | . 0265 | . 028 | $<$ | . 00707 | UEG | 105.7 | 15.4 |
|  | LH10 | PPDDT | EX571502 | DV4S*115 | UFUD | 21-SEP-95 | 20-OCT-95 | . 0265 | . 024 | $<$ | . 00707 | UGG | 90.6 | 15.4 |
|  | LH10 | PRDDT | EX571600 | DV4S*121 | UFVD | 21-SEP-95 | 28-OCT-95 | . 0208 | . 0319 | $<$ | . 00707 | veg | 153.4 | 6.5 |
|  | LH10 | PPDDT | EX571600 | DV4S*121 | UPVD | 21-SEP-95 | 28-OCT-95 | . 0208 | . 0299 | $<$ | . 00707 | UEG | 143.8 | 6.5 |
|  | LH10 | PPDDT | BX570319 | DV4S*147 | UFXD | 27-SBP-95 | 06-NOV-95 | . 0241 | . 0216 | $<$ | . 00707 | USG | 89.6 | 2.3 |
|  | LH10 | PPDDT | Bx570319 | DV4S*147 | UFXD | 27-sEP-95 | 06-NOV-95 | . 0241 | . 0211 | < | . 00707 | UGG | 87.6 | 2.3 |
|  | LH10 | PPDDT | DX570500 | DV4S*191 | UFRD | 13-SEP-95 | 08-OCT-95 | . 0459 | . 014 |  | . 0363 | ueg | 30.5 | 0.0 |
|  | LH10 | PPDDT | DX570500 | DV4S*191 | UFRD | 13-SBP-95 | 08-OCT-95 | . 0459 | . 014 |  | . 0363 | UGG | 30.5 | 0.0 |
|  | LH10 | PPDDT | DXZW0200 | DV4S*391 | URQD | 11-sEP-95 | 30-SBP-95 | . 0204 | . 034 |  | . 021 | Usa | 166.7 | 38.6 |
|  | LH10 | PPDDT | DXZw0200 | DV4S*391 | UPQD | 11-SEP-95 | 30-SEP-95 | . 0204 | . 023 |  | . 021 | UGG | 112.7 | 38.6 |
|  |  | ********** |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | avg |  |  |  |  |  |  |  |  |  |  | 93.1 |  |
|  |  | minimum |  |  |  |  |  |  |  |  |  |  | 30.5 |  |
|  |  | maximum |  |  |  |  |  | . |  |  |  |  | 166.7 |  |
|  | LH16 | PCB016 | EX570506 | DV4S*105 | NGYB | 19-SEP-95 | 10-OCT-95 | . 273 | . 205 | $<$ | . 0666 | USG | 75.1 | 28.4 |
|  | LH16 | PC8016 | EX570506 | DV4S*105 | NGYB | 19-SBP-95 | 10-OCT-95 | . 273 | . 154 | $<$ | . 0666 | UEG | 56.4 | 28.4 |
|  | IH16 | PCB016 | EX571502 | DV4S*115 | NGZB | 21-SEP-95 | 21-OCT-95 | . 354 | . 315 | $<$ | . 0666 | UGG | 89.0 | 8.3 |
|  | LH16 | PCB016 | Ex571502 | DV4S*115 | NGZE | 21-SEP-95 | 21-OCT-95 | . 354 | . 29 | $<$ | . 0666 | UGG | 81.9 | 8.3 |
|  | LH16 | PCB016 | KXX572500 | DV4S*125 | ngap | 22-SEP-95 | 03-NOV-95* | . 276 | . 197 | < | . 0666 | UGG | 71.4 | 3.1 |
|  | LH16 | PCB016 | BX572500 | DV4S*125 | NGAF | 22-SBP-95 | 03-NOV-95 | . 276 | . 191 | $<$ | . 0666 | UGG | 69.2 | 3.1 |
|  | LH16 | PCB016 | BX570319 | DV4S*147 | NGCF | 27-SEP-95 | 02-NOV-95 | . 321 | . 292 | $<$ | . 0666 | UEG | 91.0 | 4.6 |
|  | 2H16 | PCB016 | BX570319 | DV4S*147 | NGCP | 27-SBP-95 | 02-NOV-95 | . 321 | . 279 | < | . 0665 | UEG | 86.9 | 4.6 |
|  | [H16 | PCB016 | DX570500 | DV4S*191 | NGWE | 13-SEP-95 | 06-0CT-95 | . 612 | . 422 | $<$ | . 0666 | UEG | 69.0 | 17.5 |
|  | LH16 | PCB016 | DX570500 | DV4S*191 | NGWB | 13-SEP-95 | 06-OCT-95 | . 612 | . 354 | $<$ | . 0666 | USG | 57.8 | 17.5 |
|  | LH16 | PCB016 | DX2W0200 | DV4S*391 | NGVB | 11-SEP-95 | 03-OCT-95 | . 271 | . 227 | < | . 0666 | UGG | 83.8 | 3.1 |
|  | LH16 | PCB016 | DXZW0200 | DV4S*391 | NGVE | 11-SBP-95 | 03-OCT-95 | . 271 | . 22 | $<$ | . 0666 | UEG | 81.2 | 3.1 |





Chemical Quality Control Report
Installation: Port Devens, MA (DV) Group 4 Sites

## MS/MSD

| Method Deacription | IRDMIS <br> Method Code | Test Name | IRDMIS <br> Field <br> Sample <br> Number | Lab Number | Lot | Sample Date | $\begin{aligned} & \text { Analysis } \\ & \text { Date } \end{aligned}$ | Spike <br> Value | Value | < | $\begin{array}{r} \text { Original } \\ \text { Sample } \\ \text { Value } \end{array}$ | Units | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| SE IN WATRR BY GEAA | SD21 | SE | MXAX02XI | DV4W*233 | XCNP | 31-0CT-95 | 27-NOV-95 | 37.5 | 37.5 | < | 3.02 | UGL | 100.0 | 1.1 |
| SE IN WATER EY GFAA | SD21 | SB | MXAX02X1 | DV4W*233 | XCNP | 31-OCT-95 | 27-NOV-95 | 37.5 | 37.1 | $<$ | 3.02 | UGL | 98.9 | 1.1 |
| SE IN WAIER BY GPAA | SD21 | SB | MX2*10x3 | DV4W*271 | XCQP | 02-NOV-95 | 30-NOV-95 | 37.5 | 34.8 | $<$ | 3.02 | UGL | 92.8 | 4.7 |
| SE IN WATER BY GFAA | SD21 | SB | Mx2w10x3 | DVAW*271 | XCQP | 02-NOV-95 | 30-NOV-95 | 37.5 | 33.2 | $<$ | 3.02 | UGL | 88.5 | 4.7 |
|  |  | ********** |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | avg |  |  |  |  |  |  |  |  |  |  | 96.7 |  |
|  |  | minimum |  |  |  |  |  |  |  |  |  |  | 88.5 |  |
|  |  | maximum |  |  |  |  |  |  |  |  |  |  | 101.3 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AS IN WATER BY GRAA | SD22 | AS | HX5701X1 | DV4F*167 | YCRP | 30-OCT-95 | 29-NOV-95 | 37.5 | 39.4 | $<$ | 2.54 | UGL | 105.1 | 4.4 |
| AS IN WATBR BY Gran | SD22 | AS | MX5701x1 | DV4F*167 | YCRP | 30-OCT-95 | 29-NOV-95 | 37.5 | 37.7 | $<$ | 2.54 | UGL | 100.5 | 4.4 |
| AS IN WATER BY GPAA | SD22 | AS | MX5703x1 | DV4F*171 | YCSP | 02-NOV-95 | 30-NOV-95 | 37.5 | 46 |  | 71 | UGL | 122.7 | 6.7 |
| AS IN WATBR BY GRAA | SD22 | AS | MX5703x1 | DV4F*171 | ycsp | 02-NOV-95 | 30-NOV-95 | 37.5 | 43 |  | 71 | UGL | 114.7 | 6.7 |
| AS IN WATER BY GRAA | SD22 | AS | wx5705x | DV4F*204 | ycmp | 13-SEP-95 | 09-OCT-95 | 37.5 | 37.2 |  | 8.85 | UGL | 99.2 | 2.7 |
| AS IN NATER BY GPAA | SD22 | AS | wx5705xx | DV4F*204 | YCNP | 13-SBP-95 | 09-OCT-95 | 37.5 | 36.2 |  | 8.85 | UGL | 96.5 | 2.7 |
| AS IN WATER BY GPAA | SD22 | AS | MKAXO2X1 | DV4F*233 | YCRF | 31-OCT-95 | 30-NOV-95 | 37.5 | 41.8 |  | 2.98 | UGL | 111.5 | 2.9 |
| AS IN WATER BY GRAA | SD22 | AS | MXAX02X1 | DV4F*233 | YCRF | 31-OCT-95 | 30-NOV-95 | 37.5 | 40.6 |  | 2.98 | val | 108.3 | 2.9 |
| AS IN WATER BY GRAA | SD22 | AS | NX2W10x3 | DV4F*271 | YCus | 02-NOV-95 | 30-NOV-95 | 37.5 | 48 |  | 160 | 06L | 128.0 | 4.3 |
| AS IN WAIER BY GRAA | SD22 | AS | NXEW10x3 | DV4F*271 | YCuF | 02-NOV-95 | 30-NOV-95 | 37.5 | 46 |  | 160 | UGL | 122.7 | 4.3 |
| AS IN WATER BY GPAA | SD22 | AS | NX5701x1 | DV4W*167 | YCRP | 30-OCT-95 | 29-NOV-95 | 37.5 | 40.2 |  | 24.5 | UGL | 107.2 | 2.8 |
| AS IN WRTER BY GRAA | SD22 | AS | MX5701x1 | DV4W*167 | YCRP | 30-OCT-95 | 29-NOV-95 | 37.5 | 39.1 |  | 24.5 | UGL | 104.3 | 2.8 |
| AS IN WATER BY GFAA | SD22 | AS | MX55703X1 | DV4W*171 | Yesp | 02-NOU-95 | 30-NOV-95 | 37.5 | 45 |  | 74 | UGL | 120.0 | 0.0 |
| AS IN MATER BY GEAA | SD22 | As | . $\mathrm{M} \times 5703 \mathrm{X1}$ | DV4W*171 | YCSF | 02-NOV-95 | 30-NOV-95 | 37.5 | 45 |  | 74 | UGL | 120.0 | 0.0 |
| AS IN WATER BY GFAA | SD22 | AS | nxx5705xx | DV4W*204 | YCNP | 13-SEP-95 | 09-OCT-95 | 37.5 | 36.7 |  | 9.17 | UGL | 97.9 | 3.6 |
| AS IN WATER BY GFAA | SD22 | As | wx55705xx | DV4W*204 | YCNP | 13-SBP-95 | 09-OCT-95 | 37.5 | 35.4 |  | 9.17 | UGL | 94.4 | 3.6 |
| AS IN watir by gran | SD22 | AS | MXAX02X1 | DV4W*233 | YCRF | 31-OCT-95 | 30-NOV-95 | 37.5 | 39.1 |  | 5.22 | UGL | 104.3 | . 5 |
| AS IN WATER BY GEAA | SD22 | As | MXAX02X1 | DV4W*233 | YCRP | 31-OCT-95 | 30-NOV-95 | 37.5 | 38.9 |  | 5.22 | UGL | 103.7 | . 5 |
| AS IN HATER EY GPAA | SD22 | AS | MX2*10x3 | DV4W*271 | YCus | 02-NOV-95 | 30-NOV-95 | 37.5 | 45 |  | 180 | UGL | 120.0 | 11.8 |
| AS IN WATER BY GRAA | SD22 |  | MXZW10x3 | DV4W*271 | ycur | 02-NOV-95 | 30-NOV-95 | 37.5 | 40 |  | 180 | UGL | 106.7 | 21.8 |
|  |  | ***\#\#t\#*** |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | avg |  |  |  |  |  |  |  |  |  |  | 109.4 |  |
|  |  | minimum |  |  |  |  |  |  |  |  |  |  | 94.4 |  |
|  |  | maximum |  |  |  |  |  |  |  |  |  |  | 128.0 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SB IN WATER BY GPAA | SD2 8 | SB | MX5701X1 | DV4F*167 | NFWD | 30-OCT-95 | 29-NOV-95 | 80 | 77.4 | < | 3.03 | UGL | 96.8 | . 9 |




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| Value | < | original Sample Value | Onits |
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| 76.7 | < | 3.03 | vel |
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| 59.6 | < | 3.03 | vis |
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| 73.6 | $<$ | 3.03 | UGL |
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| 66.1 | $<$ | 3.03 | VGL |
| 62.6 | < | 3.03 | UGL |
| 69 | < | 3.03 | UGL |
| 71.2 | $<$ | 3.03 | UGL |
| 64.3 | $<$ | 3.03 | UGL |
| 72.6 | $<$ | 3.03 | UGL |
| 60.9 | < | 3.03 | VGL |
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Chemical Quality Control Report Installation：Fort Devens，
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| NX5701x1 | DV4F＊167 | zPSP | 30－0CT－95 | 27－1 |
| :---: | :---: | :---: | :---: | :---: |
| 5701x | DV4F＊167 | 28 | 30－0CT－95 | 7 －xov－95 |
| 5705x | DV4F＊20 | zFL | 13－sBP－95 | 03－OCT－95 |
| 5705xx | DV4F＊20 | $z 8$ | 13－S8P－95 | 5 |
| ax02x1 | DV4P＊233 | zPSF | 1 | 5 |
| Ax02x1 | DV4F＊233 | zP | 31－0CT－95 | 27－20V－95 |
| MXCZW10x3 | DV4F＊271 | 2FVP | 02－nov－95 | 27－NOV－95 |
| CWN10x3 | DV4P＊271 | zF | 02－NOV－95 | 7－N0V－95 |
| Mxax08B1 | DV4P＊451 | 2FT | 03－NOV | 28－N |
| Cax08B1 | DV4 |  | 03 －NO | 28－8 |

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 Value $<\quad \begin{array}{r}\text { Original } \\ \text { Sample } \\ \text { Value }\end{array}$



 $\stackrel{\square}{6}$

| Field Sample Number | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | Sample Date | $\begin{aligned} & \text { Analyaia } \\ & \text { Date } \end{aligned}$ | Spike Value |
| :---: | :---: | :---: | :---: | :---: | :---: |
| NX5701x1 | DV4W*167 | zfsp | 30-OCT-95 | 27-k0v-95 | 500 |
| MX5701x1 | DV4W*167 | zFSP | 30-0CT-95 | 27-nov-95 | 500 |
| wx5705xx | DV4W*204 | zpLP | 13-SBP-95 | 03-OCT-95 | 500 |
| wx5705xx | DV4W*204 | zpLp | 13-sBP-95 | 03-OCT-95 | 500 |
| mxax02x1 | DV4W*233 | zFSF | 31-0CT-95 | 27-nov-95 | 500 |
| MXAX02x1 | DV4W*233 | zFSP | 31-OCT-95 | 27-nov-95 | 50 |
| MXZN10X3 | DV4W*271 | zFVP | 02-NOV-95 | 27-nov-95 | 500 |
| mXZw10x3 | DV4W*271 | zfVF | 02-NOV-95 | 27-nov-95 | 500 |
| mxax08B1 | DV4W*451 | 2FTP | 03-NOV-95 | 28-nov-95 | 500 |
| MXAX08B1 | DV4W*451 | zPTP | 03-NOV-95 | 28-NOV-95 | 500 |















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| Number | Number | Lot | Date | Datke |




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Chemical Quality Control Report
Installation: Fort Devens, MA (DV) Group 4 sites
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S6－ACN－ST

DV4N＊167 SDSD 30－OCT－95

$\begin{array}{lll}\text { DV4W＊204 } & \text { SDOD } & 13-\text { SBP－95 } \\ \text { DV4W＊233 } & \text { SDSD } & 31-O C T-95 \\ \text { DV4W＊233 } & \text { SDSD } & 31-O C T-95\end{array}$

DV4W＊271 SDTD 02－NOV－95
MX5701X1
MX5701X1
WX5705XX
WX5705XX
MXAX02X1
MXAX02X1
MXZW10X3
MXZW10X3
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Method Description Code

$\begin{array}{lllll} & & & \\ \text { MX5701X1 } & \text { DV4W＊167 SDSD } & 30-O C T-95 & 08-N O V-95 \\ \text { MX5701X1 } & \text { DV4W＊167 SDSD } & 30-O C T-95 & 08-N O V-95\end{array}$

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| T．5 | 2．LL | T08 | \％20 | $>$ | 988＊ | s＊ | 56－ags－9z | S6－dgs－Et | amas |  | xxscolsxm | nacria | £โHم |  |
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| T•s | 2•T8 | Tan | \＄20＊ | $>$ | 90＊＊ | s． | 56－a8s－92 | 56－dBs－EI | amar | toz＊M\＄Sa | XXS0L5xM | natig | Etho |  |
| $6^{\circ}$ | $8 \cdot 98$ | Ton | － $200^{\circ}$ | ＞ | を¢\％ | $s$－ | 56－ACN－7I | 56－500－0¢ | gras | L9t＊MトAO | ExTOLSXN | nygra | Ethn |  |
| $6^{\circ}$ | 9． 48 | Tin | \％ 20 | ＞ | 8E＊＊ | $s$ ． | 56－ACN－7L | 56－LT0－0E | gaax | L9T＊MをAの | LXTOLSXN | negria | عthn |  |
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| $8 \cdot 2$ | 0.25 | Tm | عzo＊ | ＞ | saz | $s$－ |  | 56－son－zo | 93aI | TLZ＊MFAの | Exothzxw | AISNHE | عโ\％ก |  |
| $8 \cdot 2$ | 9．19 | Tan | عとo ${ }^{\circ}$ | ＞ | $80{ }^{\text {－}}$ | $s$ ． | 56－AON－t 1 | 56－10N－20 | gวal | TLZ＊MFムの | Exotmzxa | ajsnar | ع ¢\％ |  |
| I＇z | 8.99 | Ton | ع $20{ }^{\circ}$ | ＞ | －$\varepsilon$－ | 5. | 56－AON－7t | 56－100－TE | gacu | $\varepsilon \varepsilon \tau+M \beta \Omega a$ | IXZOX6XN | arsnge | عโtn |  |
| I＇z | 2•89 | $7 \times 0$ | ع 20 | ＞ | でと． | 5 － | S6－now－8T | 56－บจ0－โع | gacil |  | Ixzoxexw | arsma | عโHก |  |
| ［．9 | 9＊2L | Tan | $\varepsilon z 0^{\circ}$ | ＞ | ع9¢ ${ }^{\circ}$ | $s$ ． | S6－a85－9\％ |  | amal | ¢OZ＊MFSa | xxsolsx | arisker | Ethn |  |
| I．9 | $\boldsymbol{z} \cdot L$ | Ton | ع $20 \cdot$ | ＞ | 988＊ | 5 － | 56－d8s－9z | 56－d8s－$\frac{1}{}$ | amas | Foz＿mbad | xxsolsx | atiskeg | عthn |  |
| 6. | $8 \cdot 89$ | Tm | عzo＊ | ＞ | ＊\％${ }^{\circ}$ | 5 － | S6－now－yI | 56－工20－0¢ | gacis | L9tamind | TxtoLsxh | arsnag | Ethn |  |
| 6. | ＊． 69 | Im | E20＊ | ＞ | くもE | $s$ ． | S6－AON－7T | 56－エフO－0¢ | ！ | L9T＊MFAI | txiocsx | atsexa | ETH\％ |  |
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|  | $0 \cdot 67$ |  |  |  |  |  |  |  |  |  |  | unmTupw |  |  |
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| s．ze | 0.89 | Tan | $8160^{\circ}$ | ＞ | E® | 5 － | 56－son－ti | 56－AON－z0 | Eフal | TLZ＊M＊S | ExOTmzxw | NHCTH | عthn |  |
| s＇zE | 0.67 | TS0 | $8160^{\circ}$ | $>$ | siz | 5. | 56－sati－7I | 56－MON－z0 | Exat | TLZ＊Mbлの | ExOTmzxW | NAGTH | عเนก |  |
| s ${ }^{\text {c }}$ | $0.6 \tau 5$ | T0n | $8560^{\circ}$ | ＞ | 569 ${ }^{\circ}$ | s． | 56－ncN－7I | 56－50－TE | gaax | عEz $*$ Mbлa |  | NagTy | عт\％ก |  |
| $\mathrm{s}^{\circ}$ | 9.651 | Tin | $8160^{\circ}$ | ＞ | $865^{\circ}$ | $s$ ． | 56－A0x－7t | 56－100－IE | gada | EEZ＊MねAd | Ixzoxxxw | NJCTY | عโ\％ |  |
| \％＇I | 0.66 | Tin | $8160^{\circ}$ | $>$ | $565^{\circ}$ | 5. | 56－dgs－92 | 56－d8s－ET | aral | ¢0z＊mbsa | joxsolsxa | NSOTY | ¢ ¢\％ |  |
| $\boldsymbol{z}$ I | \％．00t | ITO | $8160^{\circ}$ | $>$ | 505＊ | $\mathrm{s}^{\text {．}}$ | 56－das－92 | 56－ats－ET | amar． | toz＊Mrsa | xxscolsxy | Nraty | عthn |  |
| $\varepsilon \cdot \tau$ | 8．LIt | TEn | $8160^{\circ}$ | ＞ | $685^{\circ}$ | $s$ ． | 56－san－7I | 56－【จO－0¢ | gacur | L9I＊M＊AO | rxroossw | negre | ¢т\％ก |  |
| $\varepsilon \cdot \tau$ | 9－02T | 700 | $8160^{\circ}$ | $>$ | E09 | 5. | 56－AON－\％T | 56－【フO－0E | 8gat | L9tambsa | TXT0LSEN | Neaty | ELH |  |
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TABLE D-11

Chemical Quality Control Report
Installation: Port Devens, MA (DV) Group 4 Sitea,
MS/MSD



| Value | Original <br> Sample <br> Value Units |  |
| ---: | ---: | ---: |
| 40800 | 30400 | UGL |
| 39600 | 30400 | UGL |
| 202000 | 76700 | UGL |
| 200000 | 76700 | UGL |
| 30700 | 76700 | UGL |
| 22700 | 76700 | UGL |
| 40400 | 58000 | UGL |
| 39600 | 58000 | UGL |
| 78400 | 51200 | UGL |
| 78400 | 51200 | UGL |






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 Chemical Quality Control Report Installation：Fort Devens，MA（DV）
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Chemical Quality Control Report
Installation: Port Devens, MA (DV) Group 4 sites MS/MSD


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Installation: Port Devens, MA (DV) Group 4 Sites







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Chemical Quality Control Report
Installation：Fort Devens，MA（DV） Installation：Fort Devens，
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Chemical Quality Control Report Installation：Fort Devens，
Group 4 Sites
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| Method Description | IRDMIS Method Code | Test | $\begin{aligned} & \text { IRDMIS } \\ & \text { Field } \\ & \text { Sample } \\ & \text { Number } \end{aligned}$ | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | Chemical quality Control Report Installation: Fort Devens, MA (DV) Group 4 Sites <br> MS/MSD |  |  | Value |  |  | Onits | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | Sample Date | Analysia <br> Date | $\begin{aligned} & \text { Spike } \\ & \text { Value } \end{aligned}$ |  |  | $\begin{gathered} \text { Original } \\ \begin{array}{c} \text { Sample } \\ \text { Value } \end{array} \end{gathered}$ |  |  |  |
|  |  | ********** <br> avg minimum maximum |  |  |  |  |  |  |  |  | . |  | 78.9 65.0 94.4 |  |
|  | UH13 | DLDRN | MXG302×2 | DV4W*1.64 | TDRB | 12-PBB-96 | 08-MAR-96 | . 5 | . 449 | $<$ | . 024 | USL | 89.8 | 25.9 |
|  | UH13 | DLDRN | MXG302x2 | DV4W*164 | TDRE | 12-PEB-96 | 08-MAR-96 | . 5 | . 346 | < | . 024 | UGL | 69.2 | 25.9 |
|  | UH13 | DLDRN | MXAX03X2 | DV4W*236 | TDTB | 14-PEB-96 | 12-MAR-96 | . 5 | . 372 | $<$ | . 024 | UGL | 74.4 | 25.9 3.8 |
|  | UH13 | didrn | MXAX03X2 | DV4W*236 | TDTB | 14-PEB-96 | 12 -MAR-96 | . 5 | . 358 | < | . 024 | vel | 71.6 | 3.8 |
|  | $\mathrm{UH13}^{4}$ | DLDRN | MXZZ122X4 | DV4W*276 | TORS | 13-PEB-96 | 08-MAR-96 | . 5 | . 478 | < | . 224 | USL | 95.6 | 27.6 |
|  | UH13 | $\xrightarrow[* * * * * * * * * * ~]{\text { DLDR }}$ | MXZW12X4 | DV4W*276 | TDRB | 13-FEB-96 | 08-MAR-96 | . 5 | . 362 | < | . 224 | UEL | 72.4 | 27.6 |
|  |  | avg |  |  |  |  |  |  |  |  |  |  | 78.8 |  |
|  |  | ${ }^{\text {minimum }}$ |  |  |  |  |  |  |  |  |  |  | 69.2 |  |
|  |  | maximum |  |  |  |  |  |  |  |  |  |  | 95.6 |  |
|  | UH13 | Endon | mXG302X2 | DV4W*164 | TDRE | 12-FEB-96 | 08-MAR-96 | . 5 | . 387 | < | . 0238 | USL | 77.4 | 28.0 |
|  | $\mathrm{UH13}^{4}$ | ENDRN | mxG30292 | DV4W*164 | TDRE | 12-FRB-96 | 08-MAR-96 | . 5 | . 292 | - | . 0238 | UGL | 58.4 | 28.0 |
|  | UH13 | ENDRN |  | DV4W*236 | TDTB | 14-FEB-96 | 12-MAR-96 | . 5 | . 377 | $<$ | . 0238 | UGL | 75.4 | 4.3 |
|  | $\mathrm{UH13}$ | ENDRN | Mxax03X2 | DV4W*236 | TDTB | 14-PEB-96 | 12-MAR-96 | . 5 | . 361 | < | . 0238 | ves | 72.2 | 4.3 |
|  | $\mathrm{UH13}^{\text {che }}$ | ENDRN | MXZN1234 | DV4W*276 | TDRE | 13-8EB-96 | 08-MAR-96 | . 5 | . 413 | < | . 0238 | usl | 82.6 | 28.5 |
|  | UH13 | $\underset{* * * * * * *}{\text { SNR }}$ | nxzw22X4 | DV4W*276 | TDRE | '23-FEB-96 | 08-MAR-96 | . 5 | . 31 | < | . 0238 | usb | 62.0 | 28.5 |
|  |  |  |  |  |  |  |  |  |  |  |  |  | 71.3 |  |
|  |  | ${ }_{\text {minimum }}$ |  |  |  |  |  |  |  |  |  | - | 58.4 |  |
|  |  | maximum |  | . |  |  |  |  |  |  |  |  | 82.6 |  |
|  | UH13 | HPCL | MxG302x2 | DV4W*164 | TDRB | 12-PEB-96 | OB-MAR-96 | . 5 | . 496 | < | . 0423 | UGL | 99.2 | 24.9 |
|  | UH13 | HPCL | MXG302x2 | DV4W*164 | TDRB | 12-PRB-96 | 08-MAR-96 | . 5 | . 386 | < | . 0423 | UGL | 77.2 | 24.9 |
|  | UH13 | HPCL | MXAX03X2 | DV4W*236 | TDTB | 14-PBB-96 | 12-MAR-96 | . 5 | . 411 | < | . 0423 | usi | 82.2 | 2.2 |
|  | UH13 | HPCL | MXAX03x2 | DV4W*236 | TDTE | 14-PR8-96 | 12-MAR-96 | . 5 | . 402 |  | . 0423 | UGL | 80.4 | 2.2 |
|  | $\mathrm{UH13}_{\text {UH13 }}$ | ${ }_{\text {HPCL }}$ | MXZN12X4 | DV $4 \mathrm{~W}+276$ DV $4 \mathrm{~W} * 275$ | TDRE | 13-PRB-96 | OB-MAR-96 | . 5 | . 524 |  | . 0423 | ugl | 104.8 | 29.1 |
|  | UH13 | ${ }_{* * * * * * * * * * ~}^{\text {HPCL }}$ | mXZW12X4 | DV4W*276 | TDRE | 13-p8B-96 | 08-MAR-96 | . 5 | . 391 | < | . 0423 | UGL | 78.2 | 29.1 |
|  |  | avg <br> minimum |  |  |  |  |  |  |  |  |  |  | 87.0 |  |
|  |  | maximun |  |  |  |  |  |  |  |  |  |  | $\begin{array}{r} 77.2 \\ 104.8 \end{array}$ |  |


| Method Description | IRDMIS Method code | TestName | IRDMIS <br> Pield <br> Sample <br> Number | Lab | Lot | Chemical Quality Control Report Installation: Fort Devens, MA (DV) Group 4 Sites <br> MS/MSD |  |  | value |  | Original$\begin{gathered}\text { Sample } \\ \text { Value }\end{gathered}$ | Units | Percent Recovery | RPp |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | $\begin{aligned} & \text { Sample } \\ & \text { Date } \end{aligned}$ | Analysis Date | Spike Value |  |  |  |  |  |  |
|  | UH13 | ISODR | MXG302X2 | DV4**164 | TDRE | 12-FEB-96 | 08-MAR-96 | 1 | . 937 | < | . 0562 | UEL |  |  |
|  | UH13 | ISODR | MXG302x2 | DV4w*164 | TORE | 12-PEB-96 | OB-MAR-96 | 1 | . 733 | $<$ | . 0562 | Ves | 93.7 73.3 | 24.4 |
|  | UH23 | ISODR | MxAX03x2 | DV4w+236 | TDTB | 14-PBB-96 | 12 -MAR-96 | 1 | . 746 | < | . 0562 | UGL | 74.6 | 2.4 2.0 |
|  | UH13 | ISODR | MXAX03×2 | DV4W+236 | TDTB | 14-P88-96 | 12 -MAR-96 | 1 | . 731 | < | . 0562 | vGL | 73.1 | 2.0 |
|  | UH13 | ISODR | MXZW12X4 | DV4W*276 | TDRB | 13-PBB-96 | OB-MAR-96 | 1 | . 986 | < | . 05652 | UGL | 73.1 98.6 | 2.0 27.7 |
|  | UH13 | ISODR | mxZw12X4 | DV4**276 | TDRB | 13-PBE-96 | 08-MAR-96 | 1 | . 746 | < | . 0562 | UGE | 74.6 | 27.7 |
|  |  | avg |  |  |  |  |  |  |  |  |  |  | 81.3 |  |
|  |  | minimun maximum |  |  |  |  |  |  |  |  | . |  | 73.1 98.6 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | UH 13 | Lin | Hxas $02 \times 2$ | DV4w*164 | TDRE | 12-PBB-96 | 08-MAR-96 | . 5 | . 334 | < | . 0507 | UGL | 66.8 | 22.8 |
|  | UH13 | LIN | MXG302x2 | DV4W*154 | TDRB | 12-PBB-96 | 08-MAR-96 | . 5 | . 42 | < | . 0507 | UEL | 84.0 | 22.8 22.8 |
|  | UH13 | Lin | MXAX03x2 | DV4**236 | TDTB | 14-7EB-96 | 12 -MAR-96 | . 5 | . 33 | < | . 0507 | ves | 66.0 | 3.1 |
|  | $\mathrm{OH13}^{13}$ | Lin | Mxax03x2 | DV4W*236 | тDTB | 14-PBB-96 | 12 -MAR-96 | . 5 | . 32 | $<$ | . 0507 | UGL | 64.0 | 3.1 |
|  | $\mathrm{CH13}^{\text {che }}$ | ${ }_{\text {LIN }}$ | nxZw12x4 | DV4 * 276 | TDRE | 13-FEB-96 | 08-MAR-96 | . 5 | . 452 | < | . 0507 | USL | 90.4 | 27.1 |
|  | UH13 | $\operatorname{LIN}_{\boldsymbol{\text { LI******* }}}$ | MXZW12X4 | DV4**276 | TDRB | 13-7EB-96 | 08-MAR-96 | . 5 | . 344 | < | . 0507 | vel | 68.8 | 27.1 |
|  |  |  avg |  |  |  |  |  |  |  |  |  |  | 73.3 |  |
|  |  | minimum |  |  |  |  |  |  |  |  |  |  | 73.3 64.0 |  |
|  |  | maximum |  |  |  |  |  |  |  |  |  |  | 64.0 90.4 |  |
|  | UH23 | mexctr | MxG302x2 | DV4W*164 | TDRB | 12-FER-96 | 08-MAR-96 | 1 | . 921 | $<$ | . 057 | USL | 92.1 | 48.8 |
|  | UH13 | mexcler | mXe302x2 | DV4**164 | TDRE | 12-FEB-96 | O8-mar-96 | 1 | . 56 | < | . 057 | UGL | 56.0 | 48.8 |
|  | UH13 | mbxCle | Mxax03x2 | DV4W*236 | TDTB | 14-PEB-96 | 12-MAR-96 | 1 | . 944 | < | . 057 | ves | 94.4 | 5.8 |
|  | $\mathrm{UH13}^{4}$ | mexctr | MXAXO3X2 | DVW*236 | TDTB | 14-FEB-96 | 12-MAR-96 | 1 | 1 | < | . 057 | UGL | 100.0 | 5.8 |
|  | UH13 | mexclir | HxZW12x4 | DV4w*276 | TDRB | 13-pig-96 | 08-mar-96 | 1 | . 952 | < | . 057 | vel | 95.2 | 38.1 |
|  | UH13 | MEXCTR | MXZW12X4 | DV4W*276 | TDRE | 13-FRB-96 | 08-MAR-96 | 1 | . 647 | < | . 057 | USL | 64.7 | 38.1 |
|  |  | avg |  |  |  |  |  |  |  |  |  |  | 83.7 |  |
|  |  | minimum |  |  |  |  |  |  |  |  |  |  | 83.7 56.0 |  |
|  |  | maximum |  |  |  |  |  |  |  |  |  |  | 100.0 |  |
|  | $\mathrm{UH13}^{3}$ | PrDDT | MXXG30292 | DV4W*164 | TDRB | 12-PBB-96 | 08-mar-96 | . 5 | . 509 | < | . 034 | UGL | 101.8 | 36.7 |
|  | $\mathrm{UH13}_{\mathrm{UH13}}$ | PPDDT | MXG30222 | DV4W*164 DV4W* 235 | TDRB | 12-PEB-965 | 08-MAR-96 | . 5 | . 351 | < | . 034 | UGL | 70.2 | 36.7 |
|  | UH13 | PRDDT | MXAX $03 \times 2$ | DV4W*236 | TDTB | 14-PBB-95 | 12-MAR-96 | . 5 | . 463 | $<$ | . 034 | uga | 92.6 | 36.7 |



| Method Deacription | IRDMIS Method Code | Test Name | IRDMIS <br> Field <br> Sample <br> Number | Lab <br> Number: | Lot | Sarople <br> Date | Analyais Date | Spike <br> Valua |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | UH13 | Prdot | MXAX03 ${ }^{\text {P2 }}$ | DV4W*236 | TDTE | 14-FEB-96 | 12-MAR-96 | . 5 |
|  | UH13 | PRDDT | MX2N12X4 | DV4W*276 | TDRB | 13-FBB-96 | 08-MAR-96 | . 5 |
|  | UH13 | PPDDT | MXEW12X4 | DV4W*276 | TDRS | 13-FBB-96 | OB-MAR-96 | . 5 |
|  |  | avg <br> minimum <br> maximum |  |  |  |  |  |  |

Table D-12
Elements with Matrix Spike Recoveries in Water

- Outside USEPA Criteria

1995 AOC 57, 63AX, 69W Remedial Investigation
Fort Devens, Massachusetts

| Element | FREQUENCY of RECOVERY OUTSIDE USEPA CLP IMITS 1 | Recovery fange |
| :---: | :---: | :---: |
| Groundwater |  |  |
| Mercury ${ }^{1}$ | 2/12 | 70.8-72.8 |
| Arsenic ${ }^{1}$ | 1/16 | 128 |
| Antimony ${ }^{1}$ | 1/16 | 74.5 |
| Calcium ${ }^{1}$ | 1/16 | 134 |
| Iron ${ }^{1}$ | 5/16 | 49-145 |
| Manganese ${ }^{1}$ | 2/16 | 58.8-71.6 |
| Lead ${ }^{2}$ | 4/16 | 52.8-55.3 |
| Selenium ${ }^{2}$ | 4/16 | 35.2-53.6 |
| Arsenic ${ }^{2}$ | 1/16 | 135.7 |
| Antimony ${ }^{2}$ | 6/16 | 39.5-74.9 |
| Manganese ${ }^{2}$ | 1/16 | 133.4 |
| Surface Water |  |  |
| Iron ${ }^{1}$ | 1/4 | 129 |

${ }_{2}^{1}=$ Spike results from the 1995 Fort Devens Site Investigation.
${ }^{2}=$ Spike results from the Round 2 Groundwater sampling event.

## Elements with Matrix Spike Recoveries in Soll Outside USEPA CLP LImits <br> 1995 AOC 57, 63AX, 69W Remedial Investigation Fort Devens, Massachusetts

| \%./.ElEMENT | Frequency of recovery outside USEPA CEP LIMITS | Recovery Range |
| :---: | :---: | :---: |
| Mercury | 2/10 | 39.2-41.7 |
| Aluminum | 10/10 | 0.9-504.7 |
| Iron | 10/10 | 0.4-462.3 |
| Selenium | 6/10 | 60.0-134.5 |
| Lead by GFAA | 6/6 | 23.7-140.5 |
| Arsenic | 6/10 | 28.4-186.3 |
| Manganese | 7/10 | 4.0-477.4 |
| Nickel | 1/10 | 128.3 |

Table D-14

## Elements with Matrix Spike Recoveries in Sediment Outside USEPA Criteria

1995 AOC 57, 63AX, 69W Remedial Investigation Fort Devens, Massachuseits

| Element | Frequency of Recovery OUTSIDE USEPA CLP LIMITS | Recovery Range |
| :---: | :---: | :---: |
| Arsenic | 2/4 | 12.4-12.6 |
| Antimony | 2/4 | 126.0-126.7 |
| Manganese | 1/4 | 4.1 |
| Aluminum | 4/4 | 0.5-1.2 |
| Iron | 4/4 | 0.2-48.7 |

## Pesticide and PCBs with Soil Matrix Spike Recoveries Outside USEPA CLP LImits

1995 AOC 57, 63AX, 69W Remedial Investigation Fort Devens, Massachusetts

| Element | FREquency of Recovery OUTSIDE USEPA CLP LIMITS | Recovery Range |
| :---: | :---: | :---: |
| Endosulfan II | 2/8 | 169.8-181.1 |
| Aroclor 1260 | 2/8 | 226-226.0 |
| 4,4-DDT | 2/8 | 143.8-153.4 |

## Hardness Data with Matrix Spike Recoveries in Water Samples

 Outside Control Limits1995 AOC 57, 63AX, 69W Remedial Investigation Fort Devens, Massachusetts

| . Element | Frequency of Recovery Outside USEPA CLP Limits | Recovery Range |
| :---: | :---: | :---: |
| Groundwater |  |  |
| Hardness ${ }^{1}$ | 6/10 | 1.3-35.0 |
| Hardness ${ }^{2}$ | 2/10 | 17.1-23.1 |

${ }^{1}=$ Data collected during the 1995 Fort Devens Field Investigation.
${ }^{2}=$ Data collected during the 1996 Round 2 Groundwater sampling event.

Table D-17
USEPA CLP Surrogate Recovery Criteria for SVOCS
1995 AOC 57, 63AX, 69W Remedial investigation Fort Devens, Massachusetts

| SURROGATE | Percent Recovery Limits for Water | PERCENT RECOVERY Limits for Soll |
| :---: | :---: | :---: |
| 2-Fluorophenol | 21\% to 100\% | 25\% to $121 \%$ |
| Phenol-D6 | 10\% to $94 \%$ | 24\% to $113 \%$ |
| 2,4,6-Tribromophenol | 10\% to $123 \%$ | 19\% to 122\% |
| Nitrobenzene-D5 | 35\% to 114\% | 23\% to $120 \%$ |
| 2-Fluorobiphenyl | 43\% to 116\% | 30\% to 115\% |
| Terphenyl-D14 | $33 \%$ to $141 \%$ | 18\% to $137 \%$ |

Table D-18
usepa clp Surrogate Recovery Criteria for vocs
1995 AOC 57, 63AX, 69W Remedial Investigation Fort Devens, Massachusetts

| Surrogate: | PERCENT RECOVERY LIMITS FOR WATER | Percent Recovery lmits FOR SOIL |
| :---: | :---: | :---: |
| 1,2-Dichloroethane-D4 | 76\% to 114\% | 70\% to $121 \%$ |
| 4-Bromofluorobenzene | $86 \%$ to $115 \%$ | 74\% to 121\% |
| Toluene-D8 | 88\% to $110 \%$ | 81\% to 117\% |

sample duplicatbs (non-filterrd samples)


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| Method Description | Method Code | $\begin{aligned} & \text { Teat } \\ & \text { Name } \end{aligned}$ | $\begin{aligned} & \text { IRDMIS } \\ & \text { Pield } \\ & \text { Sample } \\ & \text { Number } \end{aligned}$ | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | $\begin{aligned} & \text { Sample } \\ & \text { Date } \end{aligned}$ | Analysis Date | $<$ | Value | Units | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| PB IN SOIL BY Gran | JD17 | $\mathrm{PB}_{8}$ | BXZW0100 | DV4S*435 | овев | 19-SBP-95 | 16-OCT-95 |  | 7.53 | UGG | 8.6 |
| PB IN SOIL by gran | JD17 | PB | Bxzwoioo | DV4S*246 | OBQ | 19-SBP-95 | 16-OCT-95 |  | 6.91 | UGg | 8.6 |
| PB IN SOIL by gran | JD17 | PB | EX570405 | DV4S*104 | OBQ | 19-SBP-95 | 16-0CT-95 |  | 1.83 | Ueg | 1.1 |
| PB IN SOIL BY GPAA | JD17 | PB | 8D570405 | DV4S*436 | OBQB | 19-SBP-95 | 16-OCT-95 |  | 1.81 | UGG | 1.1 |
| AS IN SOIL BY GPAA | J19 | As | BDAX0215 | DV4S*442 | Q $\mathrm{max}^{\text {a }}$ | 27-sEP-95 | 24-OCT-95 |  | 11.7 | UGG | 52.4 |
| As in soil by gran | J019 | AS | BxAX0215 | DV4S*217 | Q $\mathrm{BXB}^{\text {a }}$ | 27-s8P-95 | 24-OCT-95 |  | 20 | UGG | 52.4 |
| As IN SOIL by Gran | JD19 | AS | Bxzw0100 | DV4S*435 | QbVE | 19-SBP-95 | 18-OCT-95 |  | 10.6 | UGG | 27.6 |
| AS IN SOIL BY Gras | SD19 | AS | BXZW0100 | DV4S*246 | QBVB | 19-SBP-95 | 18-OCT-95 |  | 14 | UGG | 27.6 |
| As In Soil by gran | J019 | As | Dx570300 | DV4S*187 | QBus | 13-sBP-95 | OB-OCT-95 |  | 180 | Ueg | 40.0 |
| AS IN SOIL by gran | JD19 | AS | DD570300 | DV4S*431 | Qbus | 13-SBP-95 | OB-OCT-95 |  | 120 | UGG | 40.0 |
| AS IN SOIL by gran | JD19 | As | Dxzw0100 | DV4S*289 | QBus | 11-sBP-95 | 08-OCT-95 |  | 9.95 | UGG | 16.7 |
| AS IN SOIL BY GPAA | JD19 | AS | DDZW0100 | DV4S*400 | QBUB | 11-SBP-95 | 08-OCT-95 |  | 8.42 | UGG | 16.7 |
| as in soil by gram | JD19 | AS | EX570405 | DV4S*104 | QBVE | 19-SBP-95 | 18-OCT-95 |  | 9.68 | UGG | 10.0 |
| AS IN SOIL bX GFAA | TD19 | As | ED570405 | DV4S*436 | QBVB | 19-SBP-95 | 18-OCT-95 |  | 10.7 | UGG | 10.0 |
| TL IN SOIL BY GPAA | SD24 | TL | BXAX0215 | DV4S*217 | Rbgb | 27-SBP-95 | 22-OCT-95 | < | . 5 | veg | 0.0 |
| TL IN SOIL BY GPAA | JD24 | TL | BDAX0215 | DV4S*442 | rbge | 27-s8P-95 | 22-OCT-95 | < | . 5 | UGG | 0.0 |
| TL IN SOIL BY GFAA | JD24 | TL | BXZN0100 | DV4S*246 | RBFB | 19-SBP-95 | 15-OCT-95 | < | . 5 | UGG | 0.0 |
| TL IN SOIL BY GPAA | J024 | TL | BXZw0100 | DV4S*435 | RbFB | 19-SBP-95 | 15-OCT-95 | < | . 5 | UGG | 0.0 |
| TL IN SOIL BX GPAA | SD24 | TL | DX570300 | DV4S*187 | RBRE | 13-SEP-95 | 09-OCT-95 | $<$ | . 5 | UsG | 0.0 |
| TL IN SOIL BY GPAA | SD24 | TL | DD570300 | DV4S*431 | RBEB | 13-SEP-95 | 09-OCT-95 | < | . 5 | UGG | 0.0 |
| TL IN SOIL BY Gram | JD24 | TL | DXZW0100 | DV4S*289 | RBEB | 11-SEP-95 | 09-OCT-95 | < | . 5 | UGG | 0.0 |
| TL IN SOIL BY GPAA | JD24 | TL | DDEW0100 | DV4S*400 | RBEB | 11-SBP-95 | 09-OCT-95 | < | . 5 | UGG | 0.0 |
| TL IN SOIL BY Gram | S024 | TL | ED570405 | DVAS*436 | RBPB | 19-SEP-95 | 15-OCT-95 | < | . 5 | UGG | 0.0 |
| TL IN SOIL BY Grat | JD24 | TL | EX570405 | DV4S*104 | RBFB | 19-SEP-95 | 15-OCT-95 | $<$ | . 5 | UGG | 0.0 |
| SB IN SOIL BY GPAA | JD25 | SB | Bxax0215 | DV4S*217 | sbob | 27-38P-95 | 25-OCT-95 | < | 1.09 | UGG | 0.0 |
| SB IN Soil by gran | TD25 | ss | BDAX0215 | DV4S*442 | SBob | 27-3BP-95 | 25-OCT-95 | $<$ | 1.09 | UGG | 0.0 |
| SB IN SOIL BY GrAA | JD25 | SB | BxZw0100 | DV4S*246 | SBNB | 19-SEP-95 | 18-OCT-95 | < | 1.09 | UGG | 0.0 |

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Chemical Quality Control Report
Installation: Fort Devens, MA (DV)
SAMPLB DUPLICATBS (NON-FILITRRBD SAMPLBS)
















Chemical Quality Control Report
Installation：Fort Devens，MA（DV） Installation：Fort Devens，MA（DV）
Group 2، 7 Sites
sAMPLB DUPLICATBS（NON－PILTBRED SAMPLBS）


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| bNA'S IN SOIL by Gc/ms | LM18 | 12DPH | EX570405 | DVAS*104 | OBOG | 19 -sBP- | 29-SBP-95 |
| bNA's IN SOIL by gc/ms | LM18 | 13DCLIB | Bxax0215 | DV | OETG | 27-SBP-95 | 10-OCT-95 |
| bNA'S IN SOIL BY Gc/ms | LM18 | 13 DCLB | BDAX0215 | DV4S*442 | OB | 27-8BP-95 | 10-0CT-95 |
| BNA'S IN SOIL BY GC/ms | LM18 | 13DCLB | Exzwoiot | DV4S*246 | Osco | 19-SBP- | 30-SEP-95 |
| BNA's IN SOIL BY GC/ms | LM18 | 13 DCLB | BXZw0100 | DV4S*435 | OB | 19-SBP-95 | 30-SEP-95 |
| bNA's IN SOIL BY Gc/ms | [M18 | 13 DCLB | DD570300 | DV4S*431 | OBLG | 13-SBP-95 | 26-SRP-95 |
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| BNA'S IN SOIL BY GC/Ms | 18 | 13 DCLB | DDEw0100 | DV4S*400 | OBJG | 11-SBP-95 | 28-SEP-95 |
| BNA's IN SOIL BY GC/ms | [M18 | 13DCLB | kD570405 | DV4S*436 | OBOC | 19-SBP-95 | 29-SBP-95 |
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| BNA's IN SOIL BY GC/ms | LM18 | 14DCLB | BXZN0100 | DV4S*435 | OBOG | 19-SBP-95 | 30-SEP-95 |
| BNA'S IN SOIL BY GC/MS | 18 | 14DCLB | BXzwo100 | DV4S*246 | OBO | 19-SEP-95 | 30-SEP-95 |
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| BNA'S IN SOIL BX GC/ms | LM18 | 245 TCP | BDAX0215 | DV4S*442 | OETG | 27-SBP-95 | 10-OCT-95 |
| BNA'S IN SOIL BY GC/MS | IM18 | 2457 CP | BXzw0100 | DV4S*246 | OBO | 19-SBP-95 | 30-S8P-95 |
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| BNA'S IN SOIL BY GC/Ms | IM18 | 2457 CP | DX570300 | DV4S*187 | bikc | 13-SBP-95 | 26-S8P-95 |
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| ENA'S IN SOIL BY GC/ms | [M18 | $2457 C P$ | DDZw0100 | DV4S*400 | OBJG | 21-SBP-95 | 28-SEP-95 |
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Chemical Quality Control Report
Installation：Fort Devens，MA（DV）
SAMPLR DUPLICATBS（NON－PILTERED SAMPLBS）

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## Chemical Quality Control Report Installation：Fort Devens，MA（DV）

SAMPLB DUPLICATBS（NON－FILTERED SAMPLES）
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Chemical Quality Control Report
Installation：Fort Devens，MA（DV）
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Chemical Quality Oontrol Report
Installation: Fort Devens, MA (DV)
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Chemical Quality Control Report
Installation：Fort Devens，MA（DV）
SAMPLB DUPLICATBS（NON－FILTBRBD SAMPLBS）



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DV\＆W＊ 165 ZFSF DV4W＊450 ZFTP
OV4W＊275 ZFTP $\begin{array}{llll}\text { MXZW12X3 } & \text { DV4W＊275 ZFIP } & 02-\text { NOV－95 } & 28-N O V-95 \\ \text { WD5703XX } & \text { DV4W＊432 ZFLP } & 13-98 P-95 & 03-\text { OCT－95 }\end{array}$ $\begin{array}{lllll}\text { MDAXO3X1 } & \text { DV4W＊447 } & \text { ZPSP } & 31-O C T-95 & 27-\mathrm{NOV}-95 \\ \text { MXAXO3X1 } & \text { DV } 4 \mathrm{~W}+235 & \text { ZFSF } & 31-O C T-95 & 27-\mathrm{NOV}-95\end{array}$ DV4W＊ 418 2PSP $\begin{array}{lll}\text { DV4W＊} 165 \text { ZPSP } & 31-\mathrm{OCT}-95 & 27-\mathrm{NOV}-95 \\ \text { DV4 } 4450 \text { 2FTP } & 02-\mathrm{NOV}-95 & 28-\mathrm{NOV}-95\end{array}$ MXZZ12X3 DVAW 275 zFTF 02 －NOV－95 $28-\mathrm{NOV}-95$
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Chemical quality Control Report
Inctallation: Port Dovens, MA (DV)
Group 2, 7 sites
SAMPLE DUPLICATRS (NON-PILITRPED SAMPLBS)

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Chemical Quality Control Report
Installation：Fort Dovens，MA（DV）
SAMPLB DUPLICATBS（NON－PILTERED BAMPLRS）

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Chemical Quality Control Report
Installation: Fort Devens, MA (DV)
SAMPLB DUPLICATBS (NON-FILTERED SAMPLBS)


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| Method Description | IRDWIS Method Code | Teat Name |
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| BNA＇S IN WATER BY GC／ms | UN18 | 2NP |
| bNA＇S IN WATBR BY Gc／ms | UM18 | 2NP |
| BNA＇S IN WATBR BY GC／MS | UN1B | 2 NP |


MDZN12X3
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| MDEW12X3 | DV4W＊450 | WDHI | 02－NOV－95 | 05－DBC－95 |
| MXZW12K3 | DVAW＊275 | WDHI | 02－NOV－95 | 05－DEC－95 |
| WD5703xx | DV4W＊432 | WDWH | 13－s8P－95 | 27－s88－95 |
| nX5703xX | DV4W＊202 | WDWH | 13－88P－95 | 26－SEP－95 |

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SAMPLR DUPLICATBS (NON-PILTERRE SAMPLES)


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| Method | Description | IRDMIS Mathod Code | Test <br> Name |
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| BNA＇s | IN WATER BY GC／MS | UM18 | CARBAZ |
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| BNA＇S | IN WATER BY GC／MS | UM18 | CARBAZ |
| BNA＇S | IN WATER BY GC／Ms | UN18 | CARBAZ |
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| BNA＇S | IN WATER BY GC／ms | UH18 | CHRY |
| BNA＇S | IN NATER BY GC／MS | UM18 | CHRY |
| BRN＇S | IN KATBR BY GC／ms | U18 | CHRY |
| BNA＇S | IN NATER BY GC／ms | UM18 | CHRY |
| bin＇s | IN NATBR BY GC／MS | UM14 | CRRY |
| BNA＇S | IN WATER BY GC／MS | UM12 | CHRY |
| BNa＇s | IN Matbr by gc／ms | UM18 | CL6B2 |
| BNA＇s | IN matEr by GC／ms | UM18 | CL6BZ |
| BRN＇S | IN WATBR BY GC／ms | UM18 | CL6Bz |
| BNU＇S | IN WATER BY GC／MS | UM18 | CL682 |
| BREA＇S | IN MATER BY GC／mS | UH18 | CL6B2 |
| BRU＇S | IN WATER BY GC／hs | UH18 | CL682 |
| BNA＇S | IN WATER BY GC／MS | UM18 | CL682 |
| BRA＇S | IN NATER BY GC／MS | U418 | CL6Bz |
| ben＇s | IN WATER EY OC／MS | Un18 | CL6CP |
| BRL＇S | IN WATER BY GC／Ms | UM18 | CL6CP |
| BRA＇S | IN MATER BY GC／MS | 0 H 18 | CL6CP |
| bina＇s | IN NATER BY CC／MS | UN18 | CL6CP |
| bind | IN WATBR BY Ge／ms | UM18 | CL6CP |
| bind ${ }^{\text {a }}$ | IN WATER BY GC／HS | UN19 | CL6CP |
| BRNA＇S | IN WATER BY GC／ms | Un18 | CL6CP |
| BRA＇S | IN WATIRR BY GC／MS | UN18 | CL6CP |
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SAMPLB DUPLICATRS (NON-PILTERED SAMPLRS)


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 Method Description
BNA＇s IN WATER BY CC／M
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| Method Description | IRDMIS Method Codo | Tent Name | IRDNIS <br> Field <br> Sawple <br> Number | Lab <br> Number | Lot | Sample Date | Analyais Date | $<$ | Value | Units | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| BNA'S IN WATER BY GC/ms | UM18 | PCB221 | MX2W12x3 | DV4W*275 | WDHI | 02-NOV-95 | 05-DEC-95 | < | 21 | DGL | 0.0 |
| BNA'S IN WATER BY GC/ms | UM18 | PCB221 | MDEW12X3 | DV4W*450 | WDHI | 02-NOV-95 | 05-DBC-95 | < | 21 | Uel | 0.0 |
| BNA'S IN WATER BY GC/MS | UN18 | PC8221 | WX5703x | DV4W*202 | WDWH | 13-SEP-95 | 26-SEP-95 | $<$ | 21 | UGL | 0.0 |
| BNA'S IN MATER EY GC/MS | UM18 | PCB221 | WD5703xX | DV4W*432 | WDWH | 13-SBP-95 | 27-S8P-95 | $<$ | 21 | UGL | 0.0 |
| BNA'S IN WATER BY GC/ms | UM18 | PCB232 | MDAX03X1 | DV4W*447 | WDPI | 31-OCT-95 | 13-NOV-95 | $<$ | 21 | UGL | 0.0 |
| BNA'S IN WATER BY GC/MS | UM18 | PCB232 | MXAX03×1 | DV4W*235 | WDPI | 31-0CT-95 | 13-NOV-95 | $<$ | 21 | UCL | 0.0 |
| BNA'S IN WATER BY GC/MS | UM18 | PCB232 | NXG307×1. | DV4W*165 | WDPI | 31-OCT-95 | 13-M0V-95 | $<$ | 21 | UGL | 0.0 |
| BNA'S IN WATER EY GC/MS | UM18 | PCB232 | MDG3 07x1 | DV4W*448 | WDPI | 31-OCT-95 | 13-NOV-95 | < | 21 | UCL | 0.0 |
| BNA'S IN WATER BY GC/MS | U418 | PCB232 | NX2N12X3 | DV4W*275 | WDHI | 02-NOV-95 | 05-DBC-95 | $<$ | 21 | UGL | 0.0 |
| BNA'S IN WATER EX GC/MS | UM18 | PCB232 | HDZN12X3 | DViW $=450$ | WDHI | 02-NOV-95 | 05-DRC-95 | $<$ | 21 | UGL | 0.0 |
| ENA'S IN WATRR BY GC/ms | UM18 | PCB232 | WX 5703xx | DV4W*202 | WDWH | 13-SEP-95 | 26-88P-95 | < | 21 | UGL | 0.0 |
| BNA'S IN WATER BY GC/MS | U418 | PC8232 | WD5703x | DV4W*432 | WDWH | 13-SEP-95 | 27-S8P-95 | $<$ | 21 | UGL | 0.0 |
| BNA'S IN WATER BY GC/MS | UM18 ${ }^{\text {- }}$ | PCB242 | MDAX03X1 | DV4W*447 | WDPI | 31-OCT-95 | 13-NOV-95 | $<$ | 30 | UGL | 0.0 |
| BNA'S IN WATER BY GC/MS | Un18 | PCB242 | MXAXO3x1. | DV4W*235 | WDPI | 31-OCT-95 | 13-10V-95 | $<$ | 30 | UGL | 0.0 |
| BNL'S IN WATER BY GC/Ms | UM19 | PCB242 | M2xG3 07x1 | DVAW*165 | WDFI | 31-OCT-95 | 13-NOV-95 | < | 30 | UGL | 0.0 |
| BNA'S IN WATER BY GC/MS | 0 U18 | PC8242 | MDG307x1 | DV4W*448 | WDFI | 31-OCT-95 | 13-NOV-95 | $<$ | 30 | UGL | 0.0 |
| BNA'S IN WATBR BY GC/MS | UM18 | PC8242 | MX2N12X3 | DVAW*275 | WDHI | 02-NOV-95 | 05-DBC-95 | < | 30 | UGL | 0.0 |
| BNA'S IN WATER BY GC/MS | $\mathrm{UHP}_{18}$ | PCB242 | MDZW12X3 | DV4W+450 | WDHI | 02-NOV-95 | 05-DBC-95 | $<$ | 30 | UGL | 0.0 |
| BRIA'S IN WATER BY GC/MS | U,18 | PCB242 | WX5703xX | DV4W 202 | NDKH | 13-SEP-95 | 26-SBP-95 | < | 30 | vel | 0.0 |
| ENA'S IN NATER BY GC/ms | 0 L 18 | PCB242 | WD5703XX | DV4W*432 | WDWH | 13-SEP-95 | 27-88P-95 | < | 30 | val | 0.0 |
| BRN'S IN WATER BY GC/MS | UM18 | PCB248 | MDAX03X1 | DV4W*447 | WDPI | 31-OCT-95 | 13-NOV-95 | $<$ | 30 | val | 0.0 |
| ENA'S IN WATER BY GC/ms | Un18 | PCB248 | MKAXO3X1 | DV4W*235 | WDEI | 31-OCT-95 | 13-NOV-95 | $<$ | 30 | UGL | 0.0 |
| BRA'S IN WATER BY GC/MS | UM18 | PCB248 | MXG307X1 | DV4W*165 | WDPI | 31-OCT-95 | 13-NOV-95 | $<$ | 30 | UGL | 0.0 |
| BRA'S IN NATER BY GC/MS | UM18 | PCB248 | MDG307X1 | 0V4W*448 | WDPI | 31-OCT-95 | 13-ROV-95 | $<$ | 30 | uel | 0.0 |
| BNA'S IN WATER BY GC/MS | L418 | PCB248 | MXZEN12X3 | DV4N*275 | wDHI | 02-MOV-95 | 05-DEC-95 | < | 30 | UGL | 0.0 |
| BRA's IN WATER BY GC/MS | UN18 | PCB248 | HDEN12X3 | DV4W*450 | wDHI | 02-NOV-95 | 05-DEC-95 | $\leqslant$ | 30 | UGL | 0.0 |
| BNA'S IN WATER BY GC/MS | UM18 | PCB24í | wx5703x | DV4W*202 | WD*H | 13-SBP-95 | 26-SBP-95 | $<$ | 30 | UGL | 0.0 |
| BNA'S IN WATER BY GC/HS | UN18 | PCB248 | WD5703x | DV4W*432 | WDWH | 13-SEP-95 | 27-SBP-95 | $<$ | 30 | UGL | 0.0 |
| BRE' B IN WATER BY GC/ws | UN18 | PCB254 | mbax03x1 | DV4W*447 | WDFI | 31-OCT-95 | 13-NOV-95 | < | 36 | val | 0.0 |



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 BNA＇S IN WATER BY GC／MS






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## Chemical quality Control Report Inatallation：Fort Devene，MA（DV）

SAMPLE DUPLICATRS（NON－PILTRRED SAMPLBS）



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Method
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BNA＇S IN WATBR BY GC／MS
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sAMPLB DUPLICATBS (NON-PILITRRBD SMMPLBS)

| Method Dencription | IRDMIS Mothod Code | $\begin{aligned} & \text { Tant } \\ & \text { Naname } \end{aligned}$ | IRDMIS <br> Field <br> Sanple <br> Mumber | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | $\begin{aligned} & \text { sample } \\ & \text { Date } \end{aligned}$ | Analyaie Date | < | Value | Unita | RED |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ben's in water by ac/ms | OM11 | PPDDT | MDZW12 | DV4W+450 | MDHI | 02-NOV-95 | 05-DBC-95 | < | 9.2 | UOL | 0.0 |
| BNA'S IN WATER EY GC/hs | Un1: | PPDDT | nxiw1 2x3 | DV4W*275 | WDHI | 02-NOV-95 | 05-D8C-95 | < | 9.2 | vel | 0. |
| bin's in water by gc/ms | un18 | PPDOT | nex5703xx | DV4W-202 | WDWH | 13-s8P-95 | 26-88P-95 | < | 9.2 | uel | 0.0 |
| BNA'S IN WATER EY GC/hs | UH18 | PPDDT | wD5703xx | DV4W*432 | WDWH | 13-88P-95 | 27-8BP-95 | < | 0.2 | USL | 0.0 |
| bents in watir ay oc/ms | Un18 | PYR | mDax03x1 | DV4W*447 | WDPI | 31-0CT-95 | 13-nov-95 | < | 2.8 | uel | 0.0 |
| BNA'S IN MATER EY CC/Ms | UN18 | PYR | mxax03x1 | DV4W*235 | MDPI | 31-0CT-95 | 13-nov-95 | < | 2.8 | Usb | 0.0 |
| bNA'S IN WATER' BY OC/Ms | UN10 | PYR | MxG307x1 | DV4W*165 | Mర゙¢ | 31-0CT-95 | 13-80V-95 | < | 2.8 | UGL | 0.0 |
| BHA'S IN MATER EY OC/ms | U41: | PYR | hides 07x1 | DV4W*44 | MDPI | 31-OCT-95 | 13-NOV-95 | < | 2.8 | USL | 0.0 |
| beh's in wattr by ce/ms | UM18 | PYR | MKX2412X3 | DV4K+275 | WDHI | 02-NOV-95 | 05-D8C-95 | < | 2.8 | USL | 0.0 |
| BNA'S IN WATER EY OC/ms | Luls | PYR | MDEW12x3 | DV4W*450 | NDHI | 02-NOV-95 | 05-DRC-95 | < | 2.8 | UEL | 0.0 |
| BRA'S IN WATER BY GC/ms | LTH2 | PYR | wD5703x | DV4W*432 | WDWH | 13-58P-95 | 27-8BP-95 | < | 2.8 | USL | 0.0 |
| BNA's In hater by ec/ms | un18 | PYR | hex5703xx | DV4W*202 | WDWH | 13-88P-95 | 26-88P-95 | < | 2.8 | USL | 0.0 |
| bna's in mater by oc/ms | Lum18 | TXPHEN | monx03xi | DV4N*447 | NDPI | 31-ocr-95 | 13-m0V-95 | < | 36 | uel | 0.0 |
| BNA'S IN MATER BX GC/hs | UM18 | TXPHEN | NCAX03x1 | DV4W+235 | WDPI | 31-0CT-95 | 13-MOV-95 | < | 36 | uel | 0.0 |
| bin's in matir by oc/ms | UW18 | TXPHEN | micsio7x | DV4W+448 | WDFI | 31-0ct-95 | 13-nov-95 | < | 36 | UGL | 0.0 |
| bin's In mater by cc/ms | UN18 | TXPHEN | HK¢¢07x1 | DV4W*165 | WDPI | 31-OCT-95 | 13-NOV-95 | < | 36 | USL | 0.0 |
| binds in matir by cc/ms | U418 | TXPHEN | nitewi2x3 | DV4W* 450 | wdir | 02-NOV-95 | 05-D8C-95 | < | 36 | vel | 0.0 |
| binh's in hatar by oc/ms | UM18 | TXPhis | MK2N1203 | DV4W*275 | WDHI | 02-NOV-95 | 05-DBC-95 | < | 36 | val | 0.0 |
| bin's in mater by ac/ms | U418 | TXPHEN | kx5703xx | OV4W*202 | MDWH | 13-88P-95 | 26-8BP-95 | < | 36 | USL | 0.0 |
| BNA'S IN MATER BY Gc/ms | UN18 | TXPHEN | wDS703xx | DV4W* 432 | WDWH | 13-8BP-95 | 27-3EP-95 | < | 36 | uel | 0.0 |
| binds in mater bx ac/ms | UM18 | UNK522 | maxio3x | DV4N*47 | NDPI | 31-OCT-95 | 13-80V-95 |  | 10 | vel | 0.0 |
| bents in mater by ac/ms | Unle | UnK522 | M6AX03x1 | DV4N*235 | MDPI | 31-OCT-95 | 13-MOV-95 |  | 10 | UEL | 0.0 |
| bints in matbr by gc/ms | Un18 | uners22 | M $4 \times 6307 \times 1$ | DV4W*165 | MDPI | 31-0CT-95 | 13-MOV-95 |  | 10 | USL | 22.2 |
| BNA'S IN MATER BY OC/ms | UN18 | UNK5 22 | nitasixi | DV4W*44 | MDPI | 31-0CT-95 | 13-nov-95 |  | - | USL | 22.2 |
| VOC's in matir by ec/ms | UH20 | 111 TCB | hacux ${ }^{\text {axi }}$ | 0V4W+235 | xans | 31-OCT-95 | 07-nov-95 | < | . 5 | USL | 0.0 |
| Voc's in matir by oc/ms | UM20 | 111 TCB | MDNX03X1 | DV4W*447 | xOnN | 31-0CT-95 | 07-NOV-95 | < | . 5 | uel | 0.0 |
| VOC's in mater by oc/ms | UM20 | 111 TCB | mDE307x1 | DVAN*448 | xDN | 31-OCT-95 | 07-NOV-95 | < | . 5 | UGL | 0.0 |
| VOC's IN mater by oc/ms | UN20 | 111 TCB | nexas07x1 | DV4W*165 | x | 31-0CT-95 | 06-MOV-95 | < | . 5 | USL | 0. |

SAMPLB DUPLICATES (NON-PILTERED SAMPLBS)

| Method Dascription | IRDMIS Method code | Teat | IREMIS <br> Field <br> Sample <br> Number | Lab Number | Lot | $\begin{aligned} & \text { Sample } \\ & \text { Date } \end{aligned}$ | Analyaia Date | < | Value | unite | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VOC's in water by ec/ms | UM20 | 1117 CE | MX2N12X3 | DV4W*275 | XDJN | 02-NOV-95 | 07-NOV-95 | < | . 5 | UOL | 0.0 |
| VOC's in water by gc/ms | CM20 | 111 TCB | MDZw12x3 | DV4W+450 | xDKN | 02-NOV-95 | 07-nov-95 | < | . 5 | UGL | 0.0 |
| voc's in watbr by ge/ms | UM20 | 1117 CB | wD5703x | DV4W*432 | хDOM | 13-SEP-95 | 21-SBP-95 | < | . 5 | UGL | 0.0 |
| VOC'S IN WATER BY GC/ms | Cum 20 | 111 TCB | wx5703xx | DV4W*202 | XDNM | 13-8BP-95 | 20-s8P-95 | < | . 5 | USL | 0.0 |
| Voc's in mater by cc/ms | UM20 | 112 TCB | nxax03xi | DV4W*235 | xans | 31-OCT-95 | 07-nov-95 | < | 1.2 | vel | 0.0 |
| voc's in water by cc/ms | U420 | 112 TCB | mDAX03x1 | DV4W*44 | xDN | 31-OCT-95 | 07-nov-95 | < | 1.2 | UGL | 0.0 |
| voc's in watrr by ce/ms | UM20 | 112 TCB | MXG307x1 | DVAW*165 | xDIN | 31-OCT-95 | 06-NOV-95. | < | 1.2 | vel | 0.0 |
| vocis in water bx cc/ms | U420 | 112 TCB | mDG307x1 | DV4W*448 | XDNN | 31-OCT-95 | 07-NOV-95 | < | 1.2 | vel | 0.0 |
| voc's in mater by ce/ms | UM20 | 112 TCB | mDZw12x3 | DV4W+450 | xDKN | 02-NOV-95 | 07-NOV-95 | < | 1.2 | UGL | 0.0 |
| VOC's In water by cc/ms | UM20 | 112 TCB | nexzw12x3 | DV4W 275 | xans | 02-NOV-95 | 07-NOV-95 | < | 1.2 | ves | 0.0 |
| voc's in water by cc/ms | UH20 | 112 TCB | wD5703xx | DViW*432 | xDOM | 13-SEP-95 | 21-SEP-95 | < | 1.2 | vel | 0.0 |
| voc's in watar by oc/ms | UM20 | 112 TCB | wK5703xx | DV4W*202 | xDsm | 13-sBP-95 | 20-stP-95 | < | 1.2 | vel | 0.0 |
| VOC'S In matbr by ac/ms | UM20 | ${ }^{11 D C E}$ | mXPX0331 | DV4W*235 | XDN | 31-0CT-95 | 07-nov-95 | < | . 5 | ves | 0.0 |
| VOC'S IN water by oc/ms | UW20 | 11DCB | mDax03x1 | DV4W*447 | XDJN | 31-OCT-95 | 07-nov-95 | $<$ | . 5 | val | 0.0 |
| voc's in water by ce/ms | UM20 | 11DCB | MDG307K1 | DV4W*448 | xDN | 31-OCT-95 | 07-nov-95 | < | . 5 | ves | 0.0 |
| VOC'S IN WATER BY GC/MS | UM20 | 11DCE | EXCB07X1 | DV4W*165 | XDNN | 31-0CT-95 | 06-NOV-95 | < | . 5 | UGL | 0.0 |
| voc's in water by oc/ms | CM20 | 11DCB | nxzN12X3 | DViW*275 | XDN | 02-NOV-95 | 07-NOV-95 | < | . 5 | UEL | 0.0 |
| voc's in water by oc/ms | UM20 | 11DCB | MDZW12X3 | DVAW*450 | хDкN | 02-NOV-95 | 07-NOV-95 | < | .5 | UGL | 0.0 |
| voc's in water by ac/ms | UM20 | 11DCB | WD5703XX | DV4W*42 | xDOM | 13-88P-95 | 21-88P-95 | < | . 5 | UGL | 0.0 |
| voc's In water by oc/ms | UH20 | 11DCB | wx5703xx | DV4W*202 | XDIM | 13-8BP-95 | 20-s8p-95 | < | . 5 | UGL | 0.0 |
| voc's in matbr by ce/ms | um20 | 11DCLs | nexax 03 xi | DV4W*235 | xמN | 31-OCT-95 | 07-nov-95 | $<$ | . 68 | val | 0.0 |
| voc's in water by cc/ms | Un20 | 11DCLB | mDAX03x1 | DV4W*447 | xDN | 31-OCT-95 | 07-NOV-95 | < | . 68 | UGL | 0.0 |
| voc's in water by oc/ms | UN20 | 11DCLB | nxceso7x1 | DVAW*165 | xDIN | 31-OCT-95 | 06-nov-95 | < | . 68 | ugl | 0.0 |
| voc's In water by cc/ms | UM20 | 11 DCLE | MDE307x1 | DV4W*448 | XDNs | 31-OCT-95 | 07-NOV-95 | < | . 68 | ugl | 0.0 |
| voc's in matikr by ec/ms | Lin 20 | 11 DCLS | hDEw12x3 | DV4W*450 | xDkN | 02-Nov-95 | 07-NOV-95 | < | . 68 | UGL | 0.0 |
| VOC's IN WATER BY GC/ms | L 212 | 11DCLs | nexwi2x | DV4W*275 | xDIN | 02-NOV-95 | 07-nov-95 | < | . 68 | UGL | 0.0 |
| voc's in water by cc/ms | प\|20 | 11DCLs | WD5703xX | DV4W*432 | xDO\% | 13-SEP-95 | 21-S8P-95 | < | . 68 | vel | 0.0 |
| voc's in water by echms | UN20 | 11DCLE | wx5703xX | DVAW*202 | XDNM | 13-SBP-95 | 20-SBP-95 | < | . 68 | L | 0.0 |
|  | UN20 | 12DCB | $\operatorname{mDAX03X1}$ | DV4W*44 | NN | 31-OCT-95 | 07-NOV-95 |  | . 5 | UGI |  |

Chemical Quality Control Report
Installation：Fort Dovens，MA（DV）
Group 2， 7 sites



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 IRDNIS
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 MDGE307x1
MXZZN12x3
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Chemical quality Control Report
Enatallation：Port Devens，MA（DV） Group 2， 7 sites
SAMPLE DUPLICATBS（NON－pILTERED SAMPLBS） $\begin{array}{ll} & \text { IRDMIS } \\ \text { IRDNIS } & \text { Field }\end{array}$
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$6-\mathrm{NOV}-95$
$7-\mathrm{NOV}-95$
$07-\mathrm{NOV}-95$
$07-\mathrm{NOV}-95$

$21-38 \mathrm{P}-95$
$20-38 \mathrm{P}-95$
07－NOV－95



20－SBP－95



DV4W＊202 XDRN
DV4W＊447 XDJN





 $\begin{array}{ll}\text { DV } 4 W+432 \text { XDOW } & 13-S B P-95 \\ \text { DV } 4 W * 202 & \text { XDNM } \\ 13-S B P-95\end{array}$



MDAX03X1
MXCAX03X1



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  MDZW12×3


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## Mathod Description

VOC＇S IN WATER BY GC／MS UN2O








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ํㅜ쿵 voc＇s IN WATER BY GC／



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 $\begin{array}{llll}\text { WD5703XX } & \text { OVAW } 432 \text { XDOM } & 13-3 B P-95 & 21-S B P-95 \\ \text { WX5703XX } & \text { DV4W＊202 XDNH } & 13-\text { SBP－95 } & 20-\text { SBP－95 }\end{array}$ $\begin{array}{lll}\text { DV4W＊447 XDNN } & 31-O C T-95 & 07-\mathrm{NOV}-95 \\ \text { DV4W＊235 XDNN } & 31 \text {－OCT－95 } & 07-\mathrm{NOV}-95\end{array}$
 6－NOV－95



07－NOV－95
$07-\mathrm{NOV}-95$ $6-\mathrm{NOV}-95$
$7-\mathrm{NOV}-95$ 7－NOV－95
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TABLE D-19

Chemical Quality Control Report
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Chemical Quality Control Report
Installation: Fort Devens, MA (DV)
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Chemical Quality Control Report
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Chemical quality Control Report Installation: Fort Devens, MA (DV)




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|  | Chemical quality control Report Installation: Port Devens, MA (DV) group 4 Sites sAMPLE DUPLICATBS |  |  |  |  |  |  |  |  |  |  |
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| BNA'S IN WATER EX GC/Ms | UM18 | 24DMPN | MD5701x2 | DV4W*455 | WDD | 13-PBB-96 | 26-F8B-96 | < | 5.8 | vas | . 0 |
| BNA'S IN WATER BY GC/ms | UM18 | 24 DHPN | MD5703X2 | DV4W*458 | WDEJ | 14-P8B-96 | 04-MAR-96 | < | 5.8 | UGL | . 0 |
| bNa'S In water by ac/ms | UM18 | 24DMPN | Mx5703X2 | DV4W*172 | WDBJ | 14-PRB-96 | 04-MAR-96 | < | 5.8 | UGL | . 0 |
| BNA'S IN WATBR EY GC/ms | UM18 | 24 DMPN | MXAX04<2 | DV4W*238 | WDEJ | 15-PRB-96 | 04-MAR-96 | < | 5.8 | vel | . 0 |
| BNA'S IN wATER BY GC/Ms | UM18 | 24DMPN | MDAX04x2 | DV4W*457 | WDBJ | 15-P8B-96 | 04-MAR-96 | < | 5.8 | Vel. | . 0 |
| bxa's in watir by gc/ms | UM18 | 24DMPN | MDZF1114 | DV4W*456 | WDDJ | 14-P88-96 | 26-FRB-96 $\mathbf{2 6 - F E B - 9 6}$ | $<$ | 5.8 5.8 | UGL | . 0 |
| BNA'S IN WATER BY Gc/ms | UM18 | 24DMPN | MXZWilix ${ }^{\text {a }}$ | DV4W*274 | WDD | 14-PRB-96 | 26-FBB-96 | < | 5.8 | UGL | . 0 |
| BNA'S IN WATER BY GC/ms | UM18 | 24 DNP | MDS701x2 | DV4W*455 | WDD | 13-PEB-96 | 26-PEB-96 | $<$ | 21 | UGL | - 0 |
| BNA'S IN WATER BY Gc/ms | UM18 | 24DNP | M $\times 570132$ | DV4W*168 | WDD | 13-PEB-96 | 26-PEB-96 | < | 21 | UGL | . 0 |
| bNA'S In mattr by ce/ms | UM18 | 24DNP | M $\times 5703 \times 2$ | DV4W*172 | WDBJ | 14-PBB-96 | 04-MAR-96 | < | 21 | UGL | . 0 |
| BNA'S IN WATER BY GC/ms | CM18 | 24DNP | MD5703×2 | DV4W*458 | WDBJ | 14-P8B-96 | 04-MAR-96 | < | 21 | vGL | . 0 |
| BNA'S IN WATER EX GC/Ms | UM18 | 24DNP | MDAX04K2 | DV4W*457 | WDBJ | 15-P8B-96 | 04-MAR-96 | < | 21 | UGL | . 0 |
| ENA'S IN WATER BY GC/Ms | UM18 | 24 DNP | MXAX04X2 | DV4W*238 | WDES | 15-PRB-96 | 04-MAR-96 | < | 21 | UsL | . 0 |
| bNa'S in watrr by gc/ms | UM18 | 24 208 | MDZF1114 | DV4W*456 | WDD | 14-P8B-96 | $26-\mathrm{FRB}-96$ $26-\mathrm{PRB}-96$ | $<$ | 21 | UGL | . 0 |
| bind's in matrr by ec/ms | UM18 | 24DNP | mxzwilix | DV4W+274 | WDD | 14-PEB-96 | 26-PBB-96 | < | 21 | UGL | . 0 |
| ENA'S IN MATER BY GC/MS | UM18 | 240Nr | Mx5701x2 | DV4W*168 | Wpos | 13-PRB-96 | 26-FEB-96 | < | 4.5 | UCL | . 0 |
| ENA'S IN WATER BY GC/MS | UM18 | 24DNT | MD5701x2 | DV4W*455 | WDD | 13-P88-96 | 26-FRB-96 | < | 4.5 | UGL | . 0 |
| ENA'S IN WATER BY Gc/ms | UM18 | 240NT | MD5703X2 | DV4W*458 | WDEJ | 14-P88-96 | 04-MAR-96 | < | 4.5 | UGL | - 0 |
| BNA'S IN WATER BY Gc/ms | UM18 | 24DNT | Mx5703X2 | DV4W*172 | WDET | 14-P8B-96 | 04-MAR-96 | < | 4.5 | UGL | . 0 |
| ENA'S IN mattr by gc/ms | UM18 | 24DNT | mxax04x2 | DV4W*238 | WDBJ | 15-PEB-96 | 04-MAR-96 | < | 4.5 | UEL | . 0 |
| gNa's In water by cc/ms | CM18 | 24DNT | MDAX04x2 | DV4W*457 | WDBJ | 15-PEB-96 | 04-MAR-96 | < | 4.5 | UGL | . 0 |
| ENA'S In Water by gc/ms | UM18 | 24DNT | MDZF1124 | DV4W*456 | WDD | 14-PBB-96 | 26-PEB-96 | < | 4.5 | UGL | . 0 |
| ENA'S IN WATER BY GC/ms | 6M18 | 24DNT | MXZN1144. | DV4W*274 | WDD | 14-PEB-96 | 26-PEB-96 | $<$ | 4.5 | UGL | . 0 |
| BNA'S IN WATER BY GC/ms | UM18 | 26DNT | mD570142 | DV4W*45 | WDDJ | 13-PEB-96 | 26-FEB-96 | < | . 79 | vel | . 0 |
| ENA'S IN WATER BY GC/ms | UM18 | 260NT | Mx5701x2 | DV4W*168 | WDD | 13-FEB-96 | 26-PRB-96 | $<$ | . 79 | VGL | . 0 |
| ENA'S IN WATER BY GC/ms | UM18 | 26DNT | M M 5 5703K2 | DVWW*172 | WDEJ | 14-PRB-96 | 04-MAR-96 | < | .79 | UEL | . 0 |
| bNA'S IN WATER BY GC/Ms | UM18 | 26DNT | MD5703X2 | DV4W*458 | WDBJ | 14-PRB-96 | 04-MAR-96 | $<$ | . 79 | UGL | . 0 |
| bna's In water by gc/ms | UM18 | 26DNT | MDAX04×2 | DV4W*457 | WDEJ | 15-FEB-96 | 04-MAR-96 | $<$ |  |  | . 0 |

Chemical Quality Dontrol Report
Installation: Fort Devens, MA (DV) SAMPLE DURLICATBS


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Group 4 Sites
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14－MAR－96 $\begin{array}{llll}\text { MDAX04X2 } & \text { DV4W＋457 WDEJ } & 15-\mathrm{FBB}-96 & 04 \text {－NAR－96 } \\ \text { MXAX04X2 } & \text { DV4W＊238 WDBJ } & 15-\mathrm{FBB}-96 & 04 \text {－MAR－96 }\end{array}$

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Chemical Quality Control Report
Inatallation: Fort Devens, MA (DV)
Group 4 Sites

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| Ton | r．s | $>$ | 96－88d－92 | 96－898－7I | radm | － $12 \times \mathrm{mbsa}$ | 3xtruzxw | NHCDD | 8twn |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| IDA | I－s | $>$ | 96－88A－92 | 96－88a－75 | radm | 95t＊MbSa | txtrmzaw | NWCHDE | 8 TNO | SW／D．$x$ de agrum NI SItNE |
| Im | I•s | ＞ | 96－\％\％W－70 | 96－88d－5t | rgam | 8EZ＋MFAI | 2x\％0xtaw | NYCTIDY | 8 ILN | SW／0 XG \％GItM NI SIVNB |
| Ton | I－s | $>$ | 96－2\％N－70 | 96－883－St | rgam | L53 4 M 4 Aa | extoxyaw | NษCTVY | 8INK |  |
| 20n | I－s | ＞ | 96－8\％N－70 | 96－88a－tI | radm | 85t＋Mbsa | zxeolsdw | NYOTDE | 8Tw |  |
| T00 | $\underline{r} \cdot \mathrm{~s}$ | $>$ | 96－8\％\％－70 | 96－89a－pI | rgam | zLT＊MFSO | exeolsxw | NKCTM | 8Twn |  |
| Tan | I－s | ＞ | 96－88d－9Z | 96－88a－EI | raam | 89T＊MFAd | extolsxw | NYOTDE | 8thn |  |
| TSN | I＇S | $>$ | 96－9\＃\＃－9Z | 96－883－Eโ | ram | ¢5taMtsa | extolsaw | NHCTIV | 8TNA | SW／O9 XE \％ |
| TEN | $\downarrow$ | ＞ | 96－988－92 | 96－888－＞ | radm | 953＋Misa | ＊xtrmzaw | DHEY | 8Twn | SW／D 2 ／ |
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| Ton | ＊ | ＞ | 96－8tw－zo | 96－88a－st | rgam | 8Eて＊MbAL | zxpoxtxw | OHEV | 8TNת | SW／כ5 18 \％ |
| Tin | － | ＞ | 95－846－80 | 96－88a－5t | гяam | L5\％＊MFAO | 2x30xvaw | DHGY | 8iwn |  |
| Tin | $t$ | $>$ | 96－84＊－70 | 96－838－7T | гяam |  | 2xEOLSAW | จHGY | 8TWก |  |
| Ina | ＊ | ＞ | 96－8t6－70 | 96－8Ba－t |  | zLI +Mzal | 2xE0LSxW | DHEY | SINT | SH／OD Ka \％RIUM NI S．UNQ |
| TE | ＊ | ＞ | 96－88a－9z | 96－88a－EI | saam | ssbuntal | 2xtolsaw | ОНE\％ | 8TM |  |
| Ton | $\stackrel{1}{ }$ | ＞ | 96－988－9Z | 96－89a－EI | radm | 89T＊MFAS | extolsx | ОНа\％ | 8Tw |  |
| IDS | 2I | $>$ | 96－888－97 | 96－888－7I | racm | bLZ＊MFAI | \＃xtrmzxw | dNS | 9\％Nก |  |
| T50 | $\tau \tau$ | $>$ | 96－98a－92 | 96－898－7 | radm | 953＊MをAa | －xitmzaw | ant | 8TW | SW／DO |
| 750 | 2L | $>$ | 96－26W－70 | 96－88a－st | гяam | 8عZ＊Mマムの | 2x\％0xTXW | dNT | 8\％\％ |  |
| Tax | $\boldsymbol{\tau L}$ | $>$ | 96－2tw－70 | 96－88a－st | rgam | LSt¢M\％AC | zxboxtaw | dN3 | －โ\％ | SW／DO |
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| T00 | z＇s | $>$ | 96－888－9Z | 96－88d－7i | sam | FLZamtad | －xitmzxw | TINENS | 8 INก | SW／OD Ka \％givm ni sivng |
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Chemical Quality Control Report
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Chemical quality Control Report
Installation：Fort Devens，MA（DV）
Group 4 Sites
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 DV4W＊458 WDEJ $14-$ FKB－96


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Chemical Quality Control Report Group 4 Sites

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Chemical Quality Control Report
Installation: Fort Devens, MA (DV)








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$\begin{array}{lll}\text { DV } 4 W * 172 \text { WDBJ } & 14-\mathrm{FBB}-96 \\ \text { DV } 4 W 445 \text { WDBJ } & 14-\mathrm{PEB}-96 \\ \text { DV } 4 W * 457 \text { WDEJ } & 15-\mathrm{FEB}-96\end{array}$


U $4 W+458$ WDRJ 14－FEB－96



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Chemical Quality Control Report
Installation: Fort Devens, MA (DV) Group 4 Sites
SAMPLE DUPLICATES




|  | Chemical quality control Report Installation: Fort Devens, MA (DV) Group 4 Sites sample duplicatbs |  |  |  |  |  |  |  |  |  |  |
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| Method Description | IRDMIS Method Code | Test Name | $\begin{aligned} & \text { IRDNIS } \\ & \text { Field } \\ & \text { Sample } \\ & \text { Number } \end{aligned}$ | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | Date $\begin{aligned} & \text { Sample } \\ & \text { Date } \end{aligned}$ | Analyais Date | < | Value | Units | RPD |
| bna's In watbr by cc/ms | UM18 | PYR | MDAX04x2 | DV4W*457 | WDEJ | 15-P8B-96 | 04-mAR-96 | < | 2.8 | UsL | . 0 |
| ENA'S IN WATBR BY GC/ms | UM18 | PYR | MXAX04×2 | DV4W*238 | WDBJ | 15-PEB-96 | 04-MAR-96 | < | 2.8 | vel | . 0 |
| gna's in watrr by cc/ms | UM18 | PYR | MDZw11x4 | DV4W*456 | WDD | 14-FEB-96 | 26-F8B-96 | < | 2.8 | UGL | . 0 |
| gNA'S IN WATBR BY GC/Ms | UM18 | PYR | mXzwilix | DV4W*274 | WDDJ | 14-8BB-96 | 26-PBB-96 | < | 2.8 | UGI | . 0 |
| BNA'S IN WATER BY GC/ms | UM18 | TXPHEN | MD5701X2 | DV4W*45 | WDD | 13-PBB-96 | 26-FBB-96 | < | 36 | UGL | . 0 |
| gNa's In watrr by gc/ms | CM18 | TXPHEN | Mx5701x2 | DV4W*168 | WDD | 13-PRB-96 | 26-PBB-96 | < | 36 | USL | . 0 |
| BNA's IN WATER BY GC/Ms | UM18 | TXPHEN | MD5703X2 | DV4W*458 | WDES | 14-PEB-96 | 04-MAR-96 | < | 36 | Uel | . 0 |
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| BNA'S IN WATER BY GC/Ms | UM18 | TXPHEN | MxAX04x2 | DV4W*238 | WDES | 15-FEB-96 | 04-MAR-96 | < | 36 | UGL | . 0 |
| ENA'S In watrr by gc/ms | UM18 | TXPHEN | MDZN1114 | DV4W*456 | WDD | 14-PRB-96 | 26-PEB-96 | < | 36 | UGL | -0 |
| ENA'S IN WATER BY GC/MS | UM18 | TXPhEn | mXZN1134 | DV4W*274 | WDD | 14-788-96 | 26-FRB-96 | < | 36 | UGL | . 0 |
| bna's in water by gc/ms | UM18 | UNK549 | Mx5703×2 | DV4W*172 | WDES | 14-FEB-96 | 04-MAR-96 |  | 7 | USL | 15.4 |
| BNA'S IN WATER BY GC/MS | UM18 | UNK549 | MD5703×2 | DV4W*458 | WDBJ | 14-PBE-96 | 04-MAR-96 |  | 6 | UGL | 15.4 |
| minds in matirr by gc/ms | U418 | UNK649 | MDZN11X4 | DV4W*556 | wDD | 14-PEB-96 | 26-7RB-96 |  | 50 | ust | 85.7 |
| BNA'S IN WATER BX GC/MS | UM18 | UNK649 | mxzw11x4 | DV4W*274 | WDD | 14-F8B-96 | 26-FBB-96 |  | 20 | USL | 85.7 |
| VOC'S IN WATER BY GC/MS | UM20 | 1117 CB | Mx5701x2 | DV4W*168 | xpzo | .13-FEB-96 | 16-P8B-96 | < | . 5 | usl | .0 |
| VOC'S IN WATER BY Gc/ms | UM20 | 111 cc | MD5701x2 | DV4W*455 | xDzo | 13-P8B-96 | 16-FBB-96 | < | . 5 | U0L | . 0 |
| VDC's In water by ec/ms | UM20 | 111 TCB | Mx5703x2 | DV4W*172 | xDzo | 14-FEB-96 | 16-PBB-96 | < | . 5 | UGL | . 0 |
| voc's in haitr by gc/ms | UM20 | 111 TCB | MD5703X2 | DV4W*458 | xDAP | 14-7BE-96 | 20-PEB-96 | < | . 5 | Ues | . 0 |
| voc's in watikr by gc/ms | U420 | 111 TCB | MXAXO4X2 | DV4W*238 | xozo | 15-pBb-96 | 16-KEB-96 | < | . 5 | UEL | . 0 |
| voc's in mater by ec/ms | UM20 | 111 TCB | MDAXO4x2. |  | XDAP | 15-PEB-96 | 20-FBB-96 | < | . 5 | OGL | . 0 |
| voc's in watir by gc/ms | UM20 | 111 TCB | MDEN1134 | DV4W*456 | xDYO | 14-PEB-96 | 16-FEB-96 | < | . 5 | USL | . 0 |
| vOC's In WATER EY GC/Ms | UM20 | 111 TCB | MXZ41134 | DV4W*274 | xDYo | 14-PRB-96 | 16-FRB-96 | < | . 5 | UGL | . 0 |
| voc's in matir by ec/ms | UM20 | 112 TCB | mD5701x2 | DV4W*455 | xDzo | 13-pEB-96 | 16-PBB-96 | < | 1.2 | Uge | . 0 |
| voc's in mater by gc/ms | Ln420 | 112 CCB | MX570192 | DV4W*168 | xDzo | 13-PBB-96 | 16-FBB-96 | < | 1.2 | UGL | . 0 |
| VOC'S IN HATER BY GC/MS | UW20 | 112 TCB | MX5703X2 | DV4W*172 | xDzo | 14-PEB-96 | 16-FBB-96 | < | 1.2 | UGL | . 0 |



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MD5701X2 DV4W＊45 XDzo 13 －PBB－96 16 －FBB－96 $\begin{array}{llll}\text { MX5701X2 DV4W＊168 XDZO } & 13-\mathrm{FBB}-96 & 16 \text {－FBB－96 }\end{array}$
 $\begin{array}{llll}\text { MDDAX04X2 } & \text { DV4W＊} 457 \text { XDAP } & 15-\mathrm{FBB}-96 & 20-\mathrm{FBB}-96\end{array}$
 16－780－96 16－FBB－96

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Chemical Quality Control Report
Installation: Fort Devens, MA (DV)

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$\begin{array}{llll}\text { MX5701X2 } & \text { DV4W＊168 XDZO } & 13-\mathrm{FBB}-96 \\ \text { DV4W } 455\end{array}$
 MD5703X2 DV4W＊45 XDAP 14－PEB－96 $\begin{array}{lll}\text { MXAXO4X2 } & \text { DV } 4 W * 238 & \text { XDZO } \\ \text { MDAX } 04 \times 2 & 15-\mathrm{FEB-96} \\ \text { DV } 4 * * 457 & \text { XDAP } & 15-\mathrm{FEB}-96\end{array}$ MDZW11X4 4
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Chemical Quality Control Report
natallation: Port Devens, MA (DV)

## sample duplicatzs

Field Duplicates for Groundwater Samples with Elements Exceeding Precision Criteria

1995 AOC 57, 63AX, 69W Remedial Investigation Fort Devens, Massachusetts

| Eitment | Frequency apd Exceeded | mpd range |
| :---: | :---: | :---: |
| Total Metals |  |  |
| Arsenic ${ }^{2}$ | 1/4 | 42.4 |
| Iron ${ }^{2}$ | 1/4 | 45 |
| Dissolved Metals |  |  |
| Barium ${ }^{2}$ | 1/4 | 123.9 |

${ }^{2}=$ Data collected during the Round 2 Groundwater sampling event.

Field Duplicates for Soil and Sediment Samples with Elements Exceeding Precision Criteria

1995 AOC 57, 63AX, 69W Remedial Investigation fort Devens, Massachusetts

| Elimment | Frequency mpd Excemded. | RPD RAnge: |
| :---: | :---: | :---: |
| Soil |  |  |
| Arsenic | 1/3 | 52.4 |
| Potassium | 1/3 | 77.6 |
| Sediment |  |  |
| Mercury | 1/2 | 138.1 |
| Manganese | 1/2 | 99.5 |
| Sodium | 1/2 | 178.7 |
| Zinc | 1/2 | 114.1 |

1995 AOC 57, 63AX, 69W Remedial Investigation Fort Devens, Massachusetts

| SpIke Compound | APD LMMIS FOR Water | RPD Lmils for Soll |
| :---: | :---: | :---: |
| Lindane (gamma-BHC) | 15 | 50 |
| Heptachlor | 20 | 31 |
| Aldrin | 22 | 43 |
| Dieldrin | 18 | 38 |
| Endrin | 21 | 45 |
| 4,4-DDT | 27 | 50 |


| $\begin{aligned} & \text { ON-STIE } \\ & \text { SAMPIP } \\ & =1 \text { II } \end{aligned}$ | $\begin{gathered} \text { SAMPIL } \\ \therefore \text { COLISTRON } \\ \text { DATE } \end{gathered}$ | COMPOUND | $\begin{aligned} & \text { ORSITILAE } \\ & \text { CONCINTRAEION } \\ & \text { chena } \end{aligned}$ | $\qquad$ | (\% $0_{0}$ O | CATEGOSY |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| BFIT0413 | 9/21/93 | TPH | ND | ND | 0 | 1 |
|  |  | Voc | ND | ND | 0 | 1 |
| BF370515 | 922/95 | tonuan | 0.0037 | \$0.0024 | 200 | 1 |
|  |  | TPH | ND | ND | 0 | 1 |
| BF970612 | 9/28/95 | TPH | ND | N0 | 0 | 1 |
|  |  | voc | $N D$ | ND | 0 | 1 |
| BFAXOS06 | 10/2/99 | TPH | ND | ND | 0 | 1 |
|  |  | VOC | ND | ND | 0 | 1 |
| BFAX0508 | 102/99 | TPH | ND | ND | 0 | 1 |
|  |  | Voc | ND | ND | 0 | 1 |
| BFAX0S10 | 10/2/93 | TPH | ND | ND | 0 | 1 |
|  |  | Voc | ND | ND | 0 | 1 |
| EFS 70106 | 9/18/83 | TPH | 141 | $\checkmark 3$ | 200 | 1 |
|  |  | voc | ND | ND | 0 | 1 |
| EFS70200 | 9/12/95 | IPH | 454 | 69 | 147 | 1 |
|  |  | chylbentese | 0.0024 | 40.0023 | 200 | 1 |
|  |  | mimane | 0.0023 | 40.0023 | 200 | 1 |
|  |  | coul xyimes | 0.0029 | 40.0069 | $0^{\circ}$ | 1 |
| EF370405 | 9/19/99 | TPH | ND | ND | 0 | 1 |
|  |  | Voc | ND | ND | 0 | 1 |
| EDFS 70403 | 9/19/99 | TPH | 23.60 | -32 | $0^{\circ}$ | 1 |
|  |  | Voc | ND | ND | 0 | 1 |
| EFS 70506 | 9/19/95 | TPH | ND | ND | 0 | 1 |
|  |  | VOC | ND | ND | 0 | 1 |
| EF570704 | 9/19/93 | TPH | 31800 | 65000 | 69 | 2 |
|  |  | enyibearepe | 0.031 | 14 | 198 | 1 |
|  |  | tohame | 0.023 | 3.4 | 197 | 1 |
|  |  |  | 0.27 | 92 | 188 | 1 |
|  |  | 1,1-dichloroetrese | 80.0039 | 6.1EX | 200 | 3 |
|  |  | Letrechloronthere | 0.0059 | 4.7 | $00^{\circ}$ | 1 |
|  |  | richlarombue | 0.011 | 4.78 | $0^{\circ}$ | 1 |
| Ers 70809 | 9/20/93 | TRH | 57.6 | 475 | 0 | 1 |
|  |  | Voc | ND | ND | 0 | 1 |
| ET590903 | 9/20/95 | TPH | 79.2 | 669 | 200 | 1 |
|  |  | VOC | ND | ND | 0 | 1 |
| EF571000 | 9/19/93 | TPH | 25 | 30 | 105 | 1 |
|  |  | colvene | 0.0037 | 0.0024 | 43 | 1 |
|  |  | narmetioroathen | 0.003 | 40.0022 | 200 | 1 |
| [5F571200 | 9/20/99 | [PH | 9110 | 9700 | 62 | 2 |
|  |  | tolmen | 0.0083 | 0.0022 | 200 | 1 |
|  |  | terrackorowhem | 0.0011 | 40.0022 | $0^{\circ}$ | 1 |
| [E971305 | 9/21/95 | TRH | ND | ND | 0 | 1 |
|  |  | voc | ND | ND | 0 | 1 |
| EFS71406 | 9/21/95 | TPH | 49.3 | $<60$ | $0^{+}$ | 1 |
|  |  | Voc | ND | ND | 0 | 1 |
| EF571902 | 9/21/95 | TPH | 26100 | 21000 | 7 | 2 |
|  |  | toluen | 0.0017 | 0.0056 | 107 | 1 |
|  |  | clatiobersee | 0.00036 | 0.016 | 200 | 1 |
|  |  | Atribemzeos | 40.0017 | 0.054 | 200 | 1 |
|  |  | total y ylimer: | 40.0015 | 0.245 | 200 | 1 |
|  |  | kerichioroether | 0.0023 | 0.0048 | 70 | 1 |
| EFST71600 | 9/21/93 | TPH | 169 | 120 | 34 | 1 |
|  |  | voc | ND | ND | 0 | 1 |
| EF571700 | 9/21/95 | TPH | 2390 | 3400 | 35 | 2 |
|  |  | Helune | 0.0072 | 4.0025 | 200 | 1 |
|  |  | intrachlorortheoe | 0.0047 | 4.0025 | 200 | 1 |
| EF371402 | 9/21/93 | TPH | 49.5 | $<4$ | 0 | 1 |
|  |  | VOC | ND | ND | 0 | 1 |
| E53571902 | 9/21/93 | TPH | 130 | 40 | 200 | 1 |
|  |  | VOC | ND | ND | 0 | 1 |
|  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |
| EFS72500 |  |  |  |  |  |  |
|  | 9/21/93 | TPH | 81.1 | $\leqslant 2$ | 200 | 1 |
|  |  | voc | ND | ND | 0 | 1 |
| RF2W2607 | 9/11/95 | TPH | 902 | 2100 | 30 | 2 |
|  |  | cotal syicest | 40.0015 | 0.0023 | 200 | 1 |
| RFZW3006 | 9/11/99 | TPH | 320 | 7700 | 12 | 2 |
|  |  | Lolveer | 0.004 | 0.026 | 142 | 1 |
|  |  | chlorobenuse | <0.00086 | 0.031 | 200 | 1 |
|  |  | Crybersem | 40.0017 | $0.26 E$ | 200 | 1 |
|  |  | Cotal xylmer | 0.0023 | $6.5 \mathrm{E} / \mathrm{J}$ | 200 | 1 |
| RF2W3304 | 9/12/99 | TPH | 27.8 | 59 | 200 | 1 |
|  |  | VOC | ND | ND | 0 | 1 |
| RF2W3607 | 9/21/99 | VOC | ND | ND | 0 | 1 |
|  |  | 79H | 566 | 1100 | 64 | 2 |
| RF2W3704 | 9/23/99 | torlone | 0.0024 | 40.0046 | $0^{\circ}$ | 1 |
|  |  | TPH | 1400 | 1800 | 25 | 2 |
| RFZW3103 | 9/14/93 | TPH | 34.4 | $<120$ | $0^{\circ}$ | 1 |
|  |  | VOC | ND | ND | 0 | 1 |
| RWFEW4504 | 9/15/98 | T2H | ND | ND | 0 | 1 |
|  |  | Holume | 0.0013 | 40.0024 | 0 | 1 |


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| ${ }_{\mathbf{7 7}}$ | Total Patrolem Hydrocuroim |

## 1996 ON-SITE LABORATORY DATA

# APPENDIX D-2 QUALITY CONTROL SUMMARY REPORT 1996 ON-SITE ANALYTICAL PROGRAM 

## AOCs 69W, 61Z, 50 and 57

## DI. 0 INTRODUCTION

The purpose of this Quality Control Summary Report (CQSR) is to present evaluations of quality control (QC) measurements made during the 1996 on-site laboratory analyses and to evaluate data precision and accuracy. Dates of on-site analysis are from June 17 through November 6, 1996. The on-site laboratory provided field screening for AOCs 69W, 61Z, 50 and 57. Soil and water samples were analyzed for target volatile organic compounds and petroleum hydrocarbons at Ft Devens, Ayer, Massachusetts.

## D2.0 ANALYTICAL METHODS

The data quality objectives and general descriptions of on-site methodologies for the investigations are presented in the Fort Devens Project Operation Plan (ABB-ES, 1995). Onsite analytical procedures used during the investigations included purge and trap USEPA Method 5030A and modified USEPA Method 8021A for volatile organic compounds (VOCs) (USEPA, 1995) and the modified Massachusetts hydrocarbon methods for extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH) (MADEP, 1995a; MADEP, 1995b). Total Recoverable Petroleum Hydrocarbons (TPHC) in soils will be quantified with an infrared spectrophotometer using modified USEPA Method 418.1(USEPA, 1983). Descriptions of the 1996 analytical methods, and any modifications to procedures in the QAPjP incorporated into the 1996 field investigations are presented in Attachment 1.

## D2.1 MDL Study for EPH/VPB/VOCs Analysis:

Prior to sample analysis a Method Detection Limit (MDL) study was performed for EPH, VPH, and VOCs target compounds.

Based on the extraction and analysis of seven spiked samples, the EPH MDL for soil analysis was determined to be $18 \mathrm{mg} / \mathrm{Kg}$. For purposes of this project the reporting limit (RL) has been determined to be $100 \mathrm{mg} / \mathrm{Kg}$. Only concentrations greater than $100 \mathrm{mg} / \mathrm{kg}$ are reported. Sample quantitation limits (SQLs) consisting of the reporting limits adjusted for sample volume, percent moisture, and dilution factor are reported for non detects. The results of the EPH MDL study are listed in Table D2-1.

Based on a methanol extraction and analysis of seven spiked samples, the VPH MDL for soil analysis was determined to be $0.57 \mathrm{mg} / \mathrm{Kg}$. The reporting limit was established to be 6.3 $\mathrm{mg} / \mathrm{Kg}$. Only concentrations greater than $6.3 \mathrm{mg} / \mathrm{kg}$ are reported. Sample quantitation limits (SQLs) consisting of the reporting limits adjusted for sample volume, percent moisture, and dilution factor are reported for non detects. The results of the VPH MDL study are listed in Table D2-1.

Based on the analysis of seven spiked samples, an initial VOC MDL for soil and aqueous analysis was determined and reported in Table D2-1. The reporting limits were established to be $2.0 \mu \mathrm{~g} / \mathrm{L}$ for all target analytes ( $\mathrm{m} / \mathrm{p}$-Xylene is $4.0 \mu \mathrm{~g} / \mathrm{L}$ ). Only concentrations greater than $2.0 \mu \mathrm{~g} / \mathrm{L}$ ( $\mathrm{m} / \mathrm{p}$-Xylene is $4.0 \mu \mathrm{~g} / \mathrm{L}$ ) are reported. Sample quantitation limits (SQLs) consisting of the reporting limits adjusted for sample volume, percent moisture, and dilution factor are reported for non detects.

A second VOC MDL was made when a second field effort phase commenced in mid-summer. Based on the analysis of seven spiked samples, the second VOC MDL for soil and aqueous analysis was determined and reported in Table D2-1. The reporting limit was established to be $1.0 \mu \mathrm{~g} / \mathrm{L}$ for all target analytes ( $\mathrm{m} / \mathrm{p}$-Xylene is $2.0 \mu \mathrm{~g} / \mathrm{L}$ ). Only concentrations greater than $1.0 \mu \mathrm{~g} / \mathrm{L}$ ( $\mathrm{m} / \mathrm{p}$-Xylene is $2.0 \mu \mathrm{~g} / \mathrm{L}$ ) are reported. Sample quantitation limits (SQLs) consisting of the reporting limits adjusted for sample volume, percent moisture, and dilution factor are reported for non detects.

## D2.2 REPORTING LIMITS AND INSTRUMENT CALIBRATION

The calibration range for each instrument includes an initial calibration standard at the reporting limit. EPH instrument calibration ranged from $50 \mathrm{mg} / \mathrm{Kg}$ through $150 \mathrm{mg} / \mathrm{Kg}$ with a reporting limit of $50 \mathrm{mg} / \mathrm{Kg}$. VPH instrument calibration ranged from $6.3 \mathrm{mg} / \mathrm{Kg}$ through $19 \mathrm{mg} / \mathrm{Kg}$ with a reporting limit of $6.3 \mathrm{mg} / \mathrm{Kg}$. Initial VOC instrument calibration ranged from $1.0 \mu \mathrm{~g} / \mathrm{L}$ through $100 \mu \mathrm{~g} / \mathrm{L}$. The second phase VOC instrument calibration ranged from $1.0 \mu \mathrm{~g} / \mathrm{L}$ through $20 \mu \mathrm{~g} / \mathrm{L}$. Each instrument calibration range is recorded in the laboratory logbooks and saved electronically for future reference.

## D3.0 QUALITY CONTROL BLANK SUMMARY

Routine QC blanks analyzed in the field laboratory include instrument blanks, equipment rinse blanks (pump blanks and bailer blanks) and method blanks.

## D3.1 Instrument Blanks:

Instrument blanks were run for the EPH and TPHC analyses. Instrument blanks consisted of clean extraction solvent analyzed directly on the instrument to determine background response
for the instrument. No instrument contamination was identified through instrument blank analysis.

## D3.2 Method Blanks:

Method blanks were run for EPH/VPH/VOC and TPHC analyses after initial and continuing calibrations with a minimum of one blank per day of analysis to evaluate the potential for sample contamination during sample preparation and analysis at the on-site laboratory. EPH and TPHC soil method blanks were extracted daily with each extraction batch using the same procedures as samples. VPH soil method blanks were purged and analyzed solutions of analyte free water, methanol and surrogate. VOC method blanks were purged and analyzed solutions of analyte free water and surrogate (methanol was added for soil method blanks).

Method blank data indicate that method contamination did not result in false positive identification of EPH, VPH, or TPHC results during sample analysis. No method blanks had EPH, VPH or TPHC detected at concentrations greater than the reporting limits.

VOC method blanks were analyzed each day using the same procedure as samples. The VOC soil method blank analyzed on 8/29/96 had a detection of chloroform greater than the reporting limit at $390 \mathrm{mg} / \mathrm{Kg}$. Soil samples (RF571509 and RF571603) from AOC 57 associated with this method blank were qualified $(\mathrm{B})$ indicating the results may represent laboratory contamination. The VOC method blank analyzed on 11/01/96 had a detection of naphthalene greater than the reporting limit at $3.2 \mu \mathrm{~g} / \mathrm{Kg}$. Naphthalene was not detected in associated samples, and no samples associated with this method blank were qualified (B). With the exception of the VOC samples discussed above, VOC data indicate that no other laboratory contamination introduced during sample preparation and analysis.

## D3.3 Equipment Rinseate Blanks:

Equipment rinse blanks (pump blanks and bailer blanks) were collected periodically and analyzed for VOCs. Rinse blanks were collected at a minimum of one per twenty samples as specified in the POP. Five bailer blanks were collected and analyzed with two blanks exhibiting low levels of toluene ( $2.5 \mu \mathrm{~g} / \mathrm{L}$ and $2.1 \mu \mathrm{~g} / \mathrm{L}$ ). Samples associated with these blanks contained no toluene detections.

## D4.0 DATA ACCURACY AND PRECISION

The accuracy and precision of laboratory and field sampling methodologies was evaluated using matrix spike/ matrix spike duplicate (MS/MSD), matrix spike (MS), field duplicate analyses, and surrogate spikes as outlined below:

- EPH/VPH utilized MS/MSD and surrogate percent recovery (\%R) goals of 50\%-150\% and MS/MSD relative percent difference (RPD) goals of less than $30 \%$.
- Duplicate analyses were also utilized with RPD goals of less than $50 \%$ for soil samples.
- TPHC analyses utilized a single MS sample with a \%R goal of $50 \%$ to $150 \%$; duplicate analyses were also utilized with RPD goals of less than $50 \%$ for soil samples.
- VOC analyses utilized MS/MSD and surrogate percent recovery (\%R) goals of 50\% $150 \%$ and a MS/MSD RPD goal of less than $30 \%$.
- Field duplicate analyses were also utilized with RPD goals of less than $30 \%$ for aqueous samples and less than $50 \%$ for soil samples.

Field duplicates, matrix spikes and matrix spike/matrix spike duplicate collection frequency goal was five percent for the program.

## D4.1 Matrix Spikes:

EPH. Three samples were collected as matrix spike/matrix spike duplicates (this represented a frequency of 5 percent). The samples were spiked at a mid-point of the calibration curve ( $100 \mathrm{mg} / \mathrm{Kg}$ ). The data are tabulated in Table D4-1. MS/MSD recoveries for two calculated spike samples ranged from $43 \%$ to $54 \%$. The RPDs for the sample sets were $15 \%$ and $18 \%$. One MS/MSD data set was not analyzed due to operator failure to spike the sample with the MS/MSD spiking solution. Although two of four recoveries were outside the desired recovery range the RPD results were well below the $30 \%$ goal, indicating good precision. These results indicate a possible low bias shown by the MS/MSD recoveries. Sample results are usable as estimated values with a possible low bias by a factor of two.

VPH. Two samples were analyzed as matrix spike/matrix spike duplicates. This represented a 3.3 percent frequency. Both samples were spiked at a mid-point of the calibration curve $(12.5 \mathrm{mg} / \mathrm{Kg}$ ). The data is tabulated in Table D4-1. MS/MSD recoveries for the two spiked samples ranged from $57 \%$ to $91 \%$. The RPDs for the samples sets were $3.4 \%$ and $10 \%$. The established goals were partially met for this data set, however, the RPDs calculated are well below the established goal of $30 \%$ indicating excellent accuracy and precision.

TPHC. Nine samples were analyzed as matrix spikes. This represents an 8.1 percent frequency. The samples were spiked at a mid-point of the calibration curve ( $2500 \mathrm{mg} / \mathrm{Kg}$ ). The data is tabulated in Table D4-1. Results for TPHC in two samples exceeded the calibration range of the instrument and no MS results were obtained. MS/MSD recoveries for the other seven spiked samples ranged from $88 \%$ to $162 \%$. Two MS recoveries were not calculated due to original sample concentrations above the instrument calibration range. One
recovery exceeded the recovery goal of $150 \%$. Eighty six percent of this data set met the established goals indicating good accuracy and precision.

VOC. Twènty one samples were analyzed as matrix spike/matrix spike duplicates. This represents a 4.7 percent frequency. The data is tabulated in Table D4-2. The samples were spiked at a mid-point of the calibration curve (see Table D4-2 to find specific spike concentrations). Ninety eight percent of the spike recoveries met the goal range of $50 \%$ to $150 \%$ recovery. Ninety eight percent of the RPDs met the goal of $30 \%$ or less. The established goals were met for this data set indicating excellent accuracy and precision.

## D4.2 Field Duplicates:

Field duplicate samples were collected at a rate of approximately 5 percent of the samples during the field sampling effort and submitted to the field laboratory for analysis. Relative percent difference goals of less than $30 \%$ for aqueous sample analysis and less than $50 \%$ for soil analysis were outlined for the project.

EPH. Four samples were collected and analyzed as field duplicates (this represented a frequency of 6.7 percent). The results of the EPH field duplicate samples are listed in Table D4-3. The results of all sample sets were non-detects. In general, field duplicate results indicate good precision of measurement was obtained for the EPH sample analyses. These results indicated agreement for absence of EPH, however, evaluation of precision for positive detection of EPH was not possible.

VPH. Four samples were collected and analyzed as field duplicates (this represented a frequency of 6.7 percent). The results of the VPH field duplicate samples are listed in Table D4-3. The results of all sample sets were non-detects. These results indicated agreement for absence of VPH, however, evaluation of precision for positive detection of VPH was not possible.

TPHC. Fourteen samples were collected and analyzed as field duplicates (this represented a frequency of 13 percent). The results of the TPHC field duplicate samples are listed in Table D4-3. The RPDs of three sample duplicate sets were calculated and ranged from 0.0\% to $33 \%$. Seven results were non-detects for both samples. Four sample duplicate sets had a non-detect for one of the samples in the duplicate pair with a positive detection at the reporting limit in the associated duplicate. In general field duplicate results indicate good accuracy and precision of measurement was obtained for the TPHC sample analyses, however, variability of the TPHC measurement at the reporting limit are apparent. These results indicate detection limits and low concentration positive detections are estimated values.

VOC. Thirty nine samples were collected and analyzed as field duplicates (this represented afrequency of 8.7 percent). The results of the VOC field duplicates are listed in Table D4-4.

The results of the duplicate sample sets (seventeen soil samples and twenty two aqueous samples) were evaluated and RPDs calculated.

Eight soil RPDs were calculated and seven exceeded the $50 \%$ goal. Five of the seven were duplicate sets that exceeded the goal included a detection one sample and the duplicate did not ( $200 \% \mathrm{RPD}$ ). Two of these five results were chloroform. Chloroform was identified as a possible laboratory contaminant in Subsection D3.2. One of the results is qualified " B " indicating the sample was associated with a contaminated method blank. The differences in the field duplicate results are interpreted to be related to laboratory contamination. The three other results included o-xylene and naphthalene with positive and non-detect results in samples RF571010, EF573106, and RF571603. In all cases reported detections were only 2 to 3 times the reporting limits. These results demonstrate variability of xylenes and naphthalene at or near, the reporting limit. The remaining field duplicate results included detections of TCE, PCE, and cis-1,2-dichloroethene in samples BXG613B29 and BX502025. Although two of three results had RPDs greater than 50 , these results showed good agreement with the presence of target compounds and the relative concentrations reported. The field duplicate data indicate that all soil VOC results should be considered estimated.

Nineteen aqueous RPDs were calculated and two exceeded the goal of 30. These results indicate good accuracy and precision of measurement was obtained for the aqueous VOC sample analyses.

## D4.3 Surrogate Recoveries:

Surrogates were added to each EPH, VPH and VOC sample to monitor the efficiency of the measurement and possible matrix effects on recovery of target analytes. Surrogate recovery goals of greater than or equal to $50 \%$ were established for the project. Sample results associated with surrogate recoveries below the goal are reported with an " $S$ " qualifier.

EPH. All samples submitted for EPH analysis were spiked, prior to the extraction step, with naphthalene or $\sigma$-terphenyl as a surrogate. The surrogate recoveries were recorded and used to determine accuracy of each sample analysis. No EPH samples had surrogate percent recoveries below the goal of $50 \%$. Surrogate recoveries ranged from $75 \%$ to $160 \%$ with the mean equal to $98 \%$, indicating good recoveries were obtained during the program. Upper and lower control limits (mean $\pm 3$ standard deviations) were 144 and 53 respectively.

VPH. All samples submitted for VPH analysis were spiked, prior to the methanol extraction step, with 2,5-dibromotoluene as a surrogate. The surrogate recoveries were recorded and used to determine accuracy of each sample analysis. Surrogate goals were a minimum of $50 \%$ recovery. Sample results associated with surrogate recoveries below the goal are reported with an " $S$ " qualifier. Sample BX610215XF had a 45\% surrogate recovery and was qualified ' $S$ '. Sample BXBD0227XF had a $174 \%$ surrogate recovery and was qualified ' $S$ '. With the
exception of sample BXBD0227XF, surrogate recoveries ranged from $59 \%$ to $149 \%$ with the mean equal to $101 \%$, indicating good recoveries were generally obtained during the program. Upper and lower control limits (mean $\pm 3$ standard deviations) were 178 and 24 respectively.

VOC. All samples submitted for modified USEPA Method 8021 analysis were spiked prior to analysis with 4-Bromofluorobenzene. The surrogate recoveries were recorded and used to determine the accuracy of each sample analysis. Surrogate goal was a minimum of 50\% recovery. Soil surrogate recoveries ranged from $58 \%$ to $138 \%$ with the mean equal to $104 \%$. Upper and lower soil control limits (mean $\pm 3$ standard deviations) were 158 and 50 respectively. Aqueous surrogate recoveries ranged from $63 \%$ to $166 \%$ with the mean equal to $103 \%$, indicating good recoveries were generally obtained during the program. Upper and lower aqueous control limits (mean $\pm 3$ standard deviations) were 149 and 57 respectively. All samples had surrogate recoveries above the goal and no VOC results were qualified.

## D4.4 Data Qualification:

The on-site analytical data was qualified as needed during the field program. A secondary review was made after the laboratory was dismantled and the database reviewed for any further qualification. The qualifiers in each case were applied through guidance found in the ABB SOP: purge and trap field chromatography, 1995.

B qualifier is added to values as evidence of method blank contamination.
E qualifier is added to values that exceed the calibration range of the instrument.
S qualifier is added to values that exceed surrogate acceptance range requirements.

## D5.0 ON-SITE/OFF-SITE LABORATORY SPLIT SAMPLE DATA COMPARISON

This section discusses the results of a split samples collected during the 1996 AOC 50, 57, 612, and 69W Remedial Investigations at Fort Devens, Massachusetts. The soil samples were split in the field and submitted for on-site and off-site volatile analysis ( 14 samples), EPH/VPH ( 7 samples), and petroleum hydrocarbons by 418.1 ( 22 samples). The purpose of collection of the split samples is to provide a comparison of the on-site data with the associated off-site data, in order to evaluate data quality and establish the on-site results as screening data with definitive confirmation (USEPA, 1993).

## D.5.1 ANalytical Methodologies

The on-site field screening target compound data were evaluated using the USAEC offsite analytical GC/mass spectrometry (MS) method for VOCs and SVOCs.
Dichlorobenzenes and naphthalene off-site data were taken from the SVOC analyses. Off-
site TPH results were generated using USEPA Method 9071 to extract samples followed by analysis using USEPA Method 418.1 (USEPA, 1983; USEPA, 1986). EPH and VPH results were obtained using methods developed by the MADEP (MEDEP, 1995a; MEDEP, 1995b).

## D.5.3 PROGRAM OBJECTIVES

The objectives of the on-site soil field screening analytical program were to evaluate the downgradient, lateral, and vertical distribution of contamination in overburden soil, and identify critical samples for off-site laboratory analysis. For the purpose of this on-site/offsite data comparison action levels to evaluate the data sets were based on Category S-1 soils cleanup criteria outlined in the Massachusetts Contingency Plan (MCP) (MADEP, 1995c). A summary of target compound action levels for each target compound evaluated using the on-site methods is outlined below:

## Action Level ( $\mu \mathrm{g} / \mathrm{g}$ )

| Benzene | 10 |
| :--- | :---: |
| Toluene | 90 |
| Ethylbenzene | 80 |
| Total Xylenes | 500 |
| Chlorobenzene | 8 |
| 1,1-Dichloroethene | 0.3 |
| 1,2-Dichloroethene | 2 |
| Chloroform | 0.1 |
| 1,1,1-Trichloroethane | 30 |
| Carbon Tetrachloride | 1 |
| Trichloroethene | 0.4 |
| Tetrachloroethene | 0.5 |
| TPH | 500 |
| Dichlorobenzene (each isomer) | 100 |
| Naphthalene | 4 |
| Vinyl Chloride | 0.3 |
|  |  |
| D.5.4 DATA ComPARISON AND EvALUATION |  |
|  |  |
| Comparability of the data was evaluated using two separate comparisons outlined in |  |
| Section 4.6 of the POP (ABB-ES, 1995). The first comparison evaluates agreement based |  |
| on detection of analytes relative to action levels. The second comparison evaluates data |  |
| based on relative percent differences (RPDs) between split samples. Results of the on- |  |
| site/off-site analyses are summarized on Table D-5-1, Table D-5-2, and Table D-5-3 for |  |
| EPH/VPH, TPHC, and VOCs, respectively. |  |

## Comparison 1

In this comparison on-site and off-site results were organized into one of the four • categories described below:

1. Both on-site and off-site analyses had the target compounds detected/nondetected at concentrations less than the action levels.
2. Both on-site and off-site analyses had the target analytes detected at concentrations greater than action levels.
3. The target compounds were reported above action levels for on-site and the off-site data results were less than action levels.
4. The target compounds were reported above the action level off-site and the on-site results were less than the action levels.

A primary assumption of the comparison was that the off-site data represented the accurate definitive data when comparing results. Sample data which fall within categories 1 and 2 represent agreement between on-site and off-site analytical results. Sample data in category 3 suggested a high bias in the on-site results. Sample data in category 4 suggest a low bias in on-site results. The analytical goal of the program was to have over 95 percent of the results fall into categories 1,2 and 3 .

## EPH/VPH

EPH/VPH split sample results are presented in Table D5-1. With the exception of VPH reported by the off-site laboratory in sample BXBD0123, results were reported as non-detect by both the on-site and off-site laboratory. All results were less than the $500 \mathrm{mg} / \mathrm{g}$ action level indicating good agreement on hydrocarbon levels relative to the MCP soil criteria.

TPHC. The results of 21 of 22 (95.5\%) split sample analysis fell into Category 1 and Category 2 indicating good agreement for the on-site and off-site analyses relative to action levels for fuel hydrocarbons. These data indicate that the on-site data are adequate for the evaluation of the distribution of hydrocarbons at the $500 \mathrm{mg} / \mathrm{g}$ action levels.

VOCs. The detection of target VOCs by the on-site laboratory relative to action levels was confirmed by the off-site laboratory. All but one soil sample results fell within Category 1. The one exception was BF570705, where one target compound (Naphthalene) fell into Category 3. Overall, these results indicate good comparison of onsite and off-site results relative to MCP soil cleanup goals and that the goals of the action level comparison were met.

## Comparison 2

For the second comparison, relative percent difference (RPD) values were calculated for associated on-site/off-site surface soil samples. Calculation of RPD is outlined in the POP (ABB-ES, 1995). RPD values were compared to USEPA Region I soil field duplicate criteria of $50 \%$. No comparison was conducted for the VPH/EPH results because no comparative positive detections were available.

## VOCs

The majority of results were non-detects in both the on-site and off-site laboratory indicating consistent agreement with the absence of contamination for VOCs.
Approximately half the positive detections were low concentrations of VOCs reported in the off-site laboratory at concentrations below the reporting limit of on-site split sample. These results are at low concentrations are not interpreted to impact use of field screening results.

In the remaining samples, concentrations of VOCs reported for the on-site screening analysis are consistently greater than concentrations reported in the off-site analysis. Example of these results can be seen in samples BF570700 for naphthalene, BF570705 for ethylbenzene, xylenes, and naphthalene, and BF573006 for ethylbenzene and naphthalene. These results indicate a possible high bias of on-site results. In the above samples high concentrations of TPH were detected indicating the presence of fuel contamination at the sample locations. The on-site method for VOCs utilized a single column GC/PID analysis for BTEX and naphthalene with no second column confirmation. It is highly likely that compound concentrations were over estimated due to interference from non-target fuel hydrocarbons. The off-site analysis was conducted using GC/MS confirmation of target analytes so interference from non-target hydrocarbon would not results in quantitative interferences or false positive identification of compounds.

It is important to note that evidence had also been published indicating the possibility of low bias off-site results due to loss of VOCs during sample collection and handling using bulk sampling procedures (Liikala, 1995). It is possible that concentrations reported at the on-site laboratory may be more representative of actual site conditions. However, for the purpose of this comparison, on-site results are considered potentially biased high.

## TPHC

TPHC was detected in approximately $63 \%$ of the samples. RPDs of samples with detected TPH ranged from $6 \%$ to $200 \%$ with the majority of RPDs outside the $50 \%$ project goal. There was good correlation of split sample results relative to the magnitude of concentrations reported. In all samples with detects reported, concentrations trends between high and low values agreed well. These results indicate that TPH data are adequate for determination of presence and absence of fuel contamination and the determination of the relative concentrations of contamination at the sites, however, reported concentrations should be considered estimated values.

## D.5.5 Conclusions

There was a strong qualitative and quantitative correlation between the on-site and off-site laboratories. The goal of 95 percent of on-site/off-site data characterized by conditions specified in POP for data categories 1,2 or 3 was achieved (ABB-ES, 1995), based on results presented in Comparison 1. The comparison results indicate that screening results provided adequate data to identify the presence or absence of contamination at action levels based on MCP Category S-1 soil cleanup criteria (MADEP, 1995).

An evaluation of RPDs (Comparison 2) indicates results for on-site analyses for the VOC target compounds BTEX and naphthalene contamination may be biased high. Bias is possibly a result of interferences with fuel-related compounds and limitations of the GC/PID single column analysis used at the on-site laboratory. The TPH results are adequate for qualitative and semi-quantitative uses, but reported concentrations should be considered estimated.

## REFERENCES:

ABB Environmental Services, Inc. (ABB-ES, 1995). "Project Operations Plan", Fort Devens, Massachusetts; Data Item A004/A006; May 1995.

ABB Environmental Services, Inc. (ABB-ES), 1994. "Field Analyses Data Evaluation", SOP.
ABB Environmental Services, Inc. (ABB-ES), 1993. "Purge and Trap Analysis of Volatile Organic Compounds by Field Gas Chromatography", SOP.

Liikala, T.L., et al., 1995. Volatile Organic Compounds: Comparison of Two Sample Collection and Preservation Methods; Environmental Science and Technology; Vol. 30, No. 12, pp. 3441-3447.

Massachusetts Department of Environmental Protection, 1995a. "Method for the Determination of Extractable Petroleum Hydrocarbons (EPH); (public Comment Draft 1.0); August 1995.

Massachusetts Department of Environmental Protection, 1995b. 'Method for the Determination of Volatile Petroleum Hydrocarbons (VPH); (public Comment Draft 1.0); August 1995.

Massachusetts Department of Environmental Protection (MADEP), 1995c. "Revised Massachusetts Contingency Plan"; 310 CMR 40.000. January 1995.
U.S. Environmental Protection Agency (USEPA), 1983. "Methods for Chemical Analysis of Water and Wastes"; Environmental Monitoring and Support Laboratory; USEPA 600-4-79020; Cincinnati OH; March 1983.
U.S. Environmental Protection Agency (USEPA), 1993. "Data Quality Objectives Process for Superfund"; Office of Solid Waste and Emergency Response; EPA540-R-93-071; September 1993.
U.S. Environmental Protection Agency (USEPA), 1995. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Remedial Response; Washington, DC; SW-846; November 1986, revised January 1995.

## APPENDIX D-2 <br> TABLE D2-1 <br> 1996 METHOD DETECTION LIMIT STUDY SUMMARY <br> 1996 ON-SITE LABORATORY <br> FORT DEVENS, MASSACHUSETTS

EPH MDL Study

| COMPOUND SPIKE CONC. | R1 | R2 | R3 | R4 | R5 | R6 | R7 | STD. DEV. MDL | RL |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| EPH | $50 \mathrm{mg} / \mathrm{Kg}$ | 53 | 48 | 41 | 44 | 44 | 39 | 36 | 5.7 | 18 | $100 \mathrm{mg} / \mathrm{Kg}$ |

VPH MDL Study

| COMPOUND | SPIKE CONC. | R1 | R2 | R3 | R4 | R5 | R6 | R7 | STD. DEV. | MDL | RL |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| VPH | $2.5 \mathrm{mg} / \mathrm{Kg}$ | 2.0 | 2.1 | 2.3 | 2.3 | 1.9 | 2.4 | 1.9 | 0.19 | 0.57 | $6.3 \mathrm{mg} / \mathrm{Kg}$ |

Initial VOC MDL Study

| COMPOUND | SPIKE CONC. | R1 | R2 | R3 | R4 | R5 | R6 | R7 | STD. DEV. | MDL | RL |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Vc | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.320 | 0.358 | 0.287 | 0.296 | 0.260 | 0.302 | 0.297 | 0.0303 | 0.095 | $2.0 \mu \mathrm{~g} / \mathrm{L}$ |
| t-1,2-DCE | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.096 | 0.096 | 0.098 | 0.104 | 0.093 | 0.098 | 0.108 | 0.0053 | 0.017 | 2.0 g $/ \mathrm{L}$ |
| c-1,2-DCE | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.093 | 0.096 | 0.092 | 0.093 | 0.089 | 0.095 | 0.097 | 0.0026 | 0.008 | $2.0 \mu \mathrm{~g} / \mathrm{L}$ |
| TCE | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.093 | 0.091 | 0.093 | 0.090 | 0.086 | 0.083 | 0.094 | 0.0042 | 0.013 | $2.0 \mu \mathrm{~g} / \mathrm{L}$ |
| PCE | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.108 | 0.103 | 0.102 | 0.103 | 0.099 | 0.101 | 0.110 | 0.0039 | 0.012 | $2: 0 \mu \mathrm{~g} / \mathrm{L}$ |
| BEN | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.575 | 0.589 | 0.577 | 0.578 | 0.566 | 0.553 | 0.564 | 0.0117 | 0.037 | $2.0 \mu \mathrm{~g} / \mathrm{L}$ |
| TOL | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.416 | 0.423 | 0.415 | 0.429 | 0.409 | 0.423 | 0.422 | 0.0066 | 0.021 | $2.0 \mu \mathrm{~g} / \mathrm{L}$ |
| EBEN | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.385 | 0.411 | 0.377 | 0.400 | 0.391 | 0.397 | 0.542 | 0.0572 | 0.180 | $2.0 \mu \mathrm{~g} / \mathrm{L}$ |
| $\mathrm{m} / \mathrm{p}-\mathrm{X}$ | $0.20 \mu \mathrm{~g} / \mathrm{L}$ | 0.796 | 0.828 | 0.728 | 0.798 | 0.784 | 0.756 | 0.716 | 0.0405 | 0.127 | $4.0 \mu \mathrm{~g} / \mathrm{L}$ |
| 0-X | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.371 | 0.393 | 0.348 | 0.479 | 0.362 | 0.392 | 0.376 | 0.0429 | 0.135 | $2.0 \mu \mathrm{~g} / \mathrm{L}$ |

Second VOC MDL Study

| COMPOUND | SPIKE CONC. | R1 | R2 | R3 | R4 | R5 | R6 | R7 | STD. DEV. | MDL | RL |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |
| VC | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.065 | 0.059 | 0.055 | 0.043 | 0.052 | 0.044 | 0.050 | 0.0079 | 0.025 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |
| 1,1-DCE | $0.10 \mu \mathrm{~L}$ | 0.080 | 0.071 | 0.067 | 0.066 | 0.054 | 0.054 | 0.048 | 0.0111 | 0.035 | $1.0 \mu \mathrm{~L} / \mathrm{L}$ |
| t-1,2-DCE | $0.10 \mu \mathrm{~L} / \mathrm{L}$ | 0.104 | 0.089 | 0.099 | 0.092 | 0.092 | 0.085 | 0.080 | 0.0079 | 0.025 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |
| C-1,2-DCE | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.086 | 0.078 | 0.087 | 0.079 | 0.083 | 0.073 | 0.077 | 0.0050 | 0.016 | $1.0 \mu \mathrm{~L} / \mathrm{L}$ |
| Chloroform | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.110 | 0.105 | 0.114 | 0.106 | 0.110 | 0.101 | 0.105 | 0.0043 | 0.014 | $1.0 \mu \mathrm{~L} / \mathrm{L}$ |
| 1,1,1-TCA | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.095 | 0.090 | 0.098 | 0.089 | 0.096 | 0.086 | 0.088 | 0.0047 | 0.015 | $1.0 \mu \mathrm{~L} / \mathrm{L}$ |
| Carbon tet. | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.093 | 0.087 | 0.097 | 0.085 | 0.094 | 0.085 | 0.086 | 0.0050 | 0.016 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |
| TCE | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.090 | 0.085 | 0.091 | 0.084 | 0.085 | 0.081 | 0.081 | 0.0039 | 0.012 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |
| PCE | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.090 | 0.084 | 0.095 | 0.089 | 0.086 | 0.082 | 0.079 | 0.0054 | 0.017 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |
| BEN | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.110 | 0.106 | 0.102 | 0.104 | 0.109 | 0.106 | 0.109 | 0.0029 | 0.009 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |
| TOL | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.118 | 0.117 | 0.115 | 0.114 | 0.119 | 0.115 | 0.118 | 0.0019 | 0.006 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |
| CBEN | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.101 | 0.095 | 0.096 | 0.097 | 0.102 | 0.096 | 0.097 | 0.0028 | 0.009 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |
| EBEN | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.112 | 0.105 | 0.106 | 0.110 | 0.113 | 0.108 | 0.115 | 0.0037 | 0.012 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |
| m/p-X | $0.20 \mu \mathrm{~g} / \mathrm{L}$ | 0.244 | 0.223 | 0.222 | 0.227 | 0.239 | 0.230 | 0.222 | 0.0088 | 0.028 | $2.0 \mu \mathrm{~g} / \mathrm{L}$ |
| o-X | $0.10 \mu \mathrm{~g} / \mathrm{L}$ | 0.128 | 0.124 | 0.122 | 0.122 | 0.125 | 0.123 | 0.124 | 0.0021 | 0.007 | $1.0 \mu \mathrm{~g} / \mathrm{L}$ |

1996 ON-SITE LABORATORY
FORT DEVENS, MASSACHUSETTS
EPH MS/MSD

| SAMPLE |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| ID | SAMPLE <br> CONC. <br> $(\mathrm{mg} / \mathrm{Kg})$ | MS CONC. <br> ADDED <br> $(\mathrm{mg} / \mathrm{Kg})$ | MS <br> RECOVERY <br> $(\%)$ | MSD <br> RECOVERY <br> $(\%)$ | RPD <br> $(\%)$ |
|  | $<100$ | 100 | 45 | 54 | 18 |
| BX613A17XF | $<100$ | 100 | 50 | 43 | 15 |
| BX610123XF |  |  |  |  |  |

VPH MS/MSD

| SAMPLE <br> ID | SAMPLE <br> CONC. <br> $(\mathrm{mg} / \mathrm{Kg})$ | MS CONC. <br> ADDED <br> $(\mathrm{mg} / \mathrm{Kg})$ | MS <br> RECOVERY <br> $(\%)$ | MSD <br> RECOVERY <br> $(\%)$ | RPD <br> $(\%)$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $<6.3$ | 12.5 | 88 | 91 | 3.4 |
| BX613A17XF | $<6.3$ | 12.5 | 57 | 63 | 10 |
| BX610123XF |  |  |  |  |  |

TPHC MS

| SAMPLE <br> ID | SAMPLE <br> CONC. <br> (mg/Kg) | MS CONC. <br> ADDED <br> (mg/Kg) | MS <br> RECOVERY <br> $(\%)$ |
| :---: | :---: | :---: | :---: |
| RF571503 | $12,000 \mathrm{E}$ | 2500 | NC |
| EF573004 | $12,000 \mathrm{E}$ | 2500 | NC |
| BF570900 | $<53$ | 2500 | 104 |
| RF572002 | $<54$ | 2500 | 104 |
| BF571005 | $<53$ | 2500 | 96 |
| EF572803 | $<52$ | 2500 | 92 |
| RF571409 | 64 | 2500 | 92 |
| BFZW1909 | 840 | 2500 | 162 |
| BFZW0302 | $<54$ | 2500 | 88 |

NC = Not calculated
$E=$ Exceeded calibration range

TABLE D4-2
VOC MATRIX SPIKE and MATRIX SPIKE DUPLICATE RESULTS

- 1996 ON-SITE LABORATORATORY FORT DEVENS, MASSACHUSETTS

Aqueous samples

|  |  |  |  | $\qquad$ |  | $\begin{aligned} & \text { Rpa } \\ & \text { osion } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| MXBD01P1XF | VC | $<2.0$ | 5.0 | 101 | 101 | 0 |
|  | t-1,2-DCE | <2.0 | 5.0 | 99 | 103 | 4.0 |
|  | c-1,2-DCE | <2.0 | 5.0 | 93 | 102 | 9.2 |
|  | TCE | <2.0 | 5.0 | 101 | 104 | 2.9 |
|  | PCE | $<2.0$ | 5.0 | 102 | 105 | 2.9 |
|  | BEN | $<2.0$ | 5.0 | 90 | 100 | 11 |
|  | TOL | $<2.0$ | 5.0 | 87 | 129 | 39 |
|  | EBEN | $<2.0$ | 5.0 | 94 | 109 | 15 |
|  | m/p-X | <4.0 | 10 | 93 | 104 | 11 |
|  | 0-X | $<2.0$ | 5.0 | 90 | 104 | 14 |
| XFSA0315 | VC | $<2.0$ | 5.0 | 105 | 109 | 3.7 |
|  | t-1,2-DCE | $<2.0$ | 50 | 85 | 89 | 4.6 |
|  | c-1,2-DCE | <2.0 | 50 | 87 | 92 | 5.6 |
|  | TCE | <2.0 | 50 | 86 | 91 | 5.6 |
|  | PCE | <2.0 | 50 | 88 | 92 | 4.4 |
|  | BEN | <2.0 | 50 | 94 | 96 | 2.1 |
|  | TOL | <2.0 | 50 | 94 | 95 | 1.1 |
|  | EBEN | <2.0 | 50 | 94 | 96 | 2.1 |
|  | $\mathrm{m} / \mathrm{p}$-X | <4.0 | 100 | 95 | 97 | 2.1 |
|  | o-X | $<2.0$ | 50 | 95 | 97 | 2.1 |
| XFSA0265 | VC | $<2.0$ | 5.0 | 101 | 105 | 3.9 |
|  | t-1,2-DCE | <2.0 | 50 | 103 | 101 | 2.0 |
|  | c-1,2-DCE | 8.5 | 50 | 95 | 93 | 2.1 |
|  | TCE | $<2.0$ | 50 | 105 | 104 | 1.0 |
|  | PCE | 15 | 50 | 81 | 79 | 2.5 |
|  | BEN | $<2.0$ | 50 | 97 | 97 | 0 |
|  | TOL | $<2.0$ | 50 | 98 | 98 | 0 |
|  | EBEN | 3.1 | 50 | 96 | 98 | 2.1 |
|  | $\mathrm{m} / \mathrm{p}$-X | <4.0 | 100 | 105 | 104 | 1.0 |
|  | o-X | $<2.0$ | 50 | 103 | 104 | 1.0 |
| XFSA0660 | VC | $<1.0$ | 10 | 87 | 89 | 2.3 |
|  | 1,1-DCE | $<1.0$ | 10 | 96 | 97 | 1.0 |
|  | t-1,2-DCE | <1.0 | 10 | 95 | 101 | 6.1 |
|  | c-1,2-DCE | <1.0 | 10 | 60 | 97 | 47 |
|  | Chloroform | <1.0 | 10 | 84 | 108 | 25 |
|  | 1,1,1-TCA | <1.0 | 10 | 101 | 105 | 3.9 |
|  | Carbon tet. | <1.0 | 10 | 101 | 103 | 2.0 |
|  | TCE | <1.0 | 10 | 95 | 101 | 6.1 |
|  | PCE | <1.0 | 10 | 67 | 55 | 20 |
|  | 1,3-DCB | <1.0 | 10 | 70 | 104 | 39 |
|  | 1,4-DCB | <1.0 | 10 | 64 | 102 | 46 |

## Aqueous samples

|  |  |  |  |  |  | \#Rrs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| XFSA0755 | 1,2-DCB | $<1.0$ | 10 | 56 | 108 | 63 |
|  | BEN | $<1.0$ | 10 | 87 | 102 | 16 |
|  | TOL | <1.0 | 10 | 90 | 103 | 13 |
|  | CBEN | $<1.0$ | 10 | 79 | 106 | 29 |
|  | EBEN | <1.0 | 10 | 93 | 103 | 10 |
|  | $\mathrm{m} / \mathrm{p}$-X | $<2.0$ | 20 | 92 | 104 | 12 |
|  | o-X | <1.0 | 10 | 79 | 102 | 25 |
|  | Naph | <1.0 | 10 | 12* | 101 | 158* |
|  | VC | $<1.0$ | 10 | 85 | 91 | 6.8 |
|  | 1,1-DCE | <1.0 | 10 | 98 | 102 | 4.0 |
|  | t-1,2-DCE | <1.0 | 10 | 102 | 104 | 1.9 |
|  | c-1,2-DCE | $<1.0$ | 10 | 108 | 111 | 2.7 |
|  | Chloroform | <1.0 | 10 | 110 | 110 | 0 |
|  | 1,1,1-TCA | <1.0 | 10 | 105 | 107 | 1.9 |
|  | Carbon tet. | <1.0 | 10 | 104 | 107 | 2.8 |
|  | TCE | <1.0 | 10 | 110 | 109 | 0.9 |
|  | PCE | <1.0 | 10 | 116 | 117 | 0.9 |
|  | 1,3-DCB | <1.0 | 10 | 106 | 108 | 1.9 |
|  | 1,4-DCB | <1.0 | 10 | 107 | 109 | 1.9 |
|  | 1,2-DCB | <1.0 | 10 | 114 | 114 | 0 |
|  | BEN | <1.0 | 10 | 105 | 106 | 0.9 |
|  | TOL | $<1.0$ | 10 | 108 | 108 | 0 |
|  | CBEN | <1.0 | 10 | 106 | 105 | 0.9 |
|  | EBEN | <1.0 | 10 | 105 | 104 | 1.0 |
|  | m/p-X | $<2.0$ | 20 | 109 | 108 | 0.9 |
|  | o-X | <1.0 | 10 | 106 | 106 | 0 |
|  | Naph | <1.0 | 10 | 99 | 113 | 13 |
| XFSA1015 | VC | <1.0 | 10 | 110 | 113 | 2.7 |
|  | 1,1-DCE | <1.0 | 10 | 112 | 114 | 1.8 |
|  | t-1,2-DCE | <1.0 | 10 | 118 | 120 | 1.7 |
|  | c-1,2-DCE | <1.0 | 10 | 114 | 116 | 1.7 |
|  | Chloroform | <1.0 | 10 | 113 | 116 | 2.6 |
|  | 1,1,1-TCA | <1.0 | 10 | 112 | 113 | 0.9 |
|  | Carbon tet. | <1.0 | 10 | 112 | 115 | 2.6 |
|  | TCE | $<1.0$ | 10 | 115 | 116 | 0.9 |
|  | PCE | <1.0 | 10 | 114 | 115 | 0.9 |
|  | 1,3-DCB | <1.0 | 10 | 118 | 119 | 0.8 |
|  | 1,4-DCB | <1.0 | 10 | 120 | 123 | 2.5 |
|  | 1,2-DCB | <1.0 | 10 | 125 | 128 | 2.4 |
|  | BEN | <1.0 | 10 | 103 | 104 | 1.0 |
|  | TOL | <1.0 | 10 | 106 | 107 | 0.9 |
|  | CBEN | <1.0 | 10 | 103 | 105 | 1.9 |
|  | EBEN | <1.0 | 10 | 102 | 103 | 1.0 |
|  | m/p-X | <2.0 | 20 | 102 | 103 | 1.0 |

Aqueous samples

|  | ANEMW! | 4Mimise cores (ogli) |  | $\qquad$ |  | RP\% \%\%s |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| XFSA1220 | 0-X | $<1.0$ | 10 | 104 | 105 | 1.0 |
|  | Naph | <1.0 | 10 | 125 | 146 | 15 |
|  | VC | <1.0 | 10 | 88 | 91 | 3.4 |
|  | 1,1-DCE | <1.0 | 10 | 96 | 99 | 3.1 |
|  | t-1,2-DCE | <1.0 | 10 | 97 | 102 | 5.0 |
|  | c-1,2-DCE | <1.0 | 10 | 95 | 101 | 6.1 |
|  | Chloroform | <1.0 | 10 | 96 | 102 | 6.1 |
|  | 1,1,1-TCA | <1.0 | 10 | 98 | 101 | 3.0 |
|  | Carbon tet. | <1.0 | 10 | 96 | 100 | 4.1 |
|  | TCE | <1.0 | 10 | 95 | 100 | 5.1 |
|  | PCE | <1.0 | 10 | 96 | 102 | 6.1 |
|  | 1,3-DCB | <1.0 | 10 | 96 | 105 | 9.0 |
|  | 1,4-DCB | <1.0 | 10 | 95 | 105 | 10 |
|  | 1,2-DCB | <1.0 | 10 | 88 | 104 | 17 |
|  | BEN | <1.0 | 10 | 101 | 104 | 2.9 |
|  | TOL | <1.0 | 10 | 103 | 106 | 2.9 |
|  | CBEN | $<1.0$ | 10 | 100 | 104 | 3.9 |
|  | EBEN | <1.0 | 10 | 100 | 103 | 3.0 |
|  | m/p-X | $<2.0$ | 20 | 100 | 103 | 3.0 |
|  | $0-\mathrm{X}$ | <1.0 | 10 | 101 | 105 | 3.9 |
|  | Naph | <1.0 | 10 | 94 | 127 | 30 |
| XFSA1420 | VC | <1.0 | 10 | 82 | 84 | 2.4 |
|  | 1,1-DCE | <1.0 | 10 | 96 | 98 | 2.1 |
|  | t-1,2-DCE | <1.0 | 10 | 104 | 108 | 3.8 |
|  | c-1,2-DCE | <1.0 | 10 | 102 | 107 | 4.8 |
|  | Chloroform | <1.0 | 10 | 105 | 109 | 3.7 |
|  | 1,1,1-TCA | <1.0 | 10 | 103 | 107 | 3.8 |
|  | Carbon tet. | <1.0 | 10 | 105 | 110 | 4.7 |
|  | TCE | <1.0 | 10 | 108 | 110 | 1.8 |
|  | PCE | <1.0 | 10 | 112 | 115 | 2.6 |
|  | 1,3-DCB | <1.0 | 10 | 111 | 115 | 3.5 |
|  | 1,4-DCB | $<1.0$ | 10 | 122 | 126 | 3.2 |
|  | 1,2-DCB | <1.0 | 10 | 128 | 132 | 3.1 |
|  | BEN | <1.0 | 10 | 99 | 99 | 0 |
|  | TOL | $<1.0$ | 10 | 100 | 101 | 1.0 |
|  | CBEN | <1.0 | 10 | 102 | 103 | 1.0 |
|  | EBEN | <1.0 | 10 | 100 | 101 | 1.0 |
|  | m/p-X | $<2.0$ | 20 | 100 | 101 | 1.0 |
|  | o-X | <1.0 | 10 | 102 | 103 | 1.0 |
|  | Naph | <1.0 | 10 | 102 | 136 | 29 |

## APPENDIX D-2

TABLE D4-2
VOC MATRIX SPIKE and MATRIX SPIKE DUPLICATE RESULTS

- 1996 ON-SITE LABORATORATORY

FORT DEVENS, MASSACHUSETTS

Aqueous samples

|  | ANAMME: | SAMIESE cone (ogli) |  |  |  | $\begin{aligned} & \text { Ren } \\ & \text { \& \% } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| XFSA1350 | VC | <1.0 | 10 | 84 | 79 | 6.1 |
|  | 1,1-DCE | $<1.0$ | 10 | 102 | 99 | 3.0 |
|  | t-1,2-DCE | <1.0 | 10 | 110 | 109 | 0.9 |
|  | c-1,2-DCE | <1.0 | 10 | 107 | 108 | 0.9 |
|  | Chloroform | <1.0 | 10 | 108 | 107 | 0.9 |
|  | 1,1,1-TCA | <1.0 | 10 | 105 | 104 | 1.0 |
|  | Carbon tet. | <1.0 | 10 | 106 | 106 | 0.0 |
|  | TCE | <1.0 | 10 | 106 | 108 | 1.9 |
|  | PCE | <1.0 | 10 | 99 | 101 | 2.0 |
|  | 1,3-DCB | $<1.0$ | 10 | 111 | 111 | 0 |
|  | 1,4-DCB | <1.0 | 10 | 121 | 120 | 0.8 |
|  | 1,2-DCB | <1.0 | 10 | 121 | 118 | 2.5 |
|  | BEN | <1.0 | 10 | 101 | 100 | 1.0 |
|  | TOL | <1.0 | 10 | 103 | 102 | 1.0 |
|  | CBEN | <1.0 | 10 | 106 | 105 | 0.9 |
|  | EBEN | <1.0 | 10 | 103 | 102 | 1.0 |
|  | $\mathrm{m} / \mathrm{p}$-X | <2.0 | 20 | 103 | 102 | 1.0 |
|  | 0-X | <1.0 | 10 | 105 | 104 | 1.0 |
|  | Naph | <1.0 | 10 | 135 | 146 | 7.8 |
| XFSA2030 | V' | $<1.0$ | 10 | 69 | 74 | 7.0 |
|  | 1,1-DCE | $<1.0$ | 10 | 97 | 103 | 6.0 |
|  | t-1,2-DCE | <1.0 | 10 | 108 | 112 | 3.6 |
|  | c-1,2-DCE | <1.0 | 10 | 113 | 116 | 2.6 |
|  | Chloroform | <1.0 | 10 | 114 | 116 | 1.7 |
|  | 1,1,1-TCA | <1.0 | 10 | 109 | 114 | 4.5 |
|  | Carbon tet. | <1.0 | 10 | 110 | 114 | 3.6 |
|  | TCE | <1.0 | 10 | 110 | 114 | 3.6 |
|  | PCE | <1.0 | 10 | 111 | 117 | 5.3 |
|  | 1,3-DCB | <1.0 | 10 | 120 | 125 | 4.1 |
|  | 1,4-DCB | $<1.0$ | 10 | 123 | 133 | 7.8 |
|  | 1,2-DCB | $<1.0$ | 10 | 127 | 141 | 10 |
|  | BEN | <1.0 | 10 | 90 | 93 | 3.3 |
|  | TOL | <1.0 | 10 | 93 | 96 | 3.2 |
|  | CBEN | <1.0 | 10 | 97 | 100 | 3.0 |
|  | EBEN | <1.0 | 10 | 94 | 99 | 5.2 |
|  | $\mathrm{m} / \mathrm{p}-\mathrm{X}$ | $<2.0$ | 20 | 94 | 100 | 6.2 |
|  | o-X | <1.0 | 10 | 98 | 99 | 1.0 |
|  | Naph | <1.0 | 10 | 144 | 151 | 4.7 |

APPENDIX D-2
TABLE D4-2
VOC MATRIX SPIKE and MATRIX SPIKE DUPLICATE RESULTS 1996 ON-SITE LABORATORATORY FORT DEVENS, MASSACHUSETTS

Soil samples

| SMMPLE <br> 11 |  | SMmpif come (fylk) | Mscome A मिए (1) (1) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| RF570802 | VC | $<125$ | 625 | 108 | 105 | 2.8 |
|  | 1,1-DCE | <125 | 625 | 103 | 99 | 4.0 |
|  | t-1,2-DCE | <125 | 625 | 108 | 108 | 0 |
|  | c-1,2-DCE | <125 | 625 | 107 | 108 | 0.9 |
|  | Chloroform | <125 | 625 | 107 | 108 | 0.9 |
|  | 1,1,1-TCA | <125 | 625 | 107 | 109 | 1.9 |
|  | Carbon tet. | <125 | 625 | 111 | 112 | 0.9 |
|  | TCE | <125 | 625 | 109 | 108 | 0.9 |
|  | PCE | <125 | 625 | 107 | 106 | 0.9 |
|  | BEN | <125 | 625 | 98 | 97 | 1.0 |
|  | TOL | <125 | 625 | 98 | 98 | 0 |
|  | CBEN | <125 | 625 | 99 | 102 | 3.0 |
|  | EBEN | <125 | 625 | 99 | 99 | 0 |
|  | $\mathrm{m} / \mathrm{p}$-X | $<250$ | 1250 | 98 | 99 | 1.0 |
|  | 0-X | <125 | 625 | 99 | 98 | 1.0 |
| EF573004 | VC | <125 | 625 | 102 | 104 | 1.9 |
|  | 1,1-DCE | <125 | 625 | 97 | 92 | 5.3 |
|  | t-1,2-DCE | $<125$ | 625 | 106 | 108 | 1.9 |
|  | c-1,2-DCE | <125 | 625 | 106 | 108 | 1.9 |
|  | Chloroform | <125 | 625 | 106 | 108 | 1.9 |
|  | 1,1,1-TCA | <125 | 625 | 106 | 108 | 1.9 |
|  | Carbon tet. | <125 | 625 | 108 | 108 | 0 |
|  | TCE | <125 | 625 | 107 | 109 | 1.9 |
|  | PCE | $<125$ | 625 | 112 | 113 | 0.9 |
|  | BEN | $<125$ | 625 | 99 | 99 | 0 |
|  | TOL | <125 | 625 | 100 | 100 | 0 |
|  | CBEN | $<125$ | 625 | 100 | 102 | 2.0 |
|  | EBEN | $<125$ | 625 | 107 | 110 | 2.8 |
|  | m/p-X | <250 | 1250 | 113 | 113 | 0 |
|  | o-X | <125 | 625 | 117 | 117 | 0 |
| BFZW1901 | VC | $<125$ | 625 | 103 | 99 | 4.0 |
|  | 1,1-DCE | <125 | 625 | 105 | 102 | 2.9 |
|  | t-1,2-DCE | <125 | 625 | 107 | 105 | 1.9 |
|  | c-1,2-DCE | $<125$ | 625 | 106 | 105 | 0.9 |
|  | Chloroform | <125 | 625 | 105 | 105 | 0 |
|  | 1,1,1-TCA | $<125$ | 625 | 105 | 104 | 1.0 |
|  | Carbon tet. | <125 | 625 | 107 | 104 | 2.8 |

## APPENDIX D-2 <br> TABLE D4-2 <br> VOC MATRIX SPIKE and MATRIX SPIKE DUPLICATE RESULTS 1996 ON-SITE LABORATORATORY FORT DEVENS, MASSACHUSETTS

Soil samples

|  | AMAMTH | SMITAE conc. (igesg) |  |  |  | RPD <br> (\%) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| RF571605 | TCE | $<125$ | 625 | 107 | 105 | 1.9 |
|  | PCE | <125 | 625 | 108 | 106 | 1.9 |
|  | 1,3-DCB | $<125$ | 625 | 101 | 100 | 1.0 |
|  | 1,4-DCB | <125 | 625 | 103 | 104 | 1.0 |
|  | 1,2-DCB | $<125$ | 625 | 107 | 111 | 3.7 |
|  | BEN | $<125$ | 625 | 95 | 95 | 0 |
|  | TOL | $<125$ | 625 | 97 | 97 | 0 |
|  | CBEN | $<125$ | 625 | 95 | 95 | 0 |
|  | EBEN | $<125$ | 625 | 96 | 96 | 0 |
|  | m/p-X | $<250$ | 1250 | 96 | 96 | 0 |
|  | 0-X | <125 | 625 | 97 | 97 | 0 |
|  | Naph | <125 | 625 | 84 | 101 | 18 |
|  | VC | <125 | 625 | 81 | 81 | 0 |
|  | 1,1-DCE | <125 | 625 | 89 | 86 | 3.4 |
|  | t-1,2-DCE | <125 | 625 | 94 | 94 | 0 |
|  | c-1,2-DCE | <125 | 625 | 103 | 103 | 0 |
|  | Chloroform | <125 | 625 | 113 | 112 | 0.9 |
|  | 1,1,1-TCA | <125 | 625 | 108 | 108 | 0 |
|  | Carbon tet. | $<125$ | 625 | 104 | 102 | 1.9 |
|  | TCE | <125 | 625 | 102 | 102 | 0 |
|  | PCE | $<125$ | 625 | 102 | 103 | 1.0 |
|  | 1,3-DCB | $<125$ | 625 | 107 | 108 | 0.9 |
|  | 1,4-DCB | $<125$ | 625 | 108 | 107 | 0.9 |
|  | 1,2-DCB | <125 | 625 | 107 | 109 | 1.9 |
|  | BEN | $<125$ | 625 | 78 | 79 | 1.3 |
|  | TOL | $<125$ | 625 | 80 | 81 | 1.2 |
|  | CBEN | <125 | 625 | 82 | 82 | 0 |
|  | EBEN | <125 | 625 | 83 | 83 | 0 |
|  | $\mathrm{m} / \mathrm{p}$-X | $<250$ | 1250 | 81 | 81 | 0 |
|  | $0-\mathrm{X}$ | <125 | 625 | 83 | 83 | 0 |
|  | Naph | $<125$ | 625 | 90 | 97 | 7.5 |
| RF571705 | VC | <125 | 625 | 76 | 76 | 0 |
|  | 1,1-DCE | <125 | 625 | 62 | 64 | 3.2 |
|  | t-1,2-DCE | <125 | 625 | 125 | 126 | 0.8 |
|  | c-1,2-DCE | <125 | 625 | 103 | 104 | 1.0 |
|  | Chloroform | $<125$ | 625 | 122 | 123 | 0.8 |
|  | 1,1,1-TCA | $<125$ | 625 | 106 | 106 | 0 |

## APPENDIX D-2 <br> TABLE D4-2 <br> VOC MATRIX SPIKE and MATRIX SPIKE DUPLICATE RESULTS 1996 ON-SITE LABORATORATORY FORT DEVENS, MASSACHUSETTS

Soil samples

|  |  | SMAPSE come (ugks) |  | $\qquad$ | $\qquad$ | Red (\%). |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| BFZW2110 | Carbon tet: | <125 | 625 | 108 | 107 | 0.9 |
|  | TCE | <125 | 625 | 103 | 103 | 0 |
|  | PCE | <125 | 625 | 102 | 104 | 1.9 |
|  | 1,3-DCB | <125 | 625 | 104 | 107 | 2.8 |
|  | 1,4-DCB | <125 | 625 | 104 | 108 | 3.8 |
|  | 1,2-DCB | $<125$ | 625 | 104 | 109 | 4.7 |
|  | BEN | <125 | 625 | 78 | 79 | 1.3 |
|  | TOL | <125 | 625 | 82 | 83 | 1.2 |
|  | CBEN | <125 | 625 | 81 | 81 | 0 |
|  | EBEN | <125 | 625 | 82 | 83 | 1.2 |
|  | m/p-X | $<250$ | 1250 | 80 | 81 | 1.2 |
|  | o-X | <125 | 625 | 82 | 83 | 1.2 |
|  | Naph | <125 | 625 | 77 | 89 | 14 |
|  | VC | <125 | 625 | 73 | 73 | 0 |
|  | 1,1-DCE | $<125$ | 625 | 61 | 61 | 0 |
|  | t-1,2-DCE | <125 | 625 | 99 | 99 | 0 |
|  | c-1,2-DCE | <125 | 625 | 101 | 101 | 0 |
|  | Chloroform | <125 | 625 | 116 | 116 | 0 |
|  | 1,1,1-TCA | <125 | 625 | 105 | 105 | 0 |
|  | Carbon tet. | <125 | 625 | 107 | 107 | 0 |
|  | TCE | <125 | 625 | 104 | 103 | 1.0 |
|  | PCE | <125 | 625 | 104 | 102 | 1.9 |
|  | 1,3-DCB | <125 | 625 | 108 | 108 | 0 |
|  | 1,4-DCB | <125 | 625 | 118 | 112 | 5.2 |
|  | 1,2-DCB | $<125$ | 625 | 120 | 115 | 4.3 |
|  | BEN | $<125$ | 625 | 78 | 77 | 1.3 |
|  | TOL | <125 | 625 | 83 | 83 | 0 |
|  | CBEN | $<125$ | 625 | 80 | 80 | 0 |
|  | EBEN | <125 | 625 | 82 | 82 | 0 |
|  | m/p-X | <250 | 1250 | 80 | 80 | 0 |
|  | o-X | <125 | 625 | 82 | 82 | 0 |
|  | Naph | $<125$ | 625 | 84 | 95 | 12 |
| RF572002 | VC | <125 | 625 | 101 | 98 | 3.0 |
|  | 1,1-DCE | <125 | 625 | 108 | 105 | 2.8 |
|  | t-1,2-DCE | $<125$ | 625 | 130 | 127 | 2.3 |
|  | c-1,2-DCE | <125 | 625 | 108 | 106 | 1.9 |
|  | Chloroform | $<125$ | 625 | 112 | 111 | 0.9 |

## APPENDIX D-2 <br> TABLE D4-2 <br> VOC MATRIX SPIKE and MATRIX SPIKE DUPLICATE RESULTS 1996 ON-SITE LABORATORATORY FORT DEVENS, MASSACHUSETTS

Soil samples


## APPENDIX D-2

TABLE D4-2
VOC MATRIX SPIKE and MATRIX SPIKE DUPLICATE RESULTS
1996 ON-SITE LABORATORATORY FORT DEVENS, MASSACHUSETTS

Soil samples

|  | AMMII | SAMPIER Come. (deris) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Chioroform | $<1.0$ | 10 | 79 | 94 | 17 |
|  | 1,1,1-TCA | <1.0 | 10 | 72 | 95 | 28 |
|  | Carbon tet. | <1.0 | 10 | 70 | 97 | 32 |
|  | TCE | <1.0 | 10 | 75 | 93 | 21 |
|  | PCE | <1.0 | 10 | 77 | 95 | 21 |
|  | 1,3-DCB | <1.0 | 10 | 92 | 95 | 3.2 |
|  | 1,4-DCB | <1.0 | 10 | 93 | 99 | 6.3 |
|  | 1,2-DCB | <1.0 | 10 | 95 | 104 | 9.0 |
|  | BEN | $<1.0$ | 10 | 67 | 84 | 23 |
|  | TOL | <1.0 | 10 | 71 | 84 | 17 |
|  | CBEN | <1.0 | 10 | 78 | 85 | 8.6 |
|  | EBEN | <1.0 | 10 | 75 | 85 | 13 |
|  | m/p-X | $<2.0$ | 20 | 75 | 85 | 13 |
|  | o-X | <1.0 | 10 | 78 | 85 | 8.6 |
|  | Naph | <1.0 | 10 | 126 | 101 | 22 |
| BX502015 | VC | $<1.0$ | 10 | 111 | 97 | 13 |
|  | 1,1-DCE | $<1.0$ | 10 | 110 | 99 | 11 |
|  | t-1,2-DCE | <1.0 | 10 | 110 | 102 | 7.5 |
|  | c-1,2-DCE | <1.0 | 10 | 109 | 102 | 6.6 |
|  | Chloroform | <1.0 | 10 | 110 | 104 | 5.6 |
|  | 1,1,1-TCA | <1.0 | 10 | 111 | 103 | 7.5 |
|  | Carbon tet. | <1.0 | 10 | 112 | 104 | 7.4 |
|  | TCE | <1.0 | 10 | 108 | 100 | 7.7 |
|  | PCE | <1.0 | 10 | 116 | 106 | 9.0 |
|  | 1,3-DCB | <1.0 | 10 | 108 | 103 | 4.7 |
|  | 1,4-DCB | <1.0 | 10 | 110 | 104 | 5.6 |
|  | 1,2-DCB | <1.0 | 10 | 110 | 106 | 3.7 |
|  | BEN | <1.0 | 10 | 98 | 89 | 9.6 |
|  | TOL | $<1.0$ | 10 | 98 | 89 | 9.6 |
|  | CBEN | <1.0 | 10 | 97 | 91 | 6.4 |
|  | EBEN | <1.0 | 10 | 98 | 91 | 7.4 |
|  | m/p-X | $<2.0$ | 20 | 98 | 91 | 7.4 |
|  | $0-\mathrm{X}$ | <1.0 | 10 | 98 | 91 | 7.4 |
|  | Naph | $<1.0$ | 10 | 90 | 101 | 12 |

## APPENDIX D-2

TABLE D4-2
VOC MATRIX SPIKE and MATRIX SPIKE DUPLICATE RESULTS 1996 ON-SITE LABORATORATORY FORT DEVENS, MASSACHUSETTS

Soil samples

| SAMPME <br> m | 4MAM |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| BX502025 | VC | <1.0 | 10 | 88 | 87 | 1.1 |
|  | 1,1-DCE | <1.0 | 10 | 91 | 88 | 3.4 |
|  | t-1,2-DCE | <1.0 | 10 | 98 | 96 | 2.1 |
|  | c-1,2-DCE | <1.0 | 10 | 101 | 100 | 1.0 |
|  | Chloroform | <1.0 | 10 | 103 | 100 | 3.0 |
|  | 1,1,1-TCA | $<1.0$ | 10 | 96 | 91 | 5.3 |
|  | Carbon tet. | <1.0 | 10 | 95 | 91 | 4.3 |
|  | TCE | <1.0 | 10 | 97 | 93 | 4.2 |
|  | PCE | $<1.0$ | 10 | 166 | 163 | 1.8 |
|  | 1,3-DCB | $<1.0$ | 10 | 104 | 103 | 1.0 |
|  | 1,4-DCB | $<1.0$ | 10 | 107 | 109 | 1.9 |
|  | 1,2-DCB | $<1.0$ | 10 | 108 | 1.12 | 3.6 |
|  | BEN | <1.0 | 10 | 84 | 82 | 2.4 |
|  | TOL | $<1.0$ | 10 | 84 | 82 | 2.4 |
|  | CBEN | $<1.0$ | 10 | 89 | 87 | 2.3 |
|  | EBEN | $<1.0$ | 10 | 85 | 83 | 2.4 |
|  | m/p-X | <2.0 | 20 | 85 | 83 | 2.4 |
|  | 0-X | <1.0 | 10 | 87 | 85 | 2.3 |
|  | Naph | $<1.0$ | 10 | 106 | 106 | 0 |

## APPENDIX D-2

TABLE D4-3
EPH, VPH, TPHC FIELD DUPLICATE RESULTS
1996 ON-SITE LABORATORY
FORT DEVENS, MASSACHUSETTS
EPH Duplicates

| SAMPLE | SAMPLE <br> CONC. <br> $(\mathrm{mg} / \mathrm{Kg})$ | DUPLICATE <br> CONC. <br> $(\mathrm{mg} / \mathrm{Kg})$ | RPD <br> $(\%)$ |
| :---: | :---: | :---: | :---: |
| BX613A17XF | $<100$ | $<100$ | NA |
| BX610115XF | $<100$ | $<100$ | NA |
| MXBD0323XF | $<100$ | $<100$ | NA |
| MXBD0217XF | $<100$ | $<100$ | NA |

VPH Duplicates

| SAMPLE <br> ID | SAMPLE <br> CONC. <br> $(\mathrm{mg} / \mathrm{Kg})$ | DUPLICATE <br> CONC. <br> $(\mathrm{mg} / \mathrm{Kg})$ | RPD |
| :---: | :---: | :---: | :---: |
|  | $<6.3$ | $<6.3$ | (\%) |
| BX613A17XF | $<6.3$ | $<6.3$ | NA |
| BX610115XF | $<6.3$ | $<6.3$ | NA |
| MXBD0323XF | $<6.3$ | $<6.3$ | NA |
| MXBD0217XF |  |  |  |

TPHC Duplicates

| SAMPLE <br> ID | SAMPLE <br> CONC. <br> ppm | DUPLICATE <br> CONC. <br> ppm | RPD <br> $(\%)$ |
| :---: | :---: | :---: | :---: |
| RF571206 | $<52$ |  |  |
| EF573106 | 10,000 | 14,000 | NA |
| BFZW1901 | $<53$ | 53 | 33 |
| BFZW1905 | $<53$ | $<53$ | 200 |
| RF571503 | 12000 NA | 12000 Na |  |
| RF571603 | 53 | 53 | 0 |
| BFZW0304 | $<58$ | $<58$ | 0 |
| BFZW0306 | $<57$ | $<59$ | NA |
| RF571709 | 65 | $<65$ | NA |
| RF572002 | $<54$ | $<54$ | 200 |
| BF571110 | $<62$ | $<65$ | NA |
| BF570910 | $<70$ | $<70$ | NA |
| EF572803 | $<52$ | 52 | NA |
| RF571409 | 64 | $<64$ | 200 |
|  |  |  | 200 |

$\mathrm{NC}=$ Not calculated
NA = Not applicable
$\mathrm{E}=$ Exceeded calibration range

## APPENDIX D-2

TABLE D4-4
VOC DUPLICATE RESULTS
1996 ON-SITE LABORATORY

## Aqueous Samples

|  |  |  |  | $\begin{aligned} & \text { Rei } \\ & \text { ind } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: |
| MẊ613B30XF | ALL BRL | ND | ND | NA |
| MX610129XF | ALL BRL | ND | ND | NA |
| XFSA0315 | ALL BRL | ND | ND | NA |
| XFSA0345 | VC | 4.0 | 4.3 | 7.2 |
|  | c-1,2-DCE | 86 | 85 | 1.2 |
|  | TCE | 25 | 24 | 4.1 |
|  | PCE | 67 | 65 | 3.0 |
|  | EBEN | 3.3 | 3.0 | 9.5 |
|  | m/p-X | 9.0 | 8.1 | 11 |
|  | o-X | 2.7 | 2.2 | 20 |
| XFSA0265 | c-1,2-DCE | 8.5 | 6.8 | 22 |
|  | PCE | 15 | 12 | 22 |
|  | EBEN | 3.1 | <2.0 | 200.0 |
| MF571305 | TOL | 2.9 | 2.6 | 11 |
|  | EBEN | 2.8 | 2.6 | 7.4 |
| XFSA0420 | PCE | 33E | 33E | 0 |
| XFSA0520 | C-1,2-DCE | 4.1 | 4.6 | 11 |
|  | PCE | 2.3 | 2.5 | 8.3 |
| XFSA0640 | ALL BRL | ND | ND | NA |
| XFSA0650 | ALL BRL | ND | ND | NA |
| XFSA0755 | ALL BRL | ND | ND | NA |
| XFSA0840 | ALL BRL | ND | ND | NA |
| XFSA1015 | ALL BRL | ND | ND | NA |
| XFSA1035 | ALL BRL | ND | ND | NA |
| XFSA1130 | PCE | 64E | 63E | 1.6 |
| XFSA1330 | PCE | 4500 | 4100 | 9.3 |
| XFSA1420 | ALL BRL | ND | ND | NA |
| XFSA1440 | PCE | 3.0 | 3.2 | 6.5 |
| XFSA1350 | PCE | 12000 | 8000 | 40 |

## APPENDIX D-2

TABLE D4-4
VOC DUPLICATE RESULTS
1996 ON-SITE LABORATORY
. FORT DEVENS, MASSACHUSETTS
Aqueous Samples

| SAMBIE \# | AMM14 | SMMPI come. (aylis) |  | $\begin{aligned} & \text { Rer } \\ & \text { R } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: |
| XFSA1945 | c-1,2-DCE | 11 | 7.7 | 35 |
|  | PCE | 26E | 20 | 26 |
| XFSA1965 | c-1,2-DCE | 64 E | 70E | 9.0 |
|  | TCE | 17 | 18 | 5.7 |
|  | PCE | 93E | 100E | 7.3 |
|  | TOL | 4.9 | 7.8 | 46 |
| XFSA2020 | BRL | ND | ND | NA |

## APPENDIX D-2

TABLE D4-4
VOC DUPLICATE RESULTS
1996 ON-SITE LABORATORY
. FORT DEVENS, MASSACHUSETTS
SOLL Samples

| SAMPLEM \#im | ANXIFIEM |  | DIMITEATE come (igelsg) | $\begin{aligned} & \text { RPD } \\ & \text { Sol } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: |
| RF570802 | BRL | ND | ND |  |
| EF573004 | BRL | ND | ND | NA |
| RF571010 | 0-X | 880 | $<300$ | 200 |
| RF571206 | BRL | ND | ND | NA |
| EF573106 | Naph | 560 | $<270$ | 200 |
| BFZW1901 | BRL | ND | ND | NA |
| RF571603 | Chloroform | 380 B | $<260$ | 200 |
|  | Naph | <260 | 930 | 200 |
| BFZW0304 | BRL | ND | ND | NA |
| BFZW0306 | BRL | ND | ND | NA |
| RF571709 | BRL | ND | ND | NA |
| RF572002 | Chloroform | 340 | $<270$ | 200 |
| BF571005 | BRL | ND | ND | NA |
| BF571110 | BRL | ND | ND | NA |
| BXG613B29 | c-1,2-DCE | 12 | 6.5 | 59 |
|  | PCE | 220E | 100E | 75 |
| BX502025 | PCE | 17 | 21 | 21 |
| BX502030 | BRL | ND | ND | NA |

* = data not included with statistics of the table, data is an outlier.

BRL = All target compounds reported below reporting limits
$\mathrm{ND}=$ non-detect

## Appendix D-2 <br> Table D5-1 <br> VPH/EPH Split Sample Results <br> 1996 Field Program <br> Fort Devens, Massachusetts



Notes:
$\mathrm{BC}=$ Not Calculated
RPD $=$ Relative Percent Difference

Appendix D-2
Table D5-2
TPHC Split Sample Results
1996 Field Program
Fort Devens, Massachusetts

| Fichos Samper Number | AMMLME | OFHSSHE/, Resulim, | OnS STE. Rusurt. | RPD | Scenario |
| :---: | :---: | :---: | :---: | :---: | :---: |
| EF 573106 | TPHC | 18300 | 1000 | 57* | 2 |
| EF573006 | TPHC | 6960 | 8900 | 24 | 2 |
| EF572911 | TPHC | 262 | 160 | 48 | 1 |
| EF572810 | TPHC | 36100 | 160 | 198* | 4 |
| BF571110 | TPHC | 27.8 U | 62 U | NC | 1 |
| BF571105 | TPHC | 4250 | 7400 | 54* | 2 |
| BF571010 | TPHC | 27.8 U | 65 | 200* | 1 |
| BF571005 | TPHC | 27.6 U | 53 U | NC | 1 |
| BF570905 | TPHC | 27.8 U | 61 U | NC | 1 |
| BF570900 | TPHC | 39.4 | 150 | 65* | 1 |
| BF570805 | TPHC | 27.8 U | 67 U | NC | 1 |
| BF570800 | TPHC | 50 | 53 | 6.0 | 1 |
| BF570705 | TPHC | 31600 | 14000 E | 77* | 2 |
| BF570700 | TPHC | 41400 | 12000 E | 110* | 2 |
| BFZW0306 | TPHC | 57.5 | 57 U | 200* | 1 |
| BFZW0310 | TPHC | 27.8 U | 61 U | NC | 1 |
| BFZW1905 | TPHC | 27.8 U | 0.4 U | NC | 1 |
| BFZW1909 | TPHC | 1740 | 840 | 67* | 2 |
| BFZW2002 | TPHC | 27.8 U | 62 | 200* | 1 |
| BRZW2004 | TPHC | 27.8 U | 62 U | NC | 1 |
| BFZW2104 | TPHC | 27.8 U | 55 U | NC | 1 |
| BFZW2108 | TPHC | 27.8 U | 57 | 200* | 1 |

Notes:

1. Concentrations in $\mu \mathrm{g} / \mathrm{g}$

RPD $=$ Relative Percent Difference

## APPENDIX D-2

TABLE D5-3
SUMIMARY OF VOLATILE SPLIT SAMPLE RESULTS
1996 FIELD PROGRAM
FORT DEVENS, MASSACHUSETTS


## APPENDIX D-2

TABLE D5-3
SUMMARY OF VOLATILE SPLIT SAMPLE RESULTS
1996 FIELD PROGRAM
FORT DEVENS, MASSACHUSETTS


APPENDIX D-2
TABLE D5-3
SUMMARY OF VOLATILE SPLIT SAMPLE RESULTS
1996 FIELD PROGRAM
FORT DEVENS, MASSACHUSETTS

|  ManME |  |  |  |  | Cenerser |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | CLC6H5 | 0.00086 U | 0.31 U | NA | 1 |
|  | ETC6H5 | 0.0017 U | 0.31 U | NA | 1 |
| , |  |  |  |  | 1 |
|  | TCLEE | 0.00081 U | 0.31 U | NA | 1 |
|  | TRCLE | 0.0028 U | 0.31 U | NA | 1 |
|  | XYLEN | 0.0015 U | 0.61 U | NA | 1 |
|  | 12DCLB | . 11 U | 0.31 U | NA | 1 |
|  | 13DCLB | . 13 U | 0.31 U | NA | 1 |
|  | 14DCLB | . 098 U | 0.31 U | NA | 1 |
|  | NAP | . 037 U | 0.31 U | NA | 1 |
| BF571005 | 111TCE | . 0044 U | 0.26 U | NA | 1 |
|  | 11DCE | . 0039 U | 0.26 U | NA | 1 |
|  | 12DCE | . 003 U | 0.26 U | NA | 1 |
|  | 12DCLB | . 11 U | 0.26 U | NA | 1 |
|  | 13DCLB | . 13 U | 0.26 U | NA | 1 |
|  | 14DCLB | . 098 U | 0.26 U | NA | 1 |
|  | C2H3CL | . 0062 U | 0.26 U | NA | 1 |
|  | C6H6 | . 0015 U | 0.26 U | NA | 1 |
|  | CCL4 | . 007 U | 0.26 U | NA | 1 |
|  | CHCL3 | . 00087 U | 0.26 U | NA | 1 |
|  | CLC6H5 | . 00086 U | 0.26 U | NA | 1 |
|  | ETC6H5 | . 0017 U | 0.26 U | NA | 1 |
|  | MEC6H5 | . 00078 U | 0.26 U | NA | 1 |
|  | NAP | . 037 U | 0.26 U | NA | 1 |
|  | TCLEE | . 00081 U | 0.26 U | NA | 1 |
|  | TRCLE | . 0028 U | 0.26 U | NA | 1 |
|  | XYLEN | . 0015 U | 0.39 U | NA | 1 |
| BF571010 | 111TCE | . 0044 U | 0.33 U | NA | 1 |
|  | 11DCE | . 0039 U | 0.33 U | NA | 1 |
|  | 12DCE | . 003 U | 0.33 U | NA | 1 |
|  | 12DCLB | . 11 U | 0.33 U | NA | 1 |
|  | 14DCLB | . 098 U | 0.33 U | NA | 1 |
|  | C2H3CL | . 0062 U | 0.33 U | NA | 1 |
|  | C6H6 | . 0015 U | 0.33 U | NA | 1 |
|  | CCL4 | . 007 U | 0.33 U | NA | 1 |
|  | CHCL3 | . 00087 U | 0.33 U | NA | 1 |
|  | CLC6H5 | . 00086 U | 0.33 U | NA | 1 |
|  | ETC6H5 | . 0017 U | 0.33 U | NA | 1 |
|  | MEC6H5 | . 00078 U | 0.33 U | NA | 1 |
|  | NAP | . 037 U | 0.33 U | NA | 1 |
|  | TCLEE | . 00081 U | 0.33 U | NA | 1 |
|  | TRCLE | . 0028 U | 0.33 U | NA | 1 |
|  | XYLEN | . 0015 U | 0.49 U | NA | 1 |
| BF571105 | 111TCE | . 0044 U | 0.27 U | NA | 1 |
|  | 11DCE | . 0039 U | 0.27 U | NA | 1 |
|  | 12DCE | . 003 U | 0.27 U | NA | 1 |

## APPENDIX D－2

TABLE D5－3
SUMMARY OF VOLATILE SPLIT SAMPLE RESULTS
1996 FIELD PROGRAM
．FORT DEVENS，MASSACHUSETTS

|  |  | 絃山宸 |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 12DCLB | ． 6 U | 0.27 U | NA | 1 |
|  | 13DCLB | ． 6 U | 0.27 U | NA | 1 |
|  | 14DCLB | ． 5 U | 0.27 U | NA | 1 |
|  | C2H3CL | ． 0062 U | 0.27 U | NA | 1 |
|  | C6H6 | ． 0015 U | 0.27 U | NA | 1 |
|  | CCL4 | ． 007 U | 0.27 U | NA | 1 |
|  | CHCL3 | ． 00087 U | 0.27 U | NA | 1 |
|  | CLC6H5 | ． 00086 U | 0.27 U | NA | 1 |
|  | ETC6H5 | ． 0017 U | 0.27 U | NA | 1 |
|  | MEC6H5 | ． 00078 U | 0.27 U | NA | 1 |
|  | NAP | ． 2 U | 0.27 U | NA | 1 |
|  | TCLEE | ． 00081 U | 0.27 U | NA | 1 |
|  | TRCLE | ． 0028 U | 0.27 U | NA | 1 |
|  | XYLEN | ． 0015 U | 0.41 U | NA | 1 |
| BF571110 | 111TCE | ． 0044 U | 0.31 U | NA | 1 |
|  | IlDCE | ． 0039 U | 0.31 U | NA | 1 |
|  | 12DCE | ． 003 U | 0.31 U | NA | 1 |
|  | 12DCLB | ． 11 U | 0.31 U | NA | 1 |
|  | 13DCLB | ． 13 U | 0.31 U | NA | 1 |
|  | 13DCLB | ． 13 U | 0.31 U | NA | 1 |
|  | 14DCLB | ． 098 U | 0.31 U | NA | 1 |
|  | C2H3CL | ． 0062 U | 0.31 U | NA | 1 |
|  | C6H6 | ． 0015 U | 0.31 U | NA | 1 |
|  | CCL4 | ． 007 U | 0.31 U | NA | 1 |
|  | CHCL3 | ． 00087 U | 0.31 U | NA | 1 |
|  | CLC6H5 | ． 00086 U | 0.31 U | NA | 1 |
|  | ETC6H5 | ． 0017 U | 0.31 U | NA | 1 |
|  |  |  |  | §\＃\＃\＃\＃\＃\＃， | 1 |
|  | NAP | ． 037 U | 0.31 U | NA | 1 |
|  | TCLEE | ． 00081 U | 0.31 U | NA | 1 |
|  | TRCLE | ． 0028 U | 0.31 U | NA | 1 |
|  | XYLEN | ． 0015 U | 0.62 U | NA | 1 |
| EF572810 | 111TCE | ． 0044 U | 0.31 U | NA | 1 |
|  | I1DCE | ． 0039 U | 0.31 U | NA | 1 |
|  | 12DCE | ． 003 U | 0.31 U | NA | 1 |
|  | C2H3CL | ． 0062 U | 0.31 U | NA | 1 |
|  | C6H6 | ． 0015 U | 0.31 U | NA | 1 |
|  | CCL4 | ． 007 U | 0.31 U | NA | 1 |
|  | CHCL3 | ． 00087 U | 0.31 U | NA | 1 |
|  | CLC6H5 | ． 00086 U | 0.31 U | NA | 1 |
|  |  |  |  |  | 1 |
|  | MEC6H5 | ． 00078 U | 0.31 U | NA | 1 |
|  |  |  |  |  | 1 |
|  | TRCLE | ． 0028 U | 0.31 U | NA | 1 |
|  |  |  |  |  | 1 |
| EF572911 | 111TCE | ． 0044 U | 0.31 U | NA | 1 |

APPENDIX D-2
TABLE D5-3
SUMMARY OF VOLATILE SPLIT SAMPLE RESULTS
1996 FIELD PROGRAM
FORT DEVENS, MASSACHUSETTS

|  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 11DCE | . 0039 U | 0.31 U | NA | 1 |
|  | 12DCE | . 003 U | 0.31 U | NA | 1 |
| , | C2H3CL | . 0062 U | 0.31 U | NA | 1 |
|  | C6H6 | . 0015 U | 0.31 U | NA | 1 |
|  | CCL4 | . 007 U | 0.31 U | NA | 1 |
|  | CHCL3 | . 00087 U | 0.31 U | NA | 1 |
|  | CLC6H5 | . 00086 U | 0.31 U | NA | 1 |
|  | ETC6H5 | . 0017 U | 0.31 U | NA | 1 |
|  | MEC6H5 | . 00078 U | 0.31 U | NA | 1 |
|  | TCLEE | . 00081 U | 0.31 U | NA | 1 |
|  | TRCLE | . 0028 U | 0.31 U | NA | 1 |
|  | XYLEN | . 0015 U | 0.62 U | NA | 1 |
| EF573006 | 111TCE | . 0044 U | 0.26 U | NA | 1 |
|  | 11DCE | . 0039 U | 0.26 U | NA | 1 |
|  | 12DCE | . 003 U | 0.26 U | NA | 1 |
|  | C2H3CL | . 0062 U | 0.26 U | NA | 1 |
|  | C6H6 | . 0015 U | 0.26 U | NA | 1 |
|  | CCL4 | . 007 U | 0.26 U | NA | 1 |
|  | CHCL3 | . 00087 U | 0.26 U | NA | 1 |
|  | CLC6H5 | . 00086 U | 0.26 U | NA | 1 |
|  |  | \% |  | \% | 1 |
|  | MEC6H5 | . 00078 U | 0.26 U | NA | 1 |
|  | TCLEE | . 00081 U | 0.26 U | NA | 1 |
|  | TRCLE | . 0028 U | 0.26 U | NA | 1 |
|  | XYLEN | . 13 | 3.8 | 97 | 1 |
| EF573106 | 111TCE | . 0044 U | 0.27 U | NA | 1 |
|  | 11DCE | . 0039 U | 0.27 U | NA | 1 |
|  | 12DCE | . 003 U | 0.27 U | NA | 1 |
|  | 12DCLB | . 6 U | 0.27 U | NA | 1 |
|  | 13DCLB | . 6 U | 0.27 U | NA | 1 |
|  | 14DCLB | . 5 U | 0.27 U | NA | 1 |
|  | C2H3CL | . 0062 U | 0.27 U | NA | 1 |
|  | C6H6 | . 0015 U | 0.27 U | NA | 1 |
|  | CCL4 | . 007 U | 0.27 U | NA | 1 |
|  | CHCL3 | . 00087 U | 0.27 U | NA | 1 |
|  | CLC6H5 | . 00086 U | 0.27 U | NA | 1 |
|  | ETC6H5 | . 0017 U | 0.27 U | NA | 1 |
|  | MEC6H5 | . 00078 U | 0.27 U | NA | 1 |
|  |  |  |  |  | 1 |
|  | TCLEE | . 00081 U | 0.27 U | NA | 1 |
|  | TRCLE | . 0028 U | 0.27 U | NA | 1 |
|  | XYLEN | . 0015 U | 0.41 U | NA | 1 |

NOTES:
NA= not applicable
$\mathrm{J}=$ estimated result
$\mathrm{U}=$ non-detect

## ATTACHMENT D2-1

1996 FIELD ANALYTICAL PROCEDURES

# PROJECT OPERATION PLAN ADDENDUM 1996 FIELD SCREENING METHODOLOGY TARGET VOLATILE ORGANIC COMPOUNDS(VOCS) ESTIMATION OF TOTAL VOLATTLE PETROLEUM HYDROCARBONS(TVPH) AND TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS(TEPH) 

### 1.0 Introduction

Field screening procedures for Fort Devens remedial investigations are described in Section 4.6 of the Fort Devens Project Operation Plan (POP) (ABB-ES, 1995). Modifications to some of these field screening procedures have been made for the 1996 field investigations. The purpose of this addendum is to outline modifications to field screening procedures that will be incorporated into the 1996 field program. Field screening gas chromatography (GC) procedures have been developed to provide on-site results for target volatile organics (VOCs) and estimates of total volatile petroleum hydrocarbons (TVPH) and extractable petroleum hydrocarbons (TEPH). The TVPH and TEPH measurements will provide an estimate of total hydrocarbons present in each fraction that are comparable to results generated using analytical methods developed by the Massachusetts Department of Environmental Protection (MADEP), however, TVPH and TEPH will be reported as a total concentration and not broken down into aliphatic and aromatic fractions as outlined in the MADEP methodology (MADEP, 1995). The purpose of the field analyses is to provide quick turnaround of analytical results for real time decision making during the field investigation.

A summary of the field methodologies instrumentation, sample preparation, instrument calibration, target compounds and detection limits, sample quantitation, and analytical quality control analyses are presented below.

### 2.0 Field Instrumentation and Analytical Methods

Investigations at AOC 50 are driven by the potential presence of fuel hydrocarbons including benzene, toluene, ethylbenzene, and xylene (BTEX), and solvents including tetrachloroethene (PCE) and the de-chlorination degradation products trichloroethene (TCE), cis-1,2dichloroethene, trans-1,2-dichloroethene, and vinyl chloride in groundwater. Groundwater samples collected at AOC 50 will be analyzed using purge and trap Method 5030A and modified USEPA Method 8021A and modified USEPA Method 8015A (USEPA, 1995). As outlined in Method 8021A, BTEX compounds will be identified and quantified with a photoionization detector (PID) and the chlorinated solvents will be identified and quantified using an electrolytic conductivity detector (ELCD). As outlined in Method 8015, TVPH will be quantified using a Flame ionization detector (FID). Target compounds and reporting limits
for AOC 50 groundwater samples are summarized in Table 1. For target compound analyses, analytical procedures for instrument calibration, sample identification, quality control blank analyses, and sample preparation will be consistent with those outlined in the POP. TVPH procedures are described below in Subsection 2.2.

Investigations at AOCs $61 Z$ and 63 BD are driven by the potential presence of fuel hydrocarbons as a result of fuel oil and waste oil products releases to soil. Soil samples collected at AOCs 61 Z and 63BD will be analyzed for TVPH and TEPH using modified USEPA Method 8015A for TVPH and TEPH. Soil samples analyzed for TVPH will be prepared using a methanol extraction as outlined in USEPA Method 5030A and the POP. Methanol extracts will be analyzed using purge and trap GC/FID for the TVPH. Soil samples analyzed for TEPH will be prepared using a methylene chloride micro-extraction technique and direct injection by GC/FID. A summary of target compounds and reporting limits for the soil analyses is presented in Table 1.

Laboratory techniques used for sample preparation for the TEPH method, and calibration and sample quantitation procedures for the TVPH and TEPH methods are outlined in the following sections.

### 2.1 TEPH Sample Preparation:

Sample analysis and preparation techniques have been adapted from protocols outlined in SW-846 3rd ed. USEPA Methods 3550A (USEPA 1995).

Soil Samples. Weigh 2 grams ( $\pm 0.1 \mathrm{~g}$ ) wet soil into a 12 ml screw cap test tube. Spike the sample mixture with appropriate concentration of surrogate solution. For MS/MSD samples the appropriate aliquot of spike solution is added to the sample. Add approximately 2 grams of anhydrous sodium sulfate, $\mathrm{Na}_{2} \mathrm{SO}_{4}$ (a drying agent) to the sample. With a Teflon spatula thoroughly mix the sample and sodium sulfate (break the sample up to form a uniform free flowing mixture). Add 10 mL of methylene chloride to the sample.

Shake or vortex vigorously for 3 minutes to mix and extract the sample. The field chemist will pay close attention to the sample extraction to ensure that the soil and solvent are actively mixing during the 3 minute extraction. Allow the sample to stand and separate or centrifuge the sample to separate the solvent phase. Withdraw a the extract solvent and transfer the sample extract to a sample vial and cap, sample in now ready for analysis.

Dilutions. If high concentrations of fuels are suspected, then samples should be analyzed prior to concentration, otherwise the extract can be diluted with methylene chloride to bring the target compound concentrations within the instrument calibration range. To dilute the sample, remove a measured quantity of extract and add to an appropriate volume of extraction solvent. The results of diluted samples will be adjusted for by the dilution factor.

### 2.2 TVPH and TEPH Instrument Calibration

Initial and continuing calibration will be established for TVPH and TEPH. A commercial gasoline standard will be used for TVPH calibration. A commercial Fuel Oil \#2 or diesel standard will be used for TEPH calibration. The retention time markers identified in the MADEP methods to determine the retention times of the TVPH and TEPH determination will be used to define the hydrocarbon molecular weight range of the TVPH and TEPH analyses. The hydrocarbon range quantified in the TVPH analysis will extend from 0.1 minutes before the marker compound pentane to 0.1 minute after naphthalene. The TEPH hydrocarbon range quantified will extend from 0.1 minute before naphthalene to 0.1 minute after hexatriacontane. The concentration of hydrocarbons in standards and samples will be determined based on the total baseline to baseline area response of the standards within the designated retention time widows. A three point initial calibration and continuing calibration will be conducted as outlined in the POP. The concentrations of TVPH and TEPH will be added together to determine the total concentration of petroleum hydrocarbons present at a given sample location.

### 3.0 Quality Control:

Quality control steps outlined below will be conducted during the field analyses including an MDL study for target compounds, initial and continuing calibrations, method blank extraction and analysis with each sample batch, matrix spikes and field duplicate sample analyses, and evaluation of accuracy using a surrogate standard.

- holding times: Soil: 14 days

$$
\text { Water: } 7 \text { days }
$$

- Surrogate \%R goal of $50 \%$ ( $<30 \%$ re-analysis limit)
- MDL study (Appendix B part 136, CFR 40)
- Initial calibration by linear regression (.95) or average response factor (RSD 25\%) with low standard at or near reporting limit
- Continuing calibration each day and after 20 samples ( $30 \%$ difference)
- Extraction blank (method blank) with each extraction batch prepared or daily with each purge and trap analytical sequence
- Matrix spike/Matrix spike duplicates will be prepared by spiking 5 percent of samples with target compounds, a commercial gasoline standard, or a commercial diesel fuel standard, as appropriate for each analysis, at approximately the mid-range of the calibration curve. Percent recoveries (\%R) and relative percent difference (RPD) will be used to evaluate the accuracy and precision of measurements and to qualify results. Percent recovery goals: $60 \%$ to $140 \%$; RPD < 20
- Field duplicates will be submitted to the field laboratory routinely during the program. Relative percent difference of the duplicate results will be used to evaluate the precision
of field measurements and qualify results. RPD goals are $30 \%$ for aqueous samples and $50 \%$ for soil samples.


### 4.0 Data Review and Reporting:

The field chemist will review results based on project data quality control goal outlined above. Sample results not meeting data quality control goals will be qualified as outlined below:

## Qualification flags for data evaluation

(J) The J flag is used to indicate estimated data. This can occur when a compound does not meet calibration criteria for initial calibration, continuing calibration, or both.
(B) The B flag is used when a target compound is detected in an associated method blank. All values within five times of the method blank result are flagged.
(E) The E flag is used to indicate estimated data. The flag is used when a compound is detected at a concentration that is above the highest calibration standard.
(S) The S flag is used when the associated surrogate recovery is less than $50 \%$. For soils the surrogate recovery must be greater than 50 percent for results to go unqualified, however, re-analysis will only occur if recoveries are less than $30 \%$.

Matrix spike and field duplicate results will be tabulated and summarized on an ongoing basis during the field program. Results will be used by the field chemist, FOL, and project manager on an ongoing basis to evaluate the usability of results. Associated field sample results presented in the final data reports may be qualified based on the judgment of the field and project chemist.

## REFERENCES:

Massachusetts Department of Environmental Protection (MADEP), 1995. "Method for the Determination of Extractable Petroleum Hydrocarbons (TEPH); Division of Environmental Analysis; Office of Research and Standards; Bureau of Waste Site Cleanup; August 1995.

Massachusetts Department of Environmental Protection (MADEP), 1995. "Method for the Determination of Volatile Petroleum Hydrocarbons (TVPH); Division of Environmental Analysis; Office of Research and Standards; Bureau of Waste Site Cleanup; August 1995.
U.S. Environmental Protection Agency (USEPA), 1995. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Remedial Response; Washington, DC; SW-846; November 1986; Revised January 1995.

## ATTACHMENT D-1 <br> TABLE 1

## SUMMARY OF TARGET COMPOUNDS AND REPORTING LIMITS 1996 FIELD SCREENING PROGRAM FORT DEVENS REMEDIAL INVESTIGATION

| TARGET ANALYTE | Somuc/G | WATER $\mu \mathrm{G} / \mathrm{L}$ |
| :---: | :---: | :---: |
| Benzene | 0.25 | 2 |
| Toluene | 0.25 | 2 |
| Ethylbenzene | 0.25 | 4 |
| m/p-xylene | 0.5 | 2 |
| o-xylene | 0.25 | 2 |
| Tetrachloroethene | 0.25 | 2 |
| Trichloroethene | 0.25 | 2 |
| cis-1,2-dichloroethene | 0.25 | 2 |
| trans-1,2-dichloroethene | 0.25 | 2 |
| Vinyl chloride | 0.25 | 2 |
| 1,2-dichlorobenzene* | 0.25 | 2 |
| 1,3-dichlorobenzene* | 0.25 | 2 |
| 1,4-dichlorobenzene* | 0.25 | 2 |
| Naphthalene* | 0.25 | 2 |
| TVPH | 6.25 | 50 |
| TEPH | 100 | NA |
| TPH-IR | 50 | NA |

Notes:
$\mathrm{NA}=$ soil not analyzed $\mu \mathrm{g} / \mathrm{g}=$ microgram per gram $\mu \mathrm{g} / \mathrm{L}=$ microgram per liter

* Added to target list part way through field program


## 1996 OFF-SITE LABORATORY DATA

## D.1.0 INTRODUCTION

This Data Quality Report (DQR) provides a detailed data quality assessment for off-site analytical data generated during site investigations conducted at Fort Devens during the fall of 1996 at Areas of Concern (AOCs) 57 and 69W.

Samples collected during the investigation were submitted to Environmental Science and Engineering (ESE), Gainseville, Florida. All laboratory data generated during the sampling programs were reviewed in terms of Data Quality Objectives (DQOs) established in the Fort Devens Project Operations Plan (POP) (ABB-ES, 1995), published analytical methods (USEPA, 1990; USEPA 1994) or applicable USEPA data validation guidelines (USEPA, 1988; USEPA 1989).
DQOs refer to a set of qualitative and quantitative statements that assess the data generated during the sampling and analysis phases of the project. The DQOS are defined by the parameters of precision, accuracy, representativeness, completeness, and comparability (PARCC). These parameters present an indication of the data quality, and the confidence that a particular compound may be present or absent in an associated environmental sample. This report describes the analytical methods performed at the on-site and off-site laboratories, and presents an assessment of data quality and usability for samples collected during the fall 1996 field investigation.

## D.1.1 OFF-SITE LABORATORY ANALYTICAL METHODS

Subsurface soil and groundwater samples were collected during the 1996 Fort Devens Site Investigation. Samples were analyzed for chemical parameters on the Fort Devens Project Analyte List (PAL). The analytical methodologies performed include PAL inorganics, PAL volatile organic compounds (VOCs), PAL semivolatile organic compounds (SVOCs), PAL pesticides and polychlorinated biphenyls (PCBs). In addition samples were analyzed for total petroleum hydrocarbons (TPHC), and several water quality parameters including hardness, nitrate and nitrite-nitrogen, kjeldahl-nitrogen, total phosphate, total organic carbon (TOC), total dissolved solids (TDS) and total suspended solids (TSS). The analyses performed are summarized on Table D-1.

The USEPA has identified two general levels of analytical data quality, Screening with Definitive Confirmation and Definitive Data (USEPA, 1993). All off-site laboratory data are considered Definitive Data.

The contract laboratory which completed analyses of all off-site analytical samples was Environmental Science and Engineering (ESE), Gainesville, Florida. Analyses were completed implementing the 1990 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) QA Program (USATHAMA, 1990). Method performance demonstration, data management, and oversight for USATHAMA analytical procedures are currently performed by the U.S. Army Environmental Center (USAEC). A discussion of AEC-certified methods used by ESE Laboratories for samples collected at Fort Devens is provided in Section 7.0 of the Fort Devens POP (ABB-ES, 1995), and methods are listed in Table D-1. This table includes a description of the methods used as well equivalent EPA methods, where they exist. The USAEC method numbers (i.e., method JS16) are specific to the project and to the particular laboratory performing the analyses. For some analyses standard USEPA methods are used. The methods are also indicated in Table D-1.

A detailed discussion of the USAEC laboratory QA program is presented in Section 3.0 of this RI. The laboratory must document proficiency using each of the methods by meeting strict USAEC performance protocols. Once the laboratory has demonstrated this proficiency, they become certified to perform that particular method. It is through this certification process that certified reporting limits (CRLs) are established. CRLs for USAEC methods and reporting limits (RLs) for standard USEPA methods are presented in Table D-1 and in Appendix B of the Fort Devens POP (ABB-ES, 1995).

Samples collected from AOC 612 and 69 W were also analyzed for petroleum hydrocarbon analysis using methods developed by the Massachusetts Department of Environmental Protection (MADEP, 1995a; MADEP, 1995b) for volatile petroleum hydrocarbons (VPH) and Extractable Petroleum Hydrocarbons (EPH). Results of these analyses were used to provide more detail on the chemical composition of hydrocarbons present. Analyses were performed by Groundwater Analytical, Inc., Buzzards Bay. A summary of the data quality review of VPH and EPH results is presented in Attachment D-1.

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## D.2.0 OFF-SITE LABORATORY QUALITY CONTROL BLANK RESULTS

A review was completed on QC blanks including method blanks, rinse blanks and trip blanks analyzed at the off-site laboratory. Blank samples provide a measure of contamination that may have been introduced into a sample set either (1) in the field while samples were being collected or transported to the laboratory, or (2) in the laboratory during sample preparation and analysis. This discussion is intended to provide an evaluation of data generated at this laboratory based on method blank and field quality control data.

## D.2.1 METHOD BLANKS

Method blanks were analyzed at the laboratory with each lot of samples to evaluate if sample processing and analysis resulted in sample contamination. Method blanks were performed for both water and soil samples for the following chemical classes: inorganics, VOCs, SVOCs, pesticides/PCBs. Method blanks were also analyzed using USEPA methods for hardness, TOC, TPHC, TDS, and TSS. All method blank data from the AOC 57 and 69W Fort Devens Site Investigation conducted in the fall of 1996 are presented in Table D-2.

## D.2.1.1 Inorganics

Seven aqueous method blanks (one for each IRDMIS inorganic method) were analyzed by the laboratory for PAL inorganics during the 1996 Field Investigation. All results for aqueous method blanks were below the respective CRLs indicating there was no inorganic contamination introduced at the laboratory.

One soil method blank, representing one for each IRDMIS inorganic method, was analyzed in association with field samples from the 1996 Fort Devens Investigation. Several elements were detected in soil method blanks. The frequency and concentration ranges of elements detected in these blanks are summarized in Table D-3. Results for mercury, selenium, arsenic thallium, antimony, silver, beryllium, cadmium, chromium, cobalt, sodium, molybdenum, nickel, vanadium, and zinc were below the CRLs.

Soil method blank analyses were conducted using a USAEC approved soil as the matrix. The concentrations of the detected inorganics are due to background

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levels inherent in this soil. As a result, elements reported for soil method blanks are not interpreted to represent laboratory introduced contamination.

Based on soil and aqueous method blank results, significant inorganic contamination was not introduced during laboratory handling and analysis.

## D.2.1.2 VOCs

Method blanks were run with each lot of water and soil samples to determine if VOCs were introduced during laboratory handling and analysis. Three aqueous method blanks were analyzed during the 1996 Field Investigation. All aqueous results for target VOCs were below CRLs. Three soil method blanks were analyzed for VOCs during the 1996 Field Investigation. All method blank results were at concentrations below the CRLs with the exception of acetone, methylene chloride, and trifluorochloromethane. The concentration and frequency of detection for these compounds are shown in Table D-4.

Acetone, methylene chloride, and trichlorofluoromethane, a tentatively identified compound (TIC), are considered common laboratory contaminants (USEPA, 1988) and were likely introduced during laboratory handling. These results indicate that low concentrations of acetone, methylene chloride, and triflorochloromethane may have been introduced during laboratory handling. Field samples with similar concentrations of these compounds may not be representative of site conditions.

## D.2.1.3 SVOCs

Two aqueous method blanks were analyzed for SVOC contamination during the 1996 Field Investigation. All method blank results were at concentrations below the C CRLs.

Three method blanks for soil were analyzed for SVOC contamination during the 1996 Field Investigation. The concentrations and frequency for compounds detected in soil method blanks are outlined in Table D-5. All target SVOC results for soil method blanks were at concentrations below CRLs. Dioctyl adipate (hexanedoic acid dioctyl ester) and heptacosane, which are non-target SVOCs or TICs, were detected in soil method blanks.

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## D.2.1.4 Pesticide/PCB

Two aqueous method blanks and two soil method blanks were used to determine if pesticides and PCB compounds were introduced during laboratory preparation and handling. All PCB method blank results were at concentrations below CRL values indicating no sample contamination occurred. The pesticide malathion was detected in water method blanks and the pesticides alpha-chlordane and gammachlordane were detected in soil method blanks. The concentration and frequency of detection of these pesticides in water and soil method blanks are shown in Tables D-6 and D-7, respectively. Samples with similar concentrations of these compounds in the media in which they were detected may not be representative of site conditions.

## D.2.1.5 TPHC

Several analytical methods were used to measure and characterize petroleum hydrocarbons. During the 1996 Field Investigation, two water method blanks were analyzed for total petroleum hydrocarbons (TPHC) by USEPA Method 418.1; two soil method blanks were analyzed for TPHC as diesel, gasoline and aviation gasoline by USEPA Method 8015; and three soil method blanks were analyzed for TPHC using USEPA Method 9071. All method blank results from the 1996 Field Investigation were below the corresponding CRLs. Based on method blank results, the off-site laboratory is not a significant source of TPHC contamination for the Fort Devens field samples.

## D.2.1.6 USEPA Methods for Water Quality Parameters

Method blanks were analyzed in association with USEPA methods for the following water quality parameters: nitrate and nitrite-nitrogen, kjeldahl-nitrogen, total phosphate, hardness, TOC, TDS, and TSS. No positive detections above RLs were reported in any of the above methods.

Based on method blanks results for samples analyzed by USEPA methods, the data collected during the Fort Devens Site Investigation was not impacted by laboratory contamination.

## D.2.2 FIELD QUALITY CONTROL BLANKS

Field quality control samples which were analyzed at the off-site laboratory include, rinse blanks, and trip blanks. Results from analyses of the field quality control blanks were used to evaluate the potential for contamination of samples during collection, and shipment and processing at the off-site laboratory.

## D.2.2.1 Rinse Blanks

Rinse blanks were used to evaluate the potential for field sampling contamination of site samples. Rinse blanks were collected by pouring deionized water over sampling equipment and into sample containers. The rinse blanks collected during the 1996 Fort Devens Investigation were analyzed for the following chemical classes: PAL inorganics, SVOCs, and PCBs. Rinse blanks were also analyzed by USEPA methods for TOC and TPHC. All rinse blank data collected during the 1996 investigation have been tabulated and are presented in Table D-8.

Inorganics. One rinse blank was analyzed for a subset of PAL elements analyzed by graphite furnace (mercury, thallium, lead, selenium, arsenic, and antimony) during the 1996 Field Investigation. These elements were not detected at concentrations above the CRLs. Rinse blank data for PAL elements analyzed by ICP were not reported. In general, the rinse blank data indicate that decontamination procedures were effective in the removal of residual inorganic contamination from the sampling equipment.

SVOCs. One rinse blank was collected during the 1996 Field Investigation and analyzed for SVOC contamination. With the exception of bis(2-ethylhexyl) phthalate detected at $12 \mu \mathrm{~g} / \mathrm{L}$, all results for target SVOCs were at concentrations below CRLs. The USEPA Region I considers phthalates as common laboratory contaminants (USEPA, 1988), however, phthalates were not detected in the method blanks collected during this investigation. The presence of phthalates in rinse blanks may be attributed to sampling activities. Detection of bis(2ethylhexyl)phthalate in Fort Devens field samples at concentrations similar to those detected in rinse blanks may be related to field sampling or decontamination procedures.

Pesticides/PCBs. One rinse blank was analyzed for PCBs during the 1996 Field Investigation. All results reported for PCBs in rinse blanks were below CRLs.

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The lack of PCBs detected in rinse blanks indicates there is no evidence of cross contamination during field sampling. Rinse blank samples were not submitted for pesticide analysis during this investigation.

USEPA Methods. During the 1996 Field Investigation, one rinse blank was analyzed for TOC and all results were at concentrations below the reporting limit of $1000 \mu \mathrm{~g} / \mathrm{L}$. Six rinse blanks were analyzed for TPHC. Concentrations of TPHC in the rinse blank was below the reporting limit of $181 \mu \mathrm{~g} / \mathrm{L}$, as well as TPH as gasoline and diesel (reporting limit of $340 \mu \mathrm{~g} / \mathrm{L}$ ). These data indicate contamination of TOC and TPHC during field sampling did not occur.

## D.2.2.2 Trip Blanks

Trip blanks are analyzed to assess the potential for cross contamination of VOCs during sampling, transit, and storage. The trip blank consists of a VOA sample container filled at the contract laboratory with DI/carbon filtered water and shipped to the site with the other VOA sample containers. Trip blanks were included with each shipping container of field VOC samples. No VOCs were detected in three trip blanks indicating cross contamination of VOCs during shipment or handling did not occur. Trip blank data collected during the 1996 investigation are presented in Table D-9.

## D.3.0 ACCURACY OF OFF-SITE LABORATORY DATA

'Accuracy is a quantitative parameter that determines the nearness of a result to its true value. Accuracy measures the bias in a measurement system. The accuracy of each analytical method was evaluated based on percent recoveries for matrix spikes and/or surrogate standards.

A matrix spike is a sample of a particular matrix to which predetermined quantities of standard solutions of certain target analytes were added prior to sample extraction/digestion and analysis. Samples were spilt into replicates, one replicate was spiked and both aliquots were analyzed.

Accuracy was also evaluated using the recovery of surrogate standards in the volatile and semivolatile analyses, and for pesticides and PCBs. Surrogate standards are organic compounds which are similar to the analytes of interest in chemical composition, extraction, and chromatography, but which are not normally found in environmental samples. These compounds are spiked into all samples prior to analysis.

Percent recovery of matrix spikes and surrogate spikes provide an indication of data accuracy and potential data bias from matrix related effects. Percent recovery was calculated using the equation shown in Section 3.3 of the Fort Devens POP (ABB-ES, 1995).

## D.3.1 MATRIX SPIKES

Soil and groundwater samples were used for matrix spike and matrix spike duplicate analyses. Spiked samples were analyzed for hardness, nitrate and nitrite-nitrogen, kjeldahl-nitrogen, total phosphate, TPHC, TOC, PAL inorganics, and PAL pesticide/PCBs. Matrix spike and matrix spike duplicate (MS/MSD) samples were collected at a rate of one per twenty environmental samples. A summary of all MS/MSD data collected during the Fort Devens Site Investigations are presented in Table D-10.

The spike data for samples of a specific matrix and analytical method were evaluated together, and are discussed below as one data set. The data have been

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segregated by method and by analytical parameter to show recovery trends of the individual spiked analytes. In the tables, matrix spikes have been paired with the corresponding matrix spike duplicates to make recovery and RPD comparisons. The average recoveries, and maximum and minimum recoveries for groundwater samples and soil are presented to measure trends for each particular method. The criteria used for interpreting MS/MSD data are taken from analytical USEPA CLP protocols (USEPA, 1990; USEPA, 1994) and the Fort Devens Project Operations Plan (ABB-ES, 1995).

## D.3.1.1 Inorganics

Matrix spike analysis was completed all PAL elements. The USEPA CLP guidelines specify control limits for recoveries of inorganic MS/MSDs of $75 \%$ and $125 \%$ (USEPA, 1990). The majority of PAL elements had recoveries within the USEPA control limits. A subset set of elements had recoveries outside these limits. Elements with at least one MS/MSD recovery outside USEPA CLP limits are presented in Table D-11.

Groundwater. The following groundwater samples from AOC 57 were spiked with target elements: MX5703X3 and MX5710X1. All elements had recoveries within the USEPA CLP limits indicating that groundwater data for inorganics was not significantly influenced by matrix effects.

Soil. One soil MS/MSD sample from AOC 57 (BX570905) was analyzed for PAL inorganics. For the elements aluminum and iron, all matrix spike concentrations were low relative to concentrations already present in the sample. For example, the spike concentration for aluminum was approximately $230 \mu \mathrm{~g} / \mathrm{g}$ compared with the sample concentration of $5610 \mu \mathrm{~g} / \mathrm{g}$. The spike concentration for iron was approximately $1,200 \mu \mathrm{~g} / \mathrm{g}$ while the sample concentration was $6410 \mu \mathrm{~g} / \mathrm{g}$. The USEPA Region I Data Validation Guidelines (USEPA, 1989) specify spike concentrations be greater than four times the sample concentration for data qualification actions to apply. Since the spike concentrations for aluminum and iron were insignificant relative to sample concentrations, matrix spike recoveries could not be accurately assessed. Based on these results, results for aluminum and iron in soil are not qualified in this RI.

For the elements mercury, arsenic, and manganese the MS/MSD recoveries were below the acceptable USEPA CLP recovery ranges. The frequency at which the

MS/MSD recoveries were outside the USEPA CLP limits, and the corresponding recovery ranges are shown in Table D-11. The outlier recoveries ranged from $52.7 \%$ to $74.7 \%$. Outlier recoveries may have been obtained as the result of nonhomogeneous concentrations throughout the sample matrices or from matrix interference. Overall, usable results were obtained for all PAL inorganics. The MS/MSD data for soil suggests that there may be some matrix interference in soil samples with detected concentrations of mercury, arsenic, and manganese. Results for mercury, arsenic, and manganese in soil samples should be considered estimated and may be biased low.

## D.3.1.2 Pesticides/PCBs

Pesticide and PCB compounds were spiked into groundwater samples to evaluate method accuracy. Ten target pesticide and two PCB compounds were used for spiking including endosulfan I, endosulfan II, aldrin, dieldrin, endrin, heptachlor, isodrin, lindane, methoxychlor, $4,4^{\prime}$-DDT, aroclor 1016, and aroclor 1260. Percent recoveries for pesticides were compared to the USEPA CLP control limits (USEPA, 1994) to determine if results were acceptable. The USEPA CLP guidelines do not specify limits for spike recoveries of endosulfan I, endosulfan II, isodrin, methoxychlor, and PCBs. For these compounds, the surrogate recovery control limits of $30 \%$ to $150 \%$ specified in the USEPA CLP Guidelines (USEPA, 1994) were used as guidance in evaluating spike recoveries.

Groundwater. One groundwater sample from AOC 57 (MX5703X3) was spiked with target pesticides and PCBs. The spike recoveries of pesticides and PCBs were within USEPA limits with the exception of lindane. The percent recoveries for lindane were $37 \%$ and $36 \%$, below the USEPA control limit of $46 \%$. Lindane was not detected in any groundwater samples. Based on these data, lindane reporting limits for groundwater samples collected during this RI may be biased low. Acceptable recoveries for all other pesticide and PCBs indicate there was no matrix effects and the data is acceptable.

## D.3.1.3 USEPA Methods

Matrix spike recoveries for water quality parameter analyzed by USEPA methods were evaluated for groundwater. The matrix recoveries for soil were also evaluated for TOC, TPH as gasoline and diesel, and TPHC.

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For water quality parameters of hardness, nitrate and nitrite-nitrogen, kjeldahlnitrogen, and total phosphate, the USEPA CLP control limits for inorganic spikes ( $75 \%-125 \%$ recovery) were used for guidance. Professional judgement was used when evaluating the organic parameters TOC and TPHC. The MS/MSD recoveries for these parameters were evaluated on a sample by sample basis and are discussed below.

Groundwater. One groundwater sample from AOC 57 (MX5703X3) was spiked for hardness, nitrogen and phosphate for matrix evaluation. Spike sample recoveries for total phosphate, nitrate and nitrite-nitrogen, and kjeldahl-nitrogen were within the established control limits indicating good accuracy.

According to the data downloaded from IRDMIS, percent recoveries for hardness reported for Lot ZKGN exceeded the control limits. However, the high recoveries are believed to be erroneous due to a unit conversion error samples in this lot. Corrective action for this discrepancy is currently ongoing. Qualification groundwater data based on spike recoveries was not conducted.

Soil. Two MS/MSD soil samples (EX573106 and BX570905) from AOC 57 were spiked and analyzed for matrix effects on concentrations of TPH as diesel and gasoline by USEPA Method 8015. The spike recovery range for these samples was $69.7 \%$ to $134.2 \%$. Based on these results, recoveries are within an acceptable range for TPHC data analyzed by USEPA Method 8015.

A total of three spiked soil sample pairs were analyzed for TPHC by USEPA Method 9071. These samples included two soil samples from AOC 57 (EX573106 and BX570905) and one from AOC 69W (BXZW0310). Spike recoveries ranged from $95.4 \%$ to $100.1 \%$ with the exception the MS recovery in AOC 57 soil sample EX573106. The MS and MSD recoveries reported for this sample were $2.5 \%$ and $4.0 \%$, respectively. The low spike recovery reported in sample EX573106 is attributed to sample heterogeneity between the spike and unspiked samples and no site wide qualification of TPHC results was done. TPHC results in sample EX573106, are considered estimated and biased low. Sample EX573106 had $18,300 \mu \mathrm{~g} / \mathrm{g}$ of TPHC reported in the original sample.

One soil sample (BX570914) from AOC 57 was spiked for TOC analysis. The recovery of this spiked sample was $.92 .2 \%$ and $107.6 \%$ in the. MS and MSD fractions, respectively, indicating acceptable method performance.

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## D.3.2 SURROGATE RECOVERIES

In addition to matrix spikes, the recovery of surrogate standards were also used to assess matrix effects and accuracy of the analytical data. Surrogate standards were used for VOC, SVOC, pesticide and PCB analyses and were added to all soil and groundwater samples prior to analysis.

## D.3.2.1 SVOC

The SVOC surrogate standards used to evaluate matrix effects and analytical accuracy included 2-fluorophenol, phenol-D6, 2,4,6-tribromophenol, nitrobenzeneD5, 2-fluorobiphenyl, and terphenyl-D14. Recovery criteria for these surrogates, are taken from analytical USEPA CLP protocols (USEPA, 1994) and the Fort Devens Project Operations Plan (ABB-ES, 1995) and are presented Table D-12. All SVOC surrogate recovery data for the 1996 Fort Devens Site Investigations are presented in Table D-13.

Interpretations on data usability were based on guidance outlined in the USEPA Region I Functional Guidelines for Data Validation (USEPA, 1988). According to this guidance SVOA sample results are judged based on independent evaluations of surrogate recoveries for acid fraction compounds and base-neutral compounds. Each fraction has three surrogates. The acid fraction surrogates include 2-flourophenol, phenol-D6, and 2,4,6-tribromophenol. The base-neutral surrogate standards include nitrobenzene-D5, 2-flourobiphenyl, and terphenylD14. SVOA positive results are considered estimated values if two or more surrogates in either the acid or base-neutral fraction are outside the recovery limits. Positive results are considered estimated values and negative (non-detect) results are considered as unusable (rejected) if any surrogate is less than ten percent recovery for the associated fraction.

All SVOA samples were evaluated using the criteria outlined above. Sample results were identified as usable, estimated, or rejected based on the USEPA Region I Guidelines. Data bias was identified if trends in surrogate recoveries for individual samples indicated low or high bias.

Groundwater. All SVOC results for groundwater samples meet the USEPA surrogate standard recovery guidelines and are considered acceptable.
Qualification of the groundwater data was not required.
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Soil. Four soil samples had recoveries of surrogate standards outside the USEPA CLP guidelines shown in Table D-12. However, qualification of data was not required because there was only one surrogate outlier from either acid or baseneutral fractions. All SVOC results for soil samples are considered acceptable based on surrogate standard recoveries.

## D.3.2.2 VOCs

All VOC surrogate recovery data for the Fort Devens Site Investigations are presented in Table D-14. Surrogate standards used for volatile organics include 1,2-dichloroethane-D4, 4-bromoflourobenzene, and toluene-D8. The criteria used for interpreting surrogate data are taken from analytical USEPA CLP protocols (USEPA, 1994) and the Fort Devens Project Operations Plan (ABB-ES, 1995) and are presented in Table D-15. Interpretations on data usability were based on guidance outlined in the USEPA Region I Functional Guidelines for Data Validation (USEPA, 1988). According to the guidelines, positive results are considered estimated values if one or more surrogate standard per sample is outside the recovery limits. If any surrogate standard is recovered at less than ten percent, positive results are considered estimated values and non-detect results are rejected and considered unusable.

All VOC samples were evaluated using the criteria outlined above. Sample results were identified as usable, estimated, or rejected based on the USEPA Region I Guidelines. Data bias was identified if trends in surrogate recoveries for individual samples indicated low or high bias.

VOC soil and groundwater surrogate recovery data indicate the overall accuracy of the GC/MS method used for VOC analyses was acceptable.

Groundwater. The surrogate recoveries for groundwater samples at AOCs 57 and 69 W were evaluated for matrix effects and accuracy of the analytical data. All groundwater had surrogate recoveries within the USEPA CLP criteria indicating acceptable method performance. Qualification of groundwater data was not required.

Soil. The recovery of surrogate standard 1,2-Dichloroethane-D4 in soil sample BX571010 from AOC 57 exceed the upper control limit. The surrogate recovery was $126 \%$. Detected concentrations of VOCs in this sample would be qualified as

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estimated and potentially biased high based; however, no VOC were detected in this sample.

The recovery of surrogate standard 4-bromoflourobenzene in soil samples EX572810 and EX573006 from AOC 57 exceeded the upper control limit. The recoveries were $176 \%$ and $182 \%$, respectively, compared to the upper control limit of $121 \%$. Positive results for 2-hexanone, ethylbenzene, tetrachloroethene, and xylenes in sample EX572810 and 2-hexanone and xylenes in sample EX573006 are judged as estimated and biased high based on elevated surrogate recoveries.

## D.3.2.3 Pesticide/PCBs

All pesticide surrogate recovery data for the Fort Devens Site Investigations are presented in Table D-16. Surrogate standards used for pesticide and PCB analyses include tetrachlorometaxylene and decachlorobiphenyl. The surrogate recovery control limits of $30 \%$ to $150 \%$ specified in the USEPA CLP Guidelines (USEPA, 1994) were used as guidance in evaluating surrogate spike recoveries in soil and groundwater samples.

Interpretations on data usability were based on guidance outlined in the USEPA Region I Functional Guidelines for Data Validation (USEPA, 1988). According to the guidelines, professional judgement should be used do determine if recoveries reported below or above the control limits require qualification. All Pesticide and PCB sample data were evaluated using this criteria. Sample results were identified as usable, estimated, or rejected based on the USEPA Region I Guidelines.

Groundwater. The pesticide and PCB surrogate recoveries for groundwater samples at AOCs 57 and 69 W were evaluated for matrix effects and accuracy of the analytical data. All surrogate recoveries for tetrachlorometaxylene were within the USEPA CLP control limits and are considered acceptable.

Several groundwater samples had recoveries of decachlorobiphenyl below the USEPA control limits. The outlier recoveries for this surrogate standard ranged from $13.9 \%$ to $18.4 \%$ for the PCB method and $14.6 \%$ to $28.6 \%$ in the pesticide method. Low recoveries for decachlorobiphenyl were reported for the following AOC 57 samples: MD5711X1, MX5711X1, MX5712X1 from the PCB fractions

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and; MX5713X1, MX5703X3 from the pesticide fraction. Reporting limits and detected concentrations results for pesticides and PCBs in these samples would be qualified as estimated and potentially biased low based on low surrogate recoveries. Pesticides and PCBs were not detected in these soil samples, and reporting limits are considered estimated.

Soil. All surrogate recoveries reported for the pesticide method in soil samples were within the USEPA CLP control limits and are considered acceptable. Outlier RPDs for both surrogate standards, tetrachlorometaxylene and decachlorobiphenyl, were reported for the PCB method for AOC 57 soil samples.

Samples with decachlorobiphenyl recoveries below the control limit included AOC 57 samples EX572810, EX573006, and EX573106. The surrogate recoveries in these samples were $15 \%, 15 \%$, and $19.6 \%$, respectively. Based on these results, Aroclor 1242 and Aroclor 1248 in these three samples and Aroclor 1260 in sample EX572810 are considered estimated and potentially biased-low values.

Soil samples BX570805, BX570905, BX570800, BX570805, and had high surrogate recoveries of decachlorobiphenyl. The recoveries for these samples ranged from $157.4 \%$ to $182.9 \%$. Based on these results, Aroclor 1242 and Aroclor 1248 in these four soil samples are considered estimated and potentially biased-high values.

All other soil samples had surrogate recoveries within the USEPA CLP guidelines and are considered acceptable.

## D.4.0 PRECISION

Precision is a measure of the reproducibility of the analytical results under a given set of conditions. It is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is measured as the relative percent difference (RPD) between a sample and its duplicate, as is calculated for field duplicate samples, and matrix spike/matrix spike duplicate samples. The following equation is used to calculate the RPD.

$$
R P D=100 \times \frac{D_{1}-D_{2}}{0.5\left(D_{1}+D_{2}\right)}
$$

$D_{1}$ and $D_{2}$ are the reported concentrations for sample duplicate analyses.
When evaluating precision for organic analyses, the RPDs of the field duplicates are compared to the acceptance criteria of $50 \%$ RPD for soil matrices and $30 \%$ RPD for water matrices (USEPA, 1988). In cases where one organic result is non-detect, the CRL value was used to calculate the RPD. The acceptance criteria for inorganic analysis for field duplicate samples only applies to analytes that are greater than 5 times the CRL (USEPA, 1989).

Precision is also evaluated by comparison of MS and MSD results. The USEPA CLP control limits were used to evaluate duplicate precision between MS and MSDs. In cases where USEPA CLP control limits for spikes are not available, such as inorganics and various USEPA analytical methods, the control limits for field duplicates listed above were used as guidance.

A discussion of the RPDs for field duplicates is presented below in Section D.4.1, and the RPDs for MS/MSDs are presented in Section D.4.2.

## D.4.1 OFF-SITE LABORATORY FIELD DUPLICATE RESULTS

Field duplicate samples from AOCS 57 and 69W at Fort Devens were collected to measure the sampling and analytical precision for the analyses performed at the off-site laboratory. Soil and groundwater duplicate samples were analyzed for the

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following Fort Devens PAL analytes: inorganics; VOCs; SVOCs; pesticide and PCBs, and TPH. Groundwater field duplicate samples were also analyzed for various water quality parameters including hardness, phosphate and nitrogen and soil duplicate samples were analyzed for TOC and TPHC.

All field duplicate data collected during the 1996 Fort Devens Site Investigation is shown in Table D-18. The RPD has been calculated for each pair of field duplicates.

## D.4.1.1 Inorganics

An analysis of the precision of the inorganic duplicate data was completed for each PAL element.

Groundwater. One sample duplicate pair (MX5711X1 and MD5711X1) from AOC 57 was collected. The RPDs of inorganic concentrations for duplicates ranged from $1.5 \%$ to $21.6 \%$ indicating excellent sampling and analytical precision. All field sample duplicate RPDs were within the USEPA Region I limits.

Soil. One sample duplicate pair from AOC 57 was collected. Calcium was the only element for which the duplicate RPD (78.5\%) exceeded the USEPA Region I control limit of $50 \%$ RPD. In general, the RPDs between field duplicates indicated good precision. Soil sample data for inorganic elements was considered acceptable based on duplicate precision results.

## D.4.1.2 VOCs

Groundwater. One groundwater sample field-duplicate from AOC 57 was collected. Detected target compounds included 1,2-DCE, ethylbenzene, toluene, trichloroethene, and tetrachloroethene. The RPDs ranged from $0 \%$ to $18.4 \%$ and were well within the USEPA Region I guidelines (30\%). The duplicate data for VOCs indicate good precision of the aqueous VOC concentrations.

Soil. One sample duplicate pair from AOC 57 was collected. With the exception of methylene chloride and 1,1,2-trichloro-1,2,2-trifluoroethane, there were no target VOCs detected in groundwater sample duplicates. The RPDs for all VOC results were below the USEPA Region I limit ( $50 \%$ ) with the exception of methylene chloride at $79.1 \%$ RPD. However, methylene chloride is considered a

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common laboratory contaminant so it's presence in these samples may not be site related. No qualification of the precision of results was performed.

## D.4.1.3 SVOCs

Groundwater. The RPD for duplicates for one groundwater sample pair from AOC 57 was evaluated. Most target SVOCs concentrations were reported as nondetect in both the sample and sample duplicate, resulting in acceptable agreement between results. Target SVOCs detected include 1,2,3-trimethylbenzene, 1,2dichlorobenzene, 1-ethyl-4-methylbenzene, naphthalene, and bis(2ethylhexyl)phthalate. RPDs for 1,2-dichlorobenzene, 1-ethyl-4-methylbenzene, and naphthalene were within limits ranging from 10.5 to 27.6. The sample duplicate RPD for 1,2,3-trimethylbenzene in samples MX5711X1 and MD5711X1 was $46.2 \%$, exceeding the precision control limit of $30 \%$. The concentration of $1,2,3-$ trimethylbenzene in sample MX5711X1 is considered an estimated value. The outlier RPD for bis(2-ethylhexyl)phthalate is not considered significant because this compound is a considered a potential laboratory contaminant.

Soil. The RPDs of SVOC concentrations for one duplicate soil sample from AOC 57 was evaluated. The samples evaluated were BX571110 and duplicate sample BD571110. There were no target SVOCs detected in either soil sample indicating excellent agreement for non-detected target compounds.

## D.4.1.4 Pesticide/PCBs

Groundwater. One groundwater field duplicate was collected from AOC 57. The samples evaluated were MX5711X1 and duplicate sample MD5711X1. All results were reported as non-detect indicating excellent agreement for non-detected target compounds.

Soil. One field duplicate soil sample was collected from AOC 57 for pesticides and PCBs. The samples evaluated were BX571110 and duplicate sample BD571110. All results were reported as non-detect indicating excellent agreement for non-detected target compounds.

## D.4.1.5 Other Methods

An evaluation of duplicate results for various water quality parameters obtained using non-USAEC performance demonstrated methods was conducted. Duplicate soil samples were analyzed for TOC and TPHC. A discussion of precision between sample duplicates analyzed for these parameters is presented below.

Groundwater. Two groundwater duplicate samples, representing one sample from each AOC were evaluated. The RPD reported for hardness for groundwater sample MX5711X1 and the sample duplicate MD5711X1 from AOC 57 was $34.2 \%$, just above the USEPA Region I control limit of $30 \%$. However, the RPDs for the other groundwater duplicate pair was $3.1 \%$ indicating excellent precision. As discussed in Section D.3.1.3, the data downloaded from IRDMIS shows hardness concentrations for samples in Lot ZKGN that are believed to be erroneous due to a unit conversion error. Corrective action for this discrepancy is currently ongoing.

Additional parameters evaluated for precision in groundwater include TSS, TPHC, total phosphate, nitrate and nitrite-nitrogen, and nitrogen by the kjeldahl method. With the exception of TSS data, all results had RPDs within control limits demonstrating consistency for the method and matrix. The RPD for TSS in groundwater sample MDZW19X1 and the sample duplicate MXZW19X1 from AOC 69 W was $66.7 \%$. Concentrations of TSS were only slightly greater than the RLs, and no qualification of data usability was done. The RPD for the other groundwater duplicate pair was $3.9 \%$, indicating acceptable precision.

Soil. Soil sample duplicate pairs BX571110 and BD571110 from AOC 57, and samples BXZW0306 and BDZW0306 from AOC 69W were evaluated for precision of TPHC (Method 9071) data. The TPHC results for the soil sample and duplicate pair from AOC 57 were $35.4 \mu \mathrm{~g} / \mathrm{g}$ and a non-detect value of less than $27.8 \mu \mathrm{~g} / \mathrm{g}$. Similarly, the TPHC results in the AOC 69 W sample duplicate pair were $57.5 \mu \mathrm{~g} / \mathrm{g}$ and less than $20.9 \mu \mathrm{~g} / \mathrm{g}$. Variability of results found in this soil sample duplicate pair may be attributed to sample heterogeneity. These results indicate variability of TPHC at concentrations at or near the reporting limits, and that TPHC results in soil should be considered estimated.

## D.4.2 OFF-SITE LABORATORY SPIKE DUPLICATE RESULTS

All spike duplicate data and the corresponding RPDs for the 1996 Fort Devens Site Investigation are presented in Table D-10. The RPDs for spike duplicates were calculated for hardness, TPHC, TOC, inorganics, and pesticide/PCBs. The results were compared to the USEPA CLP control limits (USEPA, 1988) to determine if results were acceptable. Samples with RPDs for spike samples outside control limits are discussed below. For most fractions which exhibited RPDs outside the established QC limits, qualification of the data was not required.

## D.4.2.1 Inorganics

Elements were spiked into groundwater, surface water, soil and sediment samples to evaluate precision. The USEPA CLP guidelines do not specify limits for spike RPDs for elements. As a result, the RPD control limits for laboratory duplicates of $25 \%$ in water samples and $35 \%$ in soil samples specified in the USEPA Region I Guidelines (USEPA, 1988) were used as guidance.

Groundwater. Two groundwater samples from AOC 57, MX5710X1 and MX5703X3 were evaluated for precision based on spiked samples. The RPDs for elements in spiked groundwater samples ranged from $0.2 \%$ to $10.5 \%$. These results were within the USEPA guidelines indicating acceptable precision between results.

Soil. Soil sample BX570905 from AOC 57 were assessed for spike duplicate precision. The RPDs for all elements ranged from $0.1 \%$ to $12.4 \%$ with the exception of iron and aluminum. Aluminum and iron RPDs were $193.6 \%$ and $198.1 \%$, respectively. However, as discussed in Section D.3.1.1, the spike concentrations low relative to the concentrations present in the unspiked sample making the comparison invalid. The RPD results for elements in soil samples were considered acceptable indicating good method performance.

## D.4.2.2 Pesticides/PCBs

Pesticide and PCB compounds were spiked in duplicate into groundwater and soil samples to evaluate precision. Nine target pesticide and two PCB compounds were used as spikes including endosulfan I, endosulfan II, aldrin, dieldrin, endrin,
heptachlor, isodrin, lindane, methoxychlor, 4,4'-DDT, aroclor 1016, and aroclor 1260. The USEPA CLP control limits for pesticides are shown in Table D-17. The USEPA CLP guidelines do not specify limits for spike RPDs for endosulfan I, endosulfan II, isodrin, and PCBs. For these compounds, the RPD control limits for field duplicates of $30 \%$ in water samples specified in the USEPA CLP Guidelines (USEPA, 1994) were used. Spiked soil samples were not analyzed for pesticides and PCBs during this investigation.

Groundwater. One groundwater sample MX5703X3, from AOC 57, was spiked with target pesticides and PCBs. The RPDs for pesticides ranged from $0.3 \%$ to $18.9 \%$ and PCBs ranged from $5.1 \%$ to $17.2 \%$. These results were all within the USEPA control limits described above. These results indicate excellent precision between sample results.

## D.4.2.3 Other USEPA Methods

Precision for spiked samples was also evaluated for various water quality parameters including hardness, total phosphate, nitrate and nitrite-nitrogen, and kjeldahl-nitrogen in water samples, and TPHC and TOC in soil samples. USEPA CLP guidelines for evaluating spike duplicate RPDs for these parameters are not available. The USEPA Region I control limits for field duplicates $30 \%$ in water and $50 \%$ in soil were used to compare RPDs between spiked samples.

Groundwater. One groundwater sample MX5703X3 from AOC 57 was spiked in duplicate for the water quality parameters listed above to evaluate precision. All RPDs between the MS and MSDs were less than the $30 \%$ control limit indicating excellent method performance.

Soil. Soil samples from AOC 57 (BX570914) were spiked in duplicate for TOC to evaluate precision. Samples EX573106, BX570905 from AOC 57, and BXZW0310 from AOC 69W were spiked in duplicate for TPHC analysis by USEPA Method 9071. All RPDs between the MS and MSDs were less than the $50 \%$ control limit indicating acceptable method performance for TOC and TPHC (Method 9071).

Two soil samples from AOC 57 (EX573106 and BX570905) were spike in duplicate to evaluate precision for TPHC as diesel and gasoline (USEPA

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Method 8015). The RPDs of soil samples for TPHC as gasoline were within the USEPA control limits indicating acceptable precision.

The RPD for TPHC as diesel fuel (63.3\%) exceeded the $50 \%$ control limits in sample EX573106. Diesel was not detected in either sample. RPD for TPH as diesel in the second soil duplicate pair was $2.6 \%$ indicating excellent agreement between results. Based on duplicate spike data, TPH results (USEPA Method 8015) for soil samples overall are acceptable and no qualification of the use of TPH diesel results was done.

## REFERENCES

ABB Environmental Services, Inc. (ABB-ES), 1995. "Project Operation Plan Fort Devens, Massachusetts; Data Item A004/A006; May 1995.

Massachusetts Department of Environmental Protection (MADEP), 1995a. "Method for the Determination of Extractable Petroleum Hydrocarbons (EPH); Division of Environmental Analysis; Draft 1.0; August 1995.

Massachusetts Department of Environmental Protection (MADEP), 1995b. "Method for the Determination of Volatile Petroleum Hydrocarbons (VPH); Division of Environmental Analysis; Draft 1.0; August 1995.
U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), 1990. Quality Assurance Program; USATHAMA PAM 11-41; Aberdeen Proving Ground, MD; January 1990.
U.S. Environmental Protection Agency (USEPA), 1983. "Methods for the Chemical Analysis of Water and Wastes"; Environmental Monitoring and Support Laboratory; USEPA 600-4-79-020; Cincinnati OH; March 1983.
U.S. Environmental Protection Agency (USEPA), 1986. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Remedial Response; Washington, DC; SW-846; November 1986.
U.S. Environmental Protection Agency (USEPA), 1988. "Region 1 Laboratory Data Validation Functional Guidelines For Evaluating Organic Analyses"; Hazardous Site Evaluation Division; November 1988.
U.S. Environmental Protection Agency (USEPA), 1989. "Region 1 Laboratory Data Validation Functional Guidelines For Evaluating Inorganic Analyses"; Hazardous Site Evaluation Division; February 1989.
U.S. Environmental Protection Agency (USEPA), 1990. "Contract Laboratory Program Statement of Work for Inorganic Analyses"; Office of Solid Waste and Remedial Response; ILM01.0; March 1990.
U.S. Environmental Protection Agency (USEPA), 1993. "Data Quality Objectives Process for Superfund"; Office of Solid Waste and Emergency Response; EPA540-R-93-071; September 1993.
U.S. Environmental Protection Agency (USEPA), 1994. "Contract Laboratory Program Statement of Work for Organic Analyses"; Office of Solid Waste and Emergency Response OLM03.1; August 1994.

# ATTACHMENT D-1 <br> PROJECT CHEMIST REVIEW SUMMARY MADEP VOLATILE PETROLEUM HYDROCARBON (VPH) AND EXTRACTABLES PETROLEUM HYDROCARBONS (EPH) METHODS AOC 69W <br> FORT DEVENS, AYER MASSACHUSETTS 

## Introduction

This memo summarizes the ABB-ES chemist review of the analytical results generated by Groundwater Analytical for VPH and EPH analyses for Ft. Devens Task 001 Modification (1996). The VPH and EPH methods were conducted as outlined in accordance with Massachusetts Department of Environmental Protection (MADEP, 1995a; MADEP, 1995b).

The data review summaries below discuss the control elements to which the data were evaluated. The data that are available for review included: method control blanks, laboratory control samples, duplicates, matrix spikes/matrix spike duplicates, holding times and a \% surrogate recovery.

## Extractable Petroleum Hydrocarbons

## Method Control Blanks

The method demonstrated no evidence of contamination of EPH or any of the targeted polynuclear aromatic hydrocarbon analytes.

## Laboratory Control Samples

The laboratory control sample analyses demonstrated percent recovery values within the specified acceptable ranges.

## Duplicates

One field duplicate sample was analyzed; no EPH or targeted polynuclear aromatic hydrocarbon analytes were detected. The results of the sample sets were non-detects. In general, the duplicate results indicate good precision of measurement was obtained for the EPH sample analyses. These results indicated agreement for absence of EPH, however, evaluations of precision for positive detection EPH was not possible.

## Matrix Spike/ Matrix Spike Duplicates

Two matrix spike/matrix spike duplicate pairs were analyzed. All target compounds with the exception of naphthalene met the quality control limits for one set of spikes. The associated samples had no detection of naphthalene and were not qualified. Although naphthalene recovery of one set was outside the desired recovery range and the RPD result (RPD = 37) slightly exceeded the $30 \%$ goal, the balance of analytes results indicate good precision was achieved.

Holding Times .
All holding and extraction time limits established for sample analysis were met.

## \% Surrogate recoveries

All surrogate recoveries were within the acceptance criteria of $60-140 \%$.

## Data Ouality Objectives (DOOs)

DQOs are based on the premise that different data uses require different levels of data quality. Data quality refers to the degree of uncertainty of analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC). These objectives are established based on site conditions, the purpose of the field program, and the knowledge of the measurement systems used for generation of the analytical data.

No major quality control problems were observed during the data validation process which would affect the usability of the sample results. A discussion of the laboratory data quality as it relates to the PARCC objectives is presented below.

## Precision and Accuracy

Precision refers to the reproducibility of a measurement under certain specified conditions, and accuracy measures the bias associated with the sampling and

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analysis process. Precision and accuracy are affected by both field and laboratory conditions. Precision was monitored through the analysis of field and laboratory blanks, matrix spikes, and surrogate spikes. The Massachusetts Department of Environmental Protection protocols used for the analysis of samples define the criteria for acceptable precision and accuracy. No major precision and accuracy problems were observed which would affect usability.

## Representativeness

Measurements are made so that the results obtained are representative of the sampling population, the medium (e.g., soil, groundwater, sediment, etc.) and the site conditions. The sampling protocols were developed to ensure that the samples were representative of the media, that sampling locations were properly selected, and that a sufficient number of samples were collected. Sample handling protocols (chain-of-custody, storage, and transportation) were adequate to preserve the sample integrity. Proper documentation established that the correct protocols had been followed. Co-located samples (field duplicates) were also collected to assess representativeness, and no major problems were observed which would affect usability.

## Completeness

The characteristic of completeness is regarded as providing the results of all samples in the data reporting format outlined in the VPH and EPH methods of Massachusetts Department of Environmental Protection. The completeness requirement for sample analysis has been met for this program.

## Comparability

The characteristic of comparability reflects both the internal consistency of measurements and the expression of results in units which are consistent with other organizations reporting similar data. Each value reported for a given measurement should be similar to other values within the same data set and with other related data sets. Comparability was assured through use of standardized sampling procedures and the use of VPH and EPH methods of Massachusetts Department of Environmental Protection analytical methods.

## APPENDIX D-3 <br> Table D-1 <br> Summary of analytical Parameters <br> AOC 57 and 69W Remedial Investigation Fort Devens, Massachusetts

| PABAMETER | MATRDX (SOIL/WATER) | USAEC <br> METHOD <br> Number | Equivalent USEPA <br> METHOD Number | Method DESCRIPTION | LABORATORY/ Army-Certified REPORTing LIMIT |
| :---: | :---: | :---: | :---: | :---: | :---: |
| pH | Water | No Certified Method | 150.1 | Measured in Field | N/A |
| Temperature | Water | No Certified Method | 170.1 | Measured in Field | N/A |
| Turbidity | Water | No Certified Method | 180.1 | Measured in Field | N/A |
| Conductivity | Water | No Cerrified Method | 120.1 | Measured in Field Electrode | N/A |
| RedOX | Water | No Certified Method | SM 2580b | Measured in Field | N/A |
| Total Suspended Solids | Water | No Certified Method | 160.2 | Gravimetric | $4000 \mu \mathrm{~g} / \mathrm{L}$ |
| Total Dissolved Solids | Water | No Cerified Method | 160.1 | Gravimetric | 10,000 $\mu \mathrm{g} / \mathrm{L}$ |
| Total Organic Carbon | Soil | No Certified Method | SW 9060 | Infrared | $360 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Water | No Certified Method | SW 9060 | infrared | $1000 \mu \mathrm{~g} / \mathrm{L}$ |
| Nitrate/Nitrite | Water | TF22 | 351.2 | Colorimetric | $10 \mu \mathrm{~g} / \mathrm{L}$ |
| Hardness | Water | N/A | 130.2 or SM2340B | Titration or Calculation | $1000 \mu \mathrm{~g} / \mathrm{L}$ |
| TKN (Kjeldahl) | Water | No Certified Method | 351.2 | Calorimetric | $183 \mu \mathrm{~g} / \mathrm{L}$ |
| Total Petroleum Hydrocarbons | Water | No Certified Method | 418.1 | infrared | $167 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | No Certified Method | SW 9071/ 418.1 | Infrared | $21 \mu \mathrm{~g} / \mathrm{g}$ |
| Aluminum | Water | SS18 | 200.7 | 1 CP | $141 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $14.1 \mu \mathrm{~g} / \mathrm{g}$ |
| Antimony | Soil | JS16 | SW 6010 | ICP | $7.14 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Water | SD28 | - | GFAA | $3.03 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD25 | - | GFAA | $1.09 \mu \mathrm{~g} / \mathrm{g}$ |
| Arsenic | Water | SD22 | 206.2 | GFAA | $2.54 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD19 | SW 7060 | GFAA | $0.25 \mu \mathrm{~g} / \mathrm{g}$ |
| Barium | Water | SS18 | 200.7 | ICP | $2.5 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $5.91 \mu \mathrm{~g} / \mathrm{g}$ |

## APPENDIX D-3 <br> Table D-1 <br> SUMMARY of ANalytical Parameters

AOC 57 and 69W Remedial Investigation Fort Devens, Massachusetts

| Parameter | Matrix (SOIL, WATER) | USAEC <br> Method <br> Number | Equivalent USEPA Method NUMBER | METHOD DESCRIPTION | LABORATORY/ Army-Certified Reporting Limit |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Beryllium | Water | SS18 | 200.7 | ICP | $5.0 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $0.5 \mu \mathrm{~g} / \mathrm{g}$ |
| Cadmium | Water | SS10 | 200.7 | ICP | $3.01 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $0.7 \mu \mathrm{~g} / \mathrm{g}$ |
| Calcium | Water. | SS18 | 200.7 | ICP | $1000 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | $1 C P$ | $100 \mu \mathrm{~g} / \mathrm{g}$ |
| Chromium | Water | SS18 | 200.7 | ICP | $6.96 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $4.05 \mu \mathrm{~g} / \mathrm{g}$ |
| Cobalt | Water | SS18 | 200.7 | ICP | $50 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $1.42 \mu \mathrm{~g} / \mathrm{g}$ |
| Copper | Water | SS18 | 200.7 | ICP | $5 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $0.965 \mu \mathrm{~g} / \mathrm{g}$ |
| Iron | Water | SS18 | 200.7 | ICP | $36.8 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $3.68 \mu \mathrm{~g} / \mathrm{g}$ |
| Lead | Soil | JS16 | SW 6010 | ICP | $10.5 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Soil | JD17 | SW 7421 | GFAA | $0.177 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Water | SD20 | 239.2 | GFAA | $1.26 \mu \mathrm{~g} / \mathrm{L}$ |
| Magnesium | Water | SS18 | 200.7 | ICP | $1000 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $100 \mu \mathrm{~g} / \mathrm{g}$ |
| Manganese | Water | SS18 | 200.7 | ICP | $2.5 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $2.05 \mu \mathrm{~g} / \mathrm{g}$ |
| Mercury | Water | SB01 | 245.1 | CVAA | $0.243 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JB01 | SW 7471 | CVAA | $0.05 \mu \mathrm{~g} / \mathrm{g}$ |
| Nickel | Water | SS18 | 200.7 | ICP | $7.11 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $1.71 \mu \mathrm{~g} / \mathrm{g}$ |

## APPENDIX D-3 <br> Table D-1 <br> SUMMARY OF ANALYTICAL PARAMETERS

## aOC 57 and 69W Remedial Investigation Fort Devens, Massachusetts

| PARAMETER | Matrix (SOIL/WATER) | USAEC <br> Method Number | Equivalent <br> USEPA <br> METHOD <br> Number | Method DESCRIPTION | LABORATORY/ Army-Certified Reporting Limit |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Potassium | Water | SS18 | 200.7 | ICP | $1000 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $100 \mu \mathrm{~g} / \mathrm{g}$ |
| Selenium | Water | SD21 | 270.2 | GFAA | $3.02 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD15 | SW7740 | GFAA | $0.25 \mu \mathrm{~g} / \mathrm{g}$ |
| Silver | Water | SD23 | 272.2 | GFAA | $0.25 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD18 | SW 7761 | GFAA | . $025 \mu \mathrm{~g} / \mathrm{g}$ |
|  | Water | SS18 | 200.7 | ICP | $4.42 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $0.589 \mu \mathrm{~g} / \mathrm{g}$ |
| Sodium | Water | SS18 | 200.7 | ICP | $2290 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $100 \mu \mathrm{~g} / \mathrm{g}$ |
| Thallium | Water | SD09 | 279.2 | GFAA | $6.99 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JD24 | $\begin{gathered} \text { SW846 } \\ 7841 \end{gathered}$ | GFAA | $0.5 \mu \mathrm{~g} / \mathrm{g}$ |
| Vanadium | Water | SS18 | 200.7 | ICP | $4.69 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $3.39 \mu \mathrm{~g} / \mathrm{g}$ |
| Zino | Water | SS18 | 200.7 | ICP | $35.8 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | JS16 | SW 6010 | ICP | $8.03 \mu \mathrm{~g} / \mathrm{g}$ |
| Semivolatile Organic Compounds | Water | UM18 | 625 | Extraction,GC/MS | See POP |
|  | Soil | LM18 | SW 8270 | Extraction,GC/MS | See POP |
| Volatile Organic Compound | Water | UM20 | 624 | Purge and Trap, GC/MS | See POP |
|  | Soil | LM19 | SW 8240 | Purge and Trap, GC/MS | See POP |
| Pesticides/PCBs | Water | UH13/UHO2 | 608 | Extraction, GC | See POP |
|  | Soil | LH10/LH16 | SW 8080 | Extraction, GC-EC | See POP |

## APPENDIX D-3 <br> Table D-1 <br> Summary of analytical Parameters <br> AOC 57 and 69W Remedial Investigation Fort Devens, Massachusetts

| PARAMETER | MATBIX (SOIL/WATER) | USAEC <br> METHOD <br> Number | Equivalent USEPA METHOD NUMBER | MeTHOD DESGRIPTION | LABORATORY/ ARMY-CERTIFIED REPORTING LIMIT |
| :---: | :---: | :---: | :---: | :---: | :---: |
| GRO | Water | No Certified Method | Modified 8015 | GC/FID | $400 \mu \mathrm{~g} / \mathrm{L}$ |
|  | Soil | No Certified Method | Modified 8015 | GC/FID | $8 \mu \mathrm{~g} / \mathrm{g}$ |
| DRO | Soil | No Certified Method | Modified 8015 | GC/FID | $8 \mu \mathrm{~g} / \mathrm{g}$ |

## Notes:

| POP | $=\quad$ Project Operations Plan; Fort Devens, Massachusetts, Data Item A004/A006; U.S. Army Environmental Center; Aberdeen Proving |
| :--- | :--- | :--- |
| Ground, Maryland; May 1995. |  |

Source: ESE, 1991.













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Contractor Method Description






















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Test
Contractor Method Description









## APPENDIX D-3 <br> Table D-3 <br> Elements Detected in Soil Method Blanks <br> 1995 AOC 57 and 69W Remedial Investigation <br> fort Devens, Massachusetts

| ELEMENT | Frequency of Detection | Concentration Range $(\omega \mathrm{g} / \mathrm{g})$ | $\begin{gathered} \text { CRL, } \\ (\mu \mathrm{g} / \mathrm{g}) \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| Aluminum | 1/1 | 636 | 14.1 |
| Barium | 1/1 | 13.4 | 29.6 |
| Calcium | 1/1 | 421 | 3.05 |
| Lead | 1/1 | . 649 | 1.26 |
| Copper | 1/1 | 1.01 | 58.6 |
| Iron | 1/1 | 1160 | 42.7 |
| Potassium | 1/1 | 215 | 37.5 |
| Magnesium | 1/1 | 202 | 50.0 |
| Manganese | 1/1 | 27.3 | 0.275 |

APPENDIX D-3
Table D-4
VOCs Detected in Method Blanks for Soll

1995 AOC 57 AND 69W REMEDIAL INVESTIGATION
Fort Devens, Massachusetts

| COMPOUND | Frequency of Detection | Concentration Range $(\mu \mathrm{g} / \mathrm{g})$ | $\begin{gathered} \mathrm{CRL} \\ (\mathrm{~g} / \mathrm{g}) \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| Target VOCs |  |  |  |
| Acetone | 1/3 | 0.017 | 0.017 |
| Methylene Chloride | 3/3 | 0.0015-0.0039 | 0.012 |
| VOC TICs |  |  |  |
| Trichlorofluoromethane | 1/3 | 0.011 | NA |

## APPEndix D-3

Table D-5

- SVOCs Detected in Soil Blanks

1995 AOC 57 and 69W Remedial Investigation
Fort Devens, Massachusetts

|  | Frequency of DETECTION | Concentration Range $(\mu \mathrm{g} / \mathrm{g})$ | $\begin{gathered} \mathrm{CRL} \\ (\mathrm{ug} / \mathrm{g}) \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| SVOC TICs |  |  |  |
| Dioctyl adipate | 1/3 | 3 | Not determined |
| heptacosane | 2/3 | 0.3 | Not determined |

1995 AOC 57 AND 69W REmEDIAL Investigation Fort Devens, Massachusetts

| Compound | Frequency of Deiection | COncentration Range $(\mu \mathrm{g} / \mathrm{L})$ | $\begin{gathered} \text { CRL } \\ (\omega \mathrm{g} / \mathrm{L}) \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| Malathion | 2/2 | 0.188 | Not Available |

## APPENDIX D-3 <br> Table D-7 <br> Pesticides Detected in Method Blanks for Soll <br> 1995 AOC 57 and 69W Remedial Investigation fort Devens, Massachusetts

| COMPOUND | Frequency of Detection | Concentration Range ( $\mathrm{\mu g} / \mathrm{L}$ ) | $\begin{gathered} \text { CRL } \\ (\mu \mathrm{g} / \mathrm{L}) \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| alpha-Chlordane | 1/2 | 0.00596 | 0.005 |
| gamma-Chlordane | 2/2 | 0.00655-0.0108 | 0.005 |

Appendix D-3
TIble: D-8
RINSE BLANKS
FT. DEVENS DV4



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 | IRDMIS |
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| Contractor Method Description | IRDMIS Method Code | Test Name | IRDNIS Site ID | IRDMIS Field Sample Number | Lab Number | Lot | Sample Date | Analys is Date | Spike Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | $\begin{aligned} & 1302 \\ & 1302 \end{aligned}$ | HARD | $\begin{aligned} & 57 M-95-03 x \\ & 57 M-95-03 X \end{aligned}$ | $\begin{aligned} & \mu \times 5703 \times 3 \\ & M \times 5703 \times 3 \end{aligned}$ | DV4W*537 DV4W*537 | $\begin{aligned} & \text { ZKGN } \\ & \text { ZKGN } \end{aligned}$ | $\begin{aligned} & \text { 02-0CT-96 } \\ & 02-0 C T-96 \end{aligned}$ | $\begin{aligned} & 14 \text {-OCT-96 } \\ & \text { 14-OCT-96 } \end{aligned}$ | $\begin{aligned} & 200000 \\ & 200000 \end{aligned}$ | $\begin{aligned} & 196000000 \\ & 192000000 \end{aligned}$ | $\begin{aligned} & 1.660 E+09 \text { UGL } \\ & 1.660 \mathrm{E}+09 \mathrm{UGL} \end{aligned}$ | 98000.0 | 2.1 |
|  |  | HARD |  |  |  |  |  |  |  |  |  | 96000.0 | 2.1 |
|  |  | avg minimum maximu |  |  |  |  |  |  |  |  |  | 97000.0 96000.0 <br> 98000.0 |  |
| ABB-ES ABB-ES ABB-ES ABB-ES | $\begin{aligned} & 8015 \\ & 8015 \\ & 8015 \\ & 8015 \end{aligned}$ | DIESEL | 57E-96-31X <br> 57E-96-31X <br> 57B-96-09X <br> 578-96-09x | EX573106 EX573106 BX570905 BX570905 | DV4S*519 <br> DV4S*519 <br> DV4S*525 <br> DV4S*525 | $\begin{aligned} & \text { QEFU } \\ & \text { QEFU } \\ & \text { QEXU } \\ & \text { OEXU } \end{aligned}$ | $\begin{aligned} & 21-A U G-96 \\ & 21-A U G-96 \\ & 29-A U G-96 \\ & 29-A U G-96 \end{aligned}$ | $\begin{aligned} & \text { 29-AUG-96 } \\ & \text { 29-AUG-96 } \\ & \text { 08-EP-96 } \\ & \text { 08-SEP-96 } \end{aligned}$ | $\begin{aligned} & 466 \\ & 466 \\ & 539 \\ & 539 . \end{aligned}$ | $591<$$307<$$508<$$495<$ | $\begin{aligned} & 7.98 \text { UGG } \\ & 7.98 \text { UGG } \\ & 7.98 \text { UGG } \\ & 7.98 \text { UGG } \end{aligned}$ | 134.2 | 63.3 |
|  |  | DIESEL |  |  |  |  |  |  |  |  |  | 69.7 | 63.3 |
|  |  | DIESEL |  |  |  |  |  |  |  |  |  | 115.4 | 2.6 |
|  |  | DIESEL |  |  |  |  |  |  |  |  |  | 112.4 | 2.6 |
|  |  | avg minimum |  |  |  |  |  |  |  |  |  | 107.9 69.7 |  |
|  |  | maximum |  |  |  |  |  |  |  |  |  | 134.2 |  |
| ABB-ES ABB-ES ABB-ESABB-ES | $\begin{aligned} & 8015 \\ & 8015 \\ & 8015 \\ & 8015 \end{aligned}$ | TPHGAS | $\begin{aligned} & 57 E-96-31 x \\ & 57 E-96-31 x \\ & 57 B-96-09 x \\ & 57 B-96-09 x \end{aligned}$ | $\begin{aligned} & \text { EX573106 } \\ & \text { EX573106 } \\ & \text { BX570905 } \\ & \text { B5750905 } \end{aligned}$ | DV4S*519 <br> DV4S*519 <br> DV4S*525 <br> DV4S*525 | OEFUOEFUQEXUOEXU | $\begin{aligned} & 21-A U G-96 \\ & 21-A U G-96 \\ & 29-A G-96 \\ & 29-A U G-96 \end{aligned}$ | $\begin{aligned} & \text { 29-AUG-96 } \\ & \text { 29-AUG-96 } \\ & \text { 08-EEP-96 } \\ & \text { 08-SEP-96 } \end{aligned}$ | $\begin{aligned} & 430 \\ & 430 \\ & 497 \end{aligned}$ | $440<$$310<$$380<$$370<$ | 8 UGG8 UGG8 UGG8 UGG | 108.3 | 34.734.7 |
|  |  | TPHGAS |  |  |  |  |  |  |  |  |  | 76.3 |  |
|  |  | TPHGAS |  |  |  |  |  |  |  |  |  | 93.6 | 2.7 |
|  |  | TPHGAS ********** |  |  |  |  |  |  | 497 |  |  | 91.1 | 2.7 |
|  |  | avg minimum maximem |  |  |  |  |  |  |  |  |  | 92.3 76.3 108.3 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | $\begin{aligned} & 9060 \\ & 9060 \end{aligned}$ | TOC | 57M-96-09X BX570914 57M-96-09X BX570914 |  | $\begin{aligned} & \text { DV4S*530 } \\ & \text { DV4S*530 } \end{aligned}$ | $\begin{aligned} & \text { ZEMO } \\ & \text { ZEMO } \end{aligned}$ | $\begin{aligned} & \text { 27-AUG-96 } \\ & \text { 27-AUG-96 } \end{aligned}$ | $\begin{aligned} & 16-\text { SEP-96 } \\ & 16 \text { SEP-96 } \end{aligned}$ | $\begin{aligned} & 2500 \\ & 2720 \end{aligned}$ | $\begin{aligned} & 2220 \\ & 2070 \end{aligned}$ | $\begin{aligned} & 792 \text { UGG } \\ & 792 \text { UGG } \end{aligned}$ | 107.6 | 15.4 |
|  |  | TOC |  |  | 92.2 |  |  |  |  |  |  | 15.4 |  |
|  |  | avg minimum |  |  |  |  |  |  |  |  |  | 99.9 92.2 |  |
|  |  | maximum |  |  |  |  |  |  |  |  |  | 107.6 |  |
| ABB-ES | 9071 | TPHC | ZWB-96-03X | 8XZW0310 |  | DV4S*501 | ZELO | 23-AUG-96 | 18-SEP-96 | 1270 | $1070<$ | 27.8 UGG | 95.4 | . 0 |
| ABB-ES | 9071 | TPHC | ZWB-96-03X | 8XZW0310 | DV4S*501 | ZELO | 23-AUG-96 | 18-SEP-96 | 1270 | 1070 < | 27.8 UGG | 95.4 | . 0 |
| ABB-ES | 9071 | TPHC | 57E-96-31X | EX573106 | DV4S*519 | ZEHO | 21-AUG-96 | 12-SEP-96 | 47300 | 1800 | 18300 UGG | 4.0 | 47.3 |
| ABB-ES | 9071 | TPHC | 57E-96-31X | Ex573106 | DV4S*519 | ZEHO | 21-ANG-96 | 12-SEP-96 | 47300 | 1110 | 18300 UGG | 2.5 | 47.3 |



| Contractor | Method Description | Appendix D-3 Table: D-10 FT. DEVENS DV4 1996 MS/MSD RESULTS |  |  |  |  |  |  |  |  |  | Original Sample Value Unit | Percent Recovery |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Number | Lab Number | Lot | Sample Date | Analysis Date | Spike Value | Value < |  |  | RPD |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/FURNACE METALS/SOIL/FURNACE | $\begin{aligned} & \text { JD24 } \\ & \text { JD24 } \end{aligned}$ | TL <br> TL <br> ********** | $\begin{aligned} & 578-96-09 x \\ & 578-06-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { DV4S*525 } \\ & \text { DV4S*525 } \end{aligned}$ |  | 29-AUG-9 | $5 \text { 24-SEP-96 }$ | 4.86 4.67 | $3.81<$ $3.66<$ | .5 UGG | 96.0 95.9 | . 0 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 95.9 \\ & 95.9 \\ & 96.0 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/FURNACE METALS/SOIL/FURNACE | $\begin{aligned} & \text { JD25 } \\ & \text { JD25 } \end{aligned}$ | $\begin{aligned} & \text { SB } \\ & \text { SB } \\ & \text { ********** } \end{aligned}$ | $\begin{aligned} & 578-96-09 x \\ & 578-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { DV4S*525 } \\ & \text { DV4S } 525 \end{aligned}$ | $\begin{aligned} & \text { SBXB } \\ & \text { SBXB } \end{aligned}$ | 29-AUG- 29-AUG- | $\begin{aligned} & 5 \text { 23-SEP-96 } \\ & 5 \\ & 23-\text { SEP-96 } \end{aligned}$ | $\begin{aligned} & 9.69 \\ & 9.62 \end{aligned}$ | $\begin{aligned} & 7.61 \ll \\ & 7.56< \end{aligned}$ | $\begin{aligned} & 1.09 \text { UGG } \\ & 1.09 \text { UGG } \end{aligned}$ | 96.1 96.2 | . 1 |
|  |  |  | avg minimum maximem |  |  |  |  |  |  |  |  |  | 96.2 96.1 96.2 |  |
| $\begin{aligned} & A B B-E S \\ & A B B-E S \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \text { AG } \\ & \text { AG } \\ & * * * * * * * * * \end{aligned}$ | $\begin{aligned} & 57 B-96-09 x \\ & 57 B-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { DV4S*525 } \\ & \text { DV4S } 525 \end{aligned}$ | UBNI UBNI | $\begin{aligned} & 29-A \cup G- \\ & 29-A \cup G-S \end{aligned}$ | $\begin{aligned} & \text { 26-SEP-96 } \\ & 26-\text { SEP-96 } \end{aligned}$ | 9.54 9.4 | 7.22 6.76 | 1.12 UGG 1.12 UGG | 92.6 88.0 | 5.1 5.1 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 90.3 88.0 92.6 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | JS16 JS16 | $\begin{aligned} & \text { AL } \\ & \text { AL } \\ & \text { ********** } \end{aligned}$ | $\begin{aligned} & 57 B-96-09 x \\ & 57 B-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { OV4S } \# 525 \\ & \text { DV4S } 525 \end{aligned}$ | UBNI UBNI | $\begin{aligned} & 29-A U G-S \\ & 29-A U G-S \end{aligned}$ | $\begin{aligned} & \text { 26-SEP-96 } \\ & \text { 26-SEP-96 } \end{aligned}$ | 239 235 | 147 2.35 | 5610 UGG 5610 UGG | 75.3 1.2 | $\begin{aligned} & 193.6 \\ & 193.6 \end{aligned}$ |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 38.3 1.2 75.3 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \text { BA } \\ & \text { BA } \\ & \text { ********** } \end{aligned}$ | $\begin{aligned} & 57 B-96-09 x \\ & 57 B-96-09 \mathrm{X} \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { DV4S*525 } \\ & \text { DV4S*525 } \end{aligned}$ | UBNI UBNI | $\begin{aligned} & 29-A U G-1 \\ & 29-A N G-1 \end{aligned}$ | $\begin{aligned} & 26-\text { SEP-96 } \\ & 26-\operatorname{SEP}-96 \end{aligned}$ | $\begin{aligned} & 71.6 \\ & 70.5 \end{aligned}$ | 57.2 54.6 | 13.3 UGG 13.3 UGG | 97.8 94.8 | 3.1 3.1 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 96.3 \\ & 94.8 \\ & 97.8 \end{aligned}$ |  |
| ABB-ES | METALS/SOIL/ICP | JS16 | BE | 57B-96-09x | BX570905 | DV4S*525 | UBNI | 29-AUG- | 26-SEP-96 | 59.6 | $49.2<$ | . 5 UGG | 101.0 | 1.1 |


| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | Appendix D-3 <br> Table: D-10 <br> FT. DEVENS DV4 1996 MS/MSD RESULTS |  |  |  |  |  | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | IRDMIS <br> Field <br> Sample <br> Number | Lab Number |  | Sample Date | Analysis Date | Spike Value |  |  |  |  |
| ABB-ES | METALS/SOIL/ICP | Js16 | BE <br>  | 57B-96-09x | BX570905 | DV4S*525 | UBNI | 29-AUG-96 | 26-SEP-96 | 58.8 | 48 < | . 5 UGG | 99.9 | 1.1 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{array}{r} 100.5 \\ 99.9 \\ 101.0 \end{array}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \text { CA } \\ & \text { CA } \end{aligned}$ | 578-96-09x 578-96-09X | $\frac{\text { BX570905 }}{1 \times 570905}$ | $\begin{aligned} & \text { DV4S*525 } \\ & \text { DV4S*525 } \end{aligned}$ | UBNI <br> UBNI | $\begin{aligned} & 29-\text { AUG-96 } \\ & \text { 29-AUG-96 } \end{aligned}$ | $\begin{aligned} & \text { 26-SEP-96 } \\ & 26 \text {-SEP-96 } \end{aligned}$ | $\begin{aligned} & 5980 \\ & 5880 \end{aligned}$ | $\begin{aligned} & 4800 \\ & 4660 \end{aligned}$ | $\begin{aligned} & 292 \text { UGG } \\ & 292 \text { UGG } \end{aligned}$ | $\begin{aligned} & 98.6 \\ & 97.0 \end{aligned}$ | 1.6 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 97.8 \\ & 97.0 \\ & 98.6 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { Js16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & C D \\ & C D \end{aligned}$ | $\begin{aligned} & 578-96-09 x \\ & 578-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { DV4S*525 } \\ & \text { DV4S*525 } \end{aligned}$ | UBNI <br> UBNI | $\begin{aligned} & \text { 29-AUG-96 } \\ & \text { 29-AUG-96 } \end{aligned}$ | $\begin{aligned} & \text { 26-SEP-96 } \\ & 26 \text { SEP-96 } \end{aligned}$ | $\begin{aligned} & 59.6 \\ & 58.8 \end{aligned}$ | $\begin{aligned} & 47.4 \ll \\ & 46.6< \end{aligned}$ | $\begin{aligned} & .7 \text { UGG } \\ & .7 \\ & \hline \end{aligned}$ | $\begin{aligned} & 97.3 \\ & 97.0 \end{aligned}$ | . 4 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 97.2 \\ & 97.0 \\ & 97.3 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \text { CO } \\ & \text { co } \\ & \text { ********** } \end{aligned}$ | $\begin{aligned} & 57 \mathrm{~B}-96-09 \mathrm{x} \\ & 578-96-09 \mathrm{x} \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { DV4S*525 } \\ & \text { DV4S*525 } \end{aligned}$ | UBNI <br> UBNI | $\begin{aligned} & \text { 29-AUG-96 } \\ & \text { 29-AUG-96 } \end{aligned}$ | $\begin{aligned} & \text { 26-SEP-96 } \\ & 26 \text {-SEP-96 } \end{aligned}$ | $\begin{aligned} & 119 \\ & 118 \end{aligned}$ | $\begin{aligned} & 91.9 \\ & 89.6 \end{aligned}$ | $\begin{aligned} & 2.7 \text { UGG } \\ & 2.7 \text { UGG } \end{aligned}$ | $\begin{aligned} & 94.5 \\ & 92.9 \end{aligned}$ | 1.7 |
|  |  |  | avg minimum maximm |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 93.7 \\ & 92.9 \\ & 94.5 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | CR <br> CR <br>  | $\begin{aligned} & 578-96-09 x \\ & 578-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { DV4S*525 } \\ & \text { DV4S*525 } \end{aligned}$ | UBNI <br> UBNI | $\begin{aligned} & \text { 29-AUG-96 } \\ & \text { 29-AUG-96 } \end{aligned}$ | $\begin{aligned} & \text { 26-SEP-96 } \\ & 26-\text { SEP-96 } \end{aligned}$ | $\begin{aligned} & 119 \\ & 118 \end{aligned}$ | $\begin{aligned} & 93.9 \\ & 90.2 \end{aligned}$ | $\begin{aligned} & 7.57 \text { UGG } \\ & 7.57 \text { UGG } \end{aligned}$ | $\begin{aligned} & 96.6 \\ & 93.6 \end{aligned}$ | 3.2 3.2 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 95.1 \\ & 93.6 \\ & 96.6 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \text { CU } \\ & \text { CU } \\ & \text { ********** } \end{aligned}$ | $\begin{aligned} & 578-96-09 x \\ & 578-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { DV4S*525 } \\ & \text { DV4S*525 } \end{aligned}$ | UBNI UBNI | $\begin{aligned} & 29-A U G-96 \\ & 29-A U G-96 \end{aligned}$ | $\begin{aligned} & \text { 26-SEP-96 } \\ & 26 \text {-SEP-96 } \end{aligned}$ | $\begin{aligned} & 59.6 \\ & 58.8 \end{aligned}$ | $\begin{aligned} & 47.9 \\ & 45.8 \end{aligned}$ | 5.47 UGG <br> 5.47 UGG | $\begin{aligned} & 98.4 \\ & 95.3 \end{aligned}$ | 3.1 |
|  |  |  | avg minimum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 96.9 \\ & 95.3 \end{aligned}$ |  |


| Contractor | Method Description | IRDMIS <br> Method <br> Code | Test Name | Appendix D-3 <br> Table: D-10 <br> FT. DEVENS DV4 1996 MS/MSD RESULTS |  |  |  |  |  |  | Value $<\quad$Original <br> Sample <br> Value Unit |  | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | IRDMIS <br> Site ID | IRDMIS Field Sample Nunber | Lab Number | Lot | Sample Date | Analysis Date | Spike Value |  |  |  |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 98.4 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | FE FE ********** avg minimum maximem | $\begin{aligned} & 578-96-09 x \\ & 578-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | DV4S*525 DV4S*525 |  | $\begin{aligned} & \text { 29-AUG- } \\ & \text { 29-AUG- } \end{aligned}$ | $\begin{aligned} & 5 \text { 26-SEP-96 } \\ & 526 \text { SEP-96 } \end{aligned}$ | $\begin{aligned} & 1190 \\ & 1180 \end{aligned}$ | $\begin{array}{r} 782 \\ 3.68 \end{array}$ | 6410 UGG 6410 UGG | 80.4 | $\begin{aligned} & 198.1 \\ & 198.1 \end{aligned}$ |
|  |  |  |  |  |  |  |  |  |  |  |  |  | 40.4 80.4 80 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \mathbf{K} \\ & \mathbf{K} \end{aligned}$ | $\begin{aligned} & 578-96-09 x \\ & 578-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | DV4S*525 DV4S*525 |  | $\begin{aligned} & \text { 29-AUG- } \\ & \text { 29-AUG- } \end{aligned}$ | $6 \text { 26-SEP-96 } 6 \text { 26-SEP-96 }$ | $\begin{aligned} & 5960 \\ & 5880 \end{aligned}$ | $\begin{aligned} & 4930 \\ & 4770 \end{aligned}$ | 521 UGG521 UGG | $\begin{gathered} 101.2 \\ 99.3 \end{gathered}$ | 1.9 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{array}{r} 100.3 \\ 99.3 \\ 101.2 \end{array}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \text { MG } \\ & \text { MG } \\ & * * * * * * * * * * \end{aligned}$ | $\begin{aligned} & 578-96-09 x \\ & 578-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | DV4S*525 DV4S*525 | UBNI UBNI | $\begin{aligned} & \text { 29-AUG-96 26-SEP-96 } \\ & \text { 29-AUG-96 26-SEP-96 } \end{aligned}$ |  | $\begin{aligned} & 5960 \\ & 5880 \end{aligned}$ | $\begin{aligned} & 4930 \\ & 4580 \end{aligned}$ | $\begin{aligned} & 1340 \text { UGG } \\ & 1340 \text { UGG } \end{aligned}$ | $\begin{gathered} 101.2 \\ 95.3 \end{gathered}$ | $\begin{aligned} & 6.0 \\ & 6.0 \end{aligned}$ |
|  |  |  | avg minimum maximum |  |  |  |  |  |  | $\begin{array}{r} 98.3 \\ 95.3 \\ 101.2 \end{array}$ |  |  |  |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \text { MN } \\ & \text { MN } \end{aligned}$ | $\begin{aligned} & 578-96-09 x \\ & 578-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | $\begin{aligned} & \text { DV4S }{ }^{\star 525} \\ & \cdot \text { DV4S*525 } \end{aligned}$ | UBNI <br> UBNI | $\begin{aligned} & \text { 29-AUG- } \\ & \text { 29-AUG- } \end{aligned}$ | $6 \text { 26-SEP-96 } 6 \text { 26-SEP-96 }$ |  | $\begin{aligned} & 59.6 \\ & 58.8 \end{aligned}$ | $\begin{aligned} & 42.7 \\ & 30.8 \end{aligned}$ | 65.2 UGG 65.2 UGG | $\begin{aligned} & 87.7 \\ & 64.1 \end{aligned}$ | $\begin{aligned} & 31.1 \\ & 31.1 \end{aligned}$ |
|  |  |  | avg minimum maximm |  |  |  |  |  |  |  |  |  | 75.9 64.1 87.7 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \mathrm{NA} \\ & \mathrm{NA} \end{aligned}$ | $\begin{aligned} & 578-96-09 x \\ & 578-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { BX570905 } \end{aligned}$ | DV4S*525 <br> DV4S*525 | $\begin{aligned} & \text { UBNI } \\ & \text { UBNI } \end{aligned}$ | $\begin{aligned} & \text { 29-AUG- } \\ & \text { 29-AUG- } \end{aligned}$ | $\begin{array}{ll} 6 & 26-\text { SEP-96 } \\ 6 \\ 26 \text {-SEP-96 } \end{array}$ | $\begin{aligned} & 5960 \\ & 5880 \end{aligned}$ | $\begin{aligned} & 4900 \\ & 4770 \end{aligned}$ | 505 UGG505 UGG | $\begin{gathered} 100.6 \\ 99.3 \end{gathered}$ | 1.3 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{array}{r} 100.0 \\ 99.3 \\ 100.6 \end{array}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \mathrm{NI} \\ & \mathrm{NI} \end{aligned}$ | $\begin{aligned} & 57 B-96-09 x \\ & 57 B-96-09 x \end{aligned}$ | $\begin{aligned} & \text { BX570905 } \\ & \text { XX570905 } \end{aligned}$ | DV4S*525 DV4S*525 | $\begin{aligned} & \text { UBNI } \\ & \text { UBNI } \end{aligned}$ | 29-AUG | $\begin{array}{ll} 6 & 26 \text {-SEP-96 } \\ 626 \text {-SEP-96 } \end{array}$ | $\begin{aligned} & 59.6 \\ & 58.8 \end{aligned}$ | 46.3 43.5 | $\begin{aligned} & \text { 7.3 UGG } \\ & 7.3 \text { UGG } \end{aligned}$ | $\begin{aligned} & 95.1 \\ & 90.6 \end{aligned}$ | 4.9 4.9 |







| Appendix D-3 <br> Table: D-10 <br> FT. DEVENS DV4 1996 MS/MSD RESULTS |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Contractor | Method Description | IRDMIS Method Code | Test Name |  IRDMIS <br> Field <br> IRDMIS Sample <br> Site ID Number | Lab Number |  | Sample Date | Analysis Date | Spike Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| $\begin{aligned} & A B B-E S \\ & A B B-E S \end{aligned}$ | total mitrogen/water/ TECH TOTAL NITROGEN/WATER/TECH | $\begin{aligned} & \text { TF26 } \\ & \text { TF26 } \end{aligned}$ | N2KJEL N2KJEL <br>  | 57M-95-03X MX5703×3$57 M-95-03 X$MX5703X3 | DV4W*537 <br> DV4W*537 | $\begin{aligned} & \text { SHOB } \\ & \text { SHOB } \end{aligned}$ | $\begin{aligned} & \text { 02-OCT- } \\ & \text { 02-OCT- } \end{aligned}$ | $\begin{aligned} & 28-\text { OCT-96 } \\ & 28-\text { OCT-96 } \end{aligned}$ | $\begin{aligned} & 4000 \\ & 4000 \end{aligned}$ | $\begin{aligned} & 4000 \\ & 4000 \end{aligned}$ | 324 UGL 324 UGL | 100.0 100.0 | . 0 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  | $\begin{aligned} & 100.0 \\ & 100.0 \\ & 100.0 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PHOSHATES/WATER/TECHNICON PHOSHATES/WATER/TECHNICON | $\begin{aligned} & \text { TF27 } \\ & \text { TF27 } \end{aligned}$ | $\begin{aligned} & \text { PO4 } \\ & \text { PO4 } \\ & \text { ********** } \end{aligned}$ | $\begin{aligned} & \text { 57M-95-03X MX5703X3 } \\ & 57 \mathrm{M}-95-03 X \operatorname{MX5703\times 3} \end{aligned}$ | DV4W*537 DV4W ${ }^{\star} 537$ | WHAC WHAC | $\begin{aligned} & \text { 02-OCT- } \\ & \text { 02-OCT- } \end{aligned}$ | $\begin{aligned} & 22-\text { Oct-96 } \\ & 22-0 C T-96 \end{aligned}$ | $\begin{aligned} & 400 \\ & 400 \end{aligned}$ | $\begin{aligned} & 427 \\ & 380 \end{aligned}$ | $\begin{aligned} & \text { 16.2 UGL } \\ & 16.2 \text { UGL } \end{aligned}$ | 106.8 95.0 | 11.6 11.6 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  | $\begin{array}{r} 100.9 \\ 95.0 \\ 106.8 \end{array}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UHO2 UHO2 | PCBO16 PCB016 ********** | 57M-95-03X M×5703×3 <br> 57M-95-03X MX5703×3 | DV4W*537 DV4W*537 | $\begin{aligned} & \text { SDOF } \\ & \text { SOQR } \end{aligned}$ | $\begin{aligned} & \text { 02-OCT- } \\ & \text { 02-OCT- } \end{aligned}$ | $\begin{aligned} & 13-\text { OCT-96 } \\ & \text { 13-OCT-96 } \end{aligned}$ | $\begin{aligned} & 3.75 \\ & 3.75 \end{aligned}$ | $\begin{aligned} & 4.25< \\ & 4.04< \end{aligned}$ | $\begin{aligned} & .16 \text { UGL } \\ & .16 \text { UGL } \end{aligned}$ | 113.3 | 5.1 5.1 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  | $\begin{aligned} & 110.5 \\ & 107.7 \\ & 13.3 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UHO2 } \\ & \text { UHO2 } \end{aligned}$ | $\begin{aligned} & \text { PCB260 } \\ & \text { PCB260 } \\ & \text { ********* } \end{aligned}$ | 57M-95-03X MX5703×3 57M-95-03X MX5703X3 | DV4W*537 <br> DV4W*537 | SDOF SDQF | $\begin{aligned} & \text { O2-OCT- } \\ & \text { 02-OCT- } \end{aligned}$ | $\begin{aligned} & 13-\text { OCT-96 } \\ & 13-\text { OCT-96 } \end{aligned}$ | $\begin{aligned} & 3.75 \\ & 3.75 \end{aligned}$ | $\begin{aligned} & 2.65< \\ & 2.23< \end{aligned}$ | $\begin{aligned} & .19 \text { UGL } \\ & .19 \text { UGL } \end{aligned}$ | $\begin{aligned} & 70.7 \\ & 59.5 \end{aligned}$ | 17.2 17.2 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  | 65.1 59.5 70.7 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | AENSLF <br> AENSLF <br> ********** | 57M-95-03X MX5703X3 57M-95-03X MX5703X3 | DV4W*537 TDBG 02-OCT-96 30-OCT-96 DV4W*537 TDBG 02-OCT-96 30-0CT-96 |  |  |  | $.5$ | $.383<$ | $\begin{aligned} & .023 \text { UGL } \\ & .023 \text { UGL } \end{aligned}$ | 76.6 76.4 | . 3 |
|  |  |  | avg minimum maximum |  |  |  |  |  | 76.5 76.4 76.6 |  |  |  |



| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | $\begin{aligned} & \text { IRDMIS } \\ & \text { Field } \\ & \text { Sample } \\ & \text { Number } \end{aligned}$ | Appendix D-3 <br> Table: D-10 <br> FT. DEVENS DV4 1996 MS/MSD RESULTS |  |  |  | Spike Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | Lab Number |  | Sample Date | Analysis Date |  |  |  |  |  |
|  |  |  | minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 66.4 \\ & 66.7 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | $\begin{aligned} & \operatorname{LIN} \\ & \text { LIN } \\ & \text { ink******* } \end{aligned}$ | 57M-95-03 $57 \mathrm{M}-95-0$ | $\begin{aligned} & M \times 5703 \times 3 \\ & M \times 5703 \times 3 \end{aligned}$ | DV4 ${ }^{*} \times 53$ DV4 |  | 02-OCT- | $\begin{aligned} & 30-0 C T-96 \\ & 30-0 C T-96 \end{aligned}$ | . 5 | $.185<$ $.18<$ | $\begin{aligned} & .0507 \text { UGL } \\ & .0507 \text { UGL } \end{aligned}$ | 37.0 36.0 | 2.7 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 36.5 \\ & 36.0 \\ & 37.0 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & A B B-E S \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | MEXCLR MEXCLR ********* | $\begin{aligned} & 57 M-95-1 \\ & 57 \mathrm{M}-95-\mathrm{C} \end{aligned}$ | $\begin{aligned} & 1 \times 5703 \times 3 \\ & M \times 5703 \times 3 \end{aligned}$ | DV4 ${ }^{\text {DV }}$ ¢ 53 | TDBG | 02-OCT- 02-OCT- | $\begin{aligned} & 30-\text { OCT-96 } \\ & 30-0 C T-96 \end{aligned}$ | 1 | . 8486 < | $\begin{aligned} & .057 \text { UGL } \\ & .057 \\ & \hline \end{aligned}$ | 84.6 82.9 | $\begin{aligned} & 2.0 \\ & 2.0 \end{aligned}$ |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 83.8 \\ & 82.9 \\ & 84.6 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | $\begin{aligned} & \text { PPDDT } \\ & \text { PPDDT } \end{aligned}$ | $\begin{aligned} & 57 M-95-1 \\ & 57 M-95-1 \end{aligned}$ | $\begin{aligned} & \text { MX5703x3 } \\ & 4 \times 5703 \times 3 \end{aligned}$ | $\begin{aligned} & \text { DV4W*53 } \\ & \text { DV4W*53 } \end{aligned}$ | $\begin{aligned} & \text { TDBG } \\ & \text { TDBG } \end{aligned}$ | 02-OCT- 02-0CT- | $\begin{aligned} & 30-\text { OCT-96 } \\ & 30-0 C T-96 \end{aligned}$ | . 5 | . $353<$ | . 034 UGL . 034 UGL | 70.6 69.6 | 1.4 |
|  |  |  | avg <br> minimum <br> maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 70.1 \\ & 69.6 \\ & 70.6 \end{aligned}$ |  |

## APPENDIX D-3 <br> Table D-11 <br> Elements with Matrix Spike Recoveries in Soil Outside USEPA Criteria <br> 1995 AOC 57 and 69W Remedial Investigation <br> Fort Devens, Massachusetts

| Elimment | Frequency of Recovery Outside USEPA CLP LiMITS | Recovery range |
| :---: | :---: | :---: |
| Mercury | 1/2 | 74.7 |
| Arsenic | 2/2 | 52.7-68.1 |
| Manganese | 1/2 | 64.1 |

## Appendix D-3

Table D-12
USEPA CLP Surrogate Recovery Criteria for SVOCS
1995 AOC 57 AND 69W Remedial Investigation
Fort Devens, Massachusetts

| Surrogate | PERCENT RECOVERY LIMITS FOR WATER | Percent recovery Limits FOR SOIL |
| :---: | :---: | :---: |
| 2-Fluorophenol | 21\% to 100\% | 25\% to 121\% |
| Phenol-D6 | 10\% to 94\% | 24\% to 113\% |
| 2,4,6-Tribromophenol | 10\% to 123\% | 19\% to 122\% |
| Nitrobenzene-D5 | 35\% to 114\% | 23\% to $120 \%$ |
| 2-Fluorobiphenyl | 43\% to 116\% | 30\% to 115\% |
| Terphenyl-D14 | $33 \%$ to $141 \%$ | 18\% to 137\% |




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 Contractor Method Description






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|  | ORGANICS／SOIL




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Contractor Method Description
Test
Name
SEMIVOLATILE SURROGATE RESULTS




| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | Field Sample Number | Lab Number | Lot | Sample Date | Analysis Date | Spike Value | Value Unit | Percent Recovery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | minimum maximum |  |  |  |  |  |  |  |  | $\begin{aligned} & 72.0 \\ & 94.0 \end{aligned}$ |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2FP | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0СТ-96 | 08-0CT-96 | 100 | 55 UGL | 55.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2FP | 57M-96-13X | M $\times 5713 \times 1$ | DV4W*307 | HDIM | 02-0СT-96 | 08-0CT-96 | 100 | 59 UGL | 59.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2FP | 57M-96-09X | M $\times 5709 \times 1$ | DV4W*533 | WDIM | 01-0СT-96 | 08-0CT-96 | 100 | 58 UGL | 58.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2FP | 57M-96-10X | M $\times 5710 \times 1$ | DV4W*534 | LDOM | 02-0СT-96 | 16-0CT-96 | 100 | 35 UGL | 35.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2FP | 57M-96-11X | MX5711×1 | DV4N*535 | LDIM | 02-0СT-96 | 08-0CT-96 | 100 | 45 UGL | 45.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2FP | G3M-92-07X | MXG307X3 | DV4W*536 | WDIM | 01-0СT-96 | 08-0СT-96 | 100 | 57 UGL | 57.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2FP | 57M-95-03X | MX5703x3 | DV4W*537 | WDIM | 02-0СT-96 | 09-OCT-96 | 100 | 51 UGL | 51.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | $\underset{* k * * * * * * * *}{2 F P}$ | SBK-96-540 | SBK96540 | DV4W*540 | WDDM | 03-SEP-96 | 13-SEP-96 | 100 | 53 UGL | 53.0 |
|  |  |  | avg |  |  |  |  |  |  |  |  | 51.6 |
|  |  |  | minimum |  |  |  |  |  |  |  |  | 35.0 |
|  |  |  |  |  |  |  |  |  |  |  |  | 59.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | NBD5 | 57N-96-11X | M05711x1 | DV4W*305 |  | 02-0СT-96 | 08-0CT-96 | 50 | 42 UGL | 84.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | NBD5 | 57M-96-13X | M×5713×1 | DV4W*307 | WDIM | 02-0СT-96 | 08-0CT-96 | 50 | 42 UGL | 84.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | NBD5 | 57M-96-09X | MX5709×1 | DV4Wぇ533 | WDIM | 01-0CT-96 | 08-0СT-96 | 50 | 43 UGL | 86.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | NBD5 | 57M-96-10X | M $\times 5710 \times 1$ | DV4W*534 | WDOH | 02-0CT-96 | 16-0CT-96 | 50 | 35 UGL | 70.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | NBD5 | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | WDIM | 02-0CT-96 | 08-0CT-96 | 50 | 33 UGL | 66.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | NBD5 | G3M-92-07X | MXG307X3 | DV4W*536 | WDIM | 01-0CT-96 | 08-0CT-96 | 50 | 39 UGL | 78.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | NBD5 | 57M-95-03X | MX5703×3 | DV4W*537 | WDIM | 02-0СT-96 | 09-0CT-96 | 50 | 36 UGL | 72.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | $\begin{aligned} & \text { NBD5 } \\ & * * * * * * * * * \end{aligned}$ | SBK-96-540 | S8K96540 | DV4W*540 | LDDM | 03-SEP-96 | 13-SEP-96 | 50 | 38 UGL | 76.0 |
|  |  |  | avg |  |  |  |  |  |  |  |  | 77.0 |
|  |  |  | minimum |  |  |  |  |  |  |  |  | 66.0 |
|  |  |  |  |  |  |  |  |  |  |  |  | 86.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | PHEND6 | 57M-96-11X | M05711x1 | DV4H*305 |  | 02-0CT-96 | 08-0CT-96 | 100 | 42 UGL | 42.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | PHEND6 | 57M-96-13X | M $\times 5713 \times 1$ | DV4W*307 | LDIM | 02-0CT-96 | 08-0CT-96 | 100 | 44 UGL | 44.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | PHEND6 | 57M-96-09X | MX5709X1 | DV4W*533 | WDIM | 01-0СT-96 | 08-0CT-96 | 100 | 42 UGL | 42.0 |
| ABB-ES | ORGANICS/HATER/GCMS | UM18 | PHEND6 | 57M-96-10X | MX5710x1 | DV4W*534 | WDM | 02-0СT-96 | 16-0СT-96 | 100 | 36 UGL | 36.0 |
| ABS-ES | ORGANICS/WATER/GCMS | UM18 | PHEND6 | 57M-96-11X | M $\times 5711 \times 1$ | DV4世*535 | WDIM | 02-0С1-96 | 08-0CT-96 | 100 | 36 UGL | 36.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | PHEND6 | G3M-92-07X | MXG307X3 | DV4W*536 | WDIM | 01-0CT-96 | 08-0CT-96 | 100 | 40 UGL | 40.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | PHEND6 | 57M-95-03X | MX5703x3 | DV4W*537 | WDIM | 02-0СT-96 | 09-OCT-96 | 100 | 36 UGL | 36.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UN18 | PHENDG <br> ********** | SBK-96-540 | SBK96540 | DV4W*540 | LDDM | 03-SEP-96 | 13-SEP-96 | 100 | 36 UGL | 36.0 |
|  |  |  | avg |  |  |  |  |  |  |  |  | 39.0 |웅우우ํ웅





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## APPENdIX D-3 <br> Table D-15 <br> USEPA CLP Surrogate Recovery Criteria for VOCS

1995 AOC 57 and 69W Remedial Investigation
Fort Devens, Massachusetts

| Surrogate | PERCENT RECOVERY LIMITS FOR WATER | Percent Recovery Limits for Soll |
| :---: | :---: | :---: |
| 1,2-Dichloroethane-D4 | 76\% to 114\% | 70\% to $121 \%$ |
| 4-Bromofluorobenzene | 86\% to $115 \%$ | 74\% to $121 \%$ |
| Toluene-D8 | 88\% to $110 \%$ | 81\% to $117 \%$ |

Appendix $D-3$
Table：D－16
DEVENS DV4 1996 DEVENS DV4
SURROGATE RECOVERIES $\underset{\text { PEST／PCB }}{\substack{\text { FT．} \\ \hline}}$ IRDMIS
Field Lab
Number
Lot
Date $\begin{array}{ll}\text { Analysis } & \begin{array}{l}\text { Spike } \\ \text { Date }\end{array} \\ \text { Value }\end{array}$



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| $\begin{array}{ll}\text { Method } \\ \text { Code } & \\ \text { Teat } \\ \text { Name }\end{array}$ |


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## avg $\substack{\text { minimum } \\ \text { maximum }}$ <br> O

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Contractor Method Description $\qquad$
PESTICIDES／SOIL／GCEC

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LH1O
LH10
LH10
LH10
LH10
LH1O
LH10

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## Appendix D-3

Table D-17
USEPA CLP Spike Precision Criteria for Pesticides

1995 AOC 57 and 69W Remedial Investigation
Fort Devens, Massachusetts

|  | RPD LIMITS FOR WATER |
| :---: | :---: |
| Lindane (gamma-BHC) | 15 |
| Heptachlor | 20 |
| Aldrin | 22 |
| Dieldrin | 18 |
| Endrin | 21 |
| 4,4-DDT | 27 |

Contractor Method Description


$$
\begin{aligned}
& \text { Table: D-18 } \\
& \text { FIELD DUPLICATE RESULTS } \\
& \text { FT. DEVENS DV4 } 1996
\end{aligned}
$$

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Number | Lab Number | Lot | Sample <br> Date | $\begin{aligned} & \text { Analysis } \\ & \text { Date } \end{aligned}$ | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | METALS/SOIL/CVAA | JB01 | HG | 578-96-11X | BX571110 | DV4S*529 | QHDH | 03-SEP-96 | 15-SEP-96 < | . 05 UGG | . 0 |
| ABB-ES | METALS/SOIL/CVAA | JB01 | HG | 578-96-11X | BD571110 | DV4S*539 | OHDH | 03-SEP-96 | 15-SEP-96 < | . 05 UGG | . 0 |
| ABB-ES | METALS/SOIL/GFAA | JD15 | SE | 578-96-11x | 8×571110 | DV4S*529 | MBCG | 03-SEP-96 | 24-SEP-96 < | . 25 UGG | . 0 |
| ABB-ES | METALS/SOIL/GFAA | JD15 | SE | 578-96-11X | BD571110 | DV4S*539 | MBCG | 03-SEP-96 | 24-SEP-96 < | . 25 UGG | . 0 |
| . ABB-ES | METALS/SOIL/GFAA | JD17 | PB | 578-96-11x | BX571110 | DV4S*529 | OBBG | 03-SEP-96 | 24-SEP-96 | 2.05 UGG | 7.1 |
| ABB-ES | METALS/SOIL/GFAA | JD17 | PB | 578-96-11X | BD571110 | DV4S*539 | OBBG | 03-SEP-96 | 24-SEP-96 | 1.91 UGG | 7.1 |
| ABB-ES | METALS/SOIL/GFAA | JD19 | AS | 578-96-11x | BD571110 | DV4S*539 | QBLG | 03-SEP-96 | 25-SEP-96 | 5.17 UGG | 7.4 |
| ABb-ES | METALS/SOIL/GFAA | JD19 | AS | 57B-96-11X | BX571110 | DV4S*529 | abLG | 03-SEP-96 | 25-SEP-96 | 4.8 UGG | 7.4 |
| ABB-ES | METALS/SOIL/FURNACE | JD24 | TL | 578-96-11X | BX571110 | DV4S*529 | RBSB | 03-SEP-96 | 24-SEP-96 < | . 5 UGG | . 0 |
| ABB-ES | METALS/SOIL/FURNACE | JD24 | TL | 57B-96-11X | BD571110 | DV4S*539 | RBSB | 03-SEP-96 | 24-SEP-96 < | . 5 UGG | . 0 |
| ABB-ES | METALS/SOIL/FURNACE | JD25 | SB | 578-96-11X | BX571110 | DV4S*529 | SBXB | 03-SEP-96 | 23-SEP-96 < | 1.09 UGG | . 0 |
| ABB-ES | METALS/SOIL/FURNACE | JD25 | SB | 578-96-11X | BD571110 | DV4S*539 | SBXB | 03-SEP-96 | 23-SEP-96 < | 1.09 UGG | . 0 |
| Abb-es | METALS/SOIL/ICP | JS16 | AG | 578-96-11x | BX571110 | DV4S*529 | UBNI | 03-SEP-96 | 26-SEP-96 < | . 589 UGG | . 0 |
| ABB-ES | METALS/SOIL/ICP | JS16 | AG | 578-96-11X | BD571110 | DV4S*539 | UBNI | 03-SEP-96 | 26-SEP-96 < | . 589 UGG | . 0 |
| ABb-es | METALS/SOIL/ICP | JS16 | AL | 578-96-11X | BX571110 | DV4S*529 | UBNI | 03-SEP-96 | 26-SEP-96 | 3940 UGG | 15.6 |
| AbB-ES | METALS/SOIL/ICP | JS16 | AL | 578-96-11X | BD571110 | DV4S*539 | UBNI | 03-SEP-96 | 26-SEP-96 | 3370 UGG | 15.6 |
| ABb-ES | METALS/SOIL/ICP | JS16 | BA | 578-96-11x | BX571110 | DV4S*529 | UBNI | 03-SEP-96 | 26-SEP-96 | 15.5 UGG | 16.0 |
| ABB-ES | METALS/SOIL/ICP | JS16 | BA | 578-96-11X | BD571110 | DV4S*539 | UBNI | 03-SEP-96 | 26-SEP-96 | 13.2 UGG | 16.0 |

Appendix D-3
Table: $0-18$
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

Appendix D-3
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

Table: $0-18$
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> site ID | IRDMIS <br> Field Sample Nunber | Lab <br> Number | Lot | Sample Date | Analysis Date | $<$ | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH10 | TXPHEN | 57B-96-11X | BD571110 | DV4S*539 | UFRF | 03-SEP-96 | 11-0CT-96 | < | . 444 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH10 | TXPHEN | 578-96-11X | BX571110 | DV4S*529 | UFRF | 03-SEP-96 | 11-0СT-96 | < | . 444 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB016 | 57B-96-11X | BX571110 | DV4S*529 | NGKH | 03-SEP-96 | 10-0CT-96 | < | . 0666 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB016 | 57B-96-11X | BD571110 | DV4S*539 | NGKH | 03-SEP-96 | 10-0СТ-96 | < | . 0666 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB221 | 57B-96-11X | BD571110 | DV4S*539 | NGKH | 03-SEP-96 | 10-OCT-96 | < | . 082 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB221 | 57B-96-11X | BX571110 | DV4S*529 | NGKH | 03-SEP-96 | 10-0СT-96 | < | . 082 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB232 | 57B-96-11X | BX571110 | DV4S*529 | NGKH | 03-SEP-96 | 10-0CT-96 | < | . 082 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB232 | 57B-96-11X | BD571110 | DV4S*539 | NGKH | 03-SEP-96 | 10-0СT-96 | < | . 082 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB242 | 57B-96-11X | BD571110 | DV4S*539 | NGKH | 03-SEP-96 | 10-0CT-96 | < | . 082 UGG | -0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB242 | 578-96-11X | BX571110 | DV4S*529 | NGKH | 03-SEP-96 | 10-0СT-96 | < | . 082 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB248 | $578-96-11 X$ $578-96-11$ | BD571110 | DV4S*539 | NGKH | 03-SEP-96 | 10-0СT-96 10-0СT-96 | < | $\begin{aligned} & .082 \text { UGG } \\ & .082 \text { UGG } \end{aligned}$ | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB248 | 57B-96-11X | BX571110 | DV4S*529 | NGKH | 03-SEP-96 | 10-0СT-96 |  | . 082 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB254 | 57B-96-11X | BD571110 | DV4S*539 | NGKH | 03-SEP-96 | 10-0СT-96 | < | $.082 \text { UGG }$ | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB254 | 57B-96-11X | BX571110 | DV4S*529 | NGKH | 03-SEP-96 | 10-0СT-96 | < | . 082 UGG | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | LH16 | PCB260 | 578-96-11X | BD571110 | DV4S*539 | NGKH | 03-SEP-96 | 10-0CT-96 | < | $.0804 \text { UGG }$ | . 0 |
| ABB-ES | PESTICIDES/SOIL/GCEC | L.H16 | PCB260 | 57B-96-11X | BX571110 | DV4S*529 | NGKH | 03-SEP-96 | 10-0СТ-96 | < | . 0804 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 124 TCB | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 |  | . 04 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 124TCB | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 04 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCNS | LM18 | 12 CLLB | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | , | . 11 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 12 DCLB | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 11 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 130 CLB | $57 \mathrm{~B}-96-11 \mathrm{X}$ $57 \mathrm{~B}-96-11 \mathrm{x}$ | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | $.13 \text { UGG }$ | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 13DCLB | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | $<$ | . 13 UGG | . 0 |

Appendix D-3
Table: D-18
FIELDD DUPLCATE RESULTS
FT. DEVENS DV4 1996

| Contractor | Method Description | IRDMIS <br> Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Number | Lab Number | Lot | Sample Date | Analysis Date | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | 14DCLB | 57B-96-11x | 8x571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 098 UGG | . 0 |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | 140CLB | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 098 UGG | . 0 |
| Abb-ES | ORGANICS/SOIL/GCMS | LM18 | 245TCP | 57B-96-11X | Bx571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 1 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 245 TCP | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 1 UGG | . 0 |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | 246TCP | 578-96-11X | Bx57110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 17 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 246TCP | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 17 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DCLP | 578-96-11X | BD57110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 18 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DCLP | 578-96-11x | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 18 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DMPN | 57B-96-11X | BD57110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 69 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24 DMPN | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 69 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DNP | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP- | 23-SEP-96 < | 1.2 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DNP | 578-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | 1.2 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DNT | 57B-96-11X | BD57110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 14 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DNT | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 14 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 260NT | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 085 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 260NT | 578-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 085 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2 CLP | 57B-96-11x | 8 S 71110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 06 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2 CLP | 57B-96-11X | 8X571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 06 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2CNAP | 578-96-11x | 80571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 036 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2CNAP | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 036 UGG | . 0 |
| Abb-ES | ORGANICS/SOIL/GCMS | LM18 | 2MNAP | 578-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 049 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24NAP | 578-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 049 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2MP | 57B-96-11x | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < | . 029 UGG | . 0 |

Appendix $D-3$
FIELD DUPLLCATE RESULTS

FT. DEVENS DV4 1996. | IRDMIS |
| :---: |
| Field |

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | Field Sample Nunber | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | Sample Date | Analysis Date |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2MP | 578-96-11X | BX571110 | DV4S*529 | OEXK | 03 | -SEP |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2NANIL | 578-96-11x | BD571110 | DV4S |  | 03 | < |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | 2NANIL | 578-96-11X | BX571110 | DV4S*529 |  | 03-SEP | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2NP | 578-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP | < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2NP | 578-96-11X | BX571110 | DV4S*529 |  | 03-SEP-9 | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 33DCBD | 578-96-11x | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 33DCBD | 578-96-11X | Bx571110 | DV4S*529 |  | 03-SEP-9 | 3-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 3NANIL | 57B-96-11X | BD571110 | DV4S*539 | oexk | 03-SEP-96 | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 3NANIL | 578-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 460N2C | 57B-96-11x | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 460N2C | 578-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-9 | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4BRPPE | 578-96-11 | BD571110 | DV4S*539 | OEXK | 03-SEP-9 | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | L.M18 | 4BRPPE | 578-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4 CANIL | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP- | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4CANIL | 57B-96-11X | BX571110 | DV4S*529 |  | 03-SEP-9 | 23-SEP-96 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4CL3C | 578-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-9 | 23-SEP-96 < |
| AB8-ES | ORGANICS/SOIL/GCMS | LM18 | 4CL3C | 57B-96-11X | Bx571110 | DV4S*529 |  | 03-SEP-96 | 23-SEP-96 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4CLPPE | 578-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 < |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | 4CLPPE | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4 MP | 57B-96-11x | 80571110 | DV4S*539 |  | 03-SEP-96 | 23-SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4MP | 578-96-11X | Bx571110 | DV4S*529 |  | 03-SEP-96 | 23-SEP-96 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4NANIL | 578-96-11x | BD571110 | DV4S*539 |  | 03-SEP | SEP-96 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4NANIL | 578-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-9 | 23-SEP-96 |

Appendix D-3
FIELD DUPLICATE RESULTS

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site 10 | IRDMIS <br> field Sample Number | Lab Number | Lot | Sample Date | Analysis Date | $<$ | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4NP | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | 1.4 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 4NP | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | $<$ | 1.4 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | ANAPNE | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 036 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | ANAPNE | 57B-96-11X | BX571110 | DV4S*529 | DEXK | 03-SEP-96 | 23-SEP-96 | $<$ | . 036 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | ANAPYL | 578-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 033 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | ANAPYL | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 033 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCNS | LM18 | ANTRC | 578-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 033 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | ANTRC | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 033 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | B2CEXM | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 059 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | B2CEXM | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | $<$ | . 059 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | B2CIPE | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 2 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | B2CIPE | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 2 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | B2CLEE | 57B-96-11X | 80571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 033 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | B2CLEE | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 033 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | B2EHP | 578-96-11x | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 62 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | B2EHP | 578-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | $<$ | . 62 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | BAANTR | 57B-96-11X | B0571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 17 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | BAANTR | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 17 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | BAPYR | 57B-96-11X | B0571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 25 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | BAPYR | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 25 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | BBFANT | 57B-96-11X | BD571110 | DV4S*539 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 21 UGG | . 0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | BBFANT | 57B-96-11X | BX571110 | DV4S*529 | OEXK | 03-SEP-96 | 23-SEP-96 | < | . 21 UGG | . 0 |
| ABB-ES ABB-ES | ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS | LM18 LM18 | BBZP BBZP | 57B-96-11X $578-96-11 X$ | BD571110 BX571110 | DV4S*539 DV4S*529 | OEXK | $03-$ SEP-96 03-SEP-96 | 23-SEP-96 23-SEP-96 | < | .17 UGG .17 UGG | . 0 |

Appendix D-3
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

Appendix D-3
Table: D-18
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996


Appendix D-3
Table: D-18
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS <br> Field Sample Number | Lab Number | Lot | Sample Date | Analysis Date | < | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | CHBR 3 | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0069 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | CHBR3 | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0069 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | CHCL3 | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 00087 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | CHCL3 | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 00087 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCNS | LM19 | CLC6H5 | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 00086 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCNS | LM19 | CLC6H5 | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 00086 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCNS | LM19 | CS2 | 578-96-11x | B0571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0044 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | CS2 | 578-96-11x | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0044 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCNS | LM19 | DBRCLM | 57B-96-11x | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0031 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | DBRCLM | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0031 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | ETC6H5 | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0017 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | ETC6H5 | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0017 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | MEC6H5 | 57B-96-11X | $8 \times 571110$ | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 |  | . 0018 UGG | 79.1 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | MEC6H5 | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 00078 UGG | 79.1 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | MEK | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 07 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | MEK | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 07 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | MIBK | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 027 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | MIBK | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 027 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | MNBK | 578-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 032 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | MNBK | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 032 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | STYR | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | $.0026 \text { UGG }$ | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | STYR | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0026 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | T13DCP | 578-96-11X | B0571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0028 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | T13DCP | 578-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0028 UGG | . 0 |

Appendix D-3
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS site 10 | IRDMIS <br> Field Sarmle Number | Lab Number | Lot | Sample Date | Analysis Date | < | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | tclea | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0024 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | TCLEA | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0024 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | TCLEE | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 00081 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | TCLEE | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 00081 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | TCLTFE | 578-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 |  | . 012 UGG | 29.7 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | TCLTFE | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 |  | . 0089 UGG | 29.7 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | TRCLE | 578-96-11x | B0571110 | DV45*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0028 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | TRCLE | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0028 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | XYLEN | 57B-96-11X | BD571110 | DV4S*539 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0015 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | XYLEN | 57B-96-11X | BX571110 | DV4S*529 | YGRK | 03-SEP-96 | 11-SEP-96 | < | . 0015 UGG | . 0 |
| ABB-ES | METALS/WATER/CVAA | S801 | HG | 57M-96-11X | M05711x1 | DV4W*305 | QJRF | 02-DCT-96 | 22-0CT-96 | < | . 243 UGL | . 0 |
| ABB-ES | METALS/WATER/CVAA | SB01 | HG | 57M-96-11X | MX5711X1 | DV4W*535 | QJRF | 02-0CT-96 | 22-0CT-96 | < | . 243 UGL | . 0 |
| ABB-ES | METALS/WATER/GFAA | SD09 | TL | 57M-96-11X | M05711x 1 | DV4W*305 | UCGG | 02-0CT-96 | 29-0CT-96 | $<$ | 6.99 UGL | . 0 |
| ABS-ES | METALS/WATER/GFAA | SD09 | TL | 57M-96-11X | MX5711X1 | DV4W*535 | UCGG | 02-0CT-96 | 29-0СT-96 | $<$ | 6.99 UGL | .0 |
| ABB-ES | METALS/WATER/GFAA | SD20 | PB | 57M-96-11x | MD5711X 1 | DV4W*305 | WCVH | 02-0СT-96 | 29-OCT-96 | < | 1:26 UGL | . 0 |
| ABB-ES | METALS/WATER/GFAA | SD20 | PB | 57M-96-11X | MX5711X1 | DV4W*535 | WCVH | 02-0СT-96 | 29-0CT-96 | < | 1.26 UGL | . 0 |
| ABB-ES | METALS/WATER/GFAA | SD21 | SE | 57M-96-11X | MD5711x1 | DV4W*305 | XCLH | 02-0CT-96 | 02-NOV-96 | < | 3.02 UGL | . 0 |
| ABB-ES | METALS/WATER/GFAA | S021 | SE | 57M-96-11X | M $\times 5711 \times 1$ | DV4**535 | XCLH | 02-0CT-96 | 02-NOV-96 | < | 3.02 UGL | . 0 |
| ABB-ES | METALS/WATER/GFAA | S022 | AS | 57M-96-11X | M05711x1 | DV4W*305 | YCOH | 02-0CT-96 | 02-NOV-96 |  | 170 UGL | . 0 |
| ABB-ES | METALS/WATER/GFAA | S022 | AS | 57M-96-11X | MX5711×1 | DV4W*535 | YCQH | 02-0Ст-96 | 02-NOV-96 |  | 170 UGL. | . 0 |

METALS/HATER/GFAA

 METALS/WATER/ICP
METALS/WATER/ICP
METLS/LATER/ICP
 METALS/WATER/ICP
METALS/WATER/ICP
METALS/HATER/ICP
METALS/WATER/ICP METALS/HATER/ICP METALS/WATER/ICP METALS/HATER/ICP METALS/WATER/ICP
METALS/WATER/ICP METALS/WATER/ICP
METALS/WATER/ICP METALS/WATER/ICP
METALS/WATER/ICP

Appendix D-3
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

| Contractor | Nethod Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS <br> Field <br> Sample <br> Number | Lab Number | Lot | Sample Date | Analysis <br> Date | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | METALS/WATER/ICP | SS18 | K | 57M-96-11X | MD5711X1 | DV4W*305 | OCDE | 02-0CT-96 | 23-0CT-96 | 1920 UGL | 13.3 |
| ABB-ES | METALS/WATER/ICP | SS18 | K | 57M-96-11X | MX5711x1 | DV4W*535 | OGDE | 02-0CT-96 | 23-0СT-96 | 1680 UGL | 13.3 |
| ABB-ES | METALS/WATER/ICP | SS18 | MG | 57M-96-11x | M $\times 5711 \times 1$ | DV4Wネ535 | OCDE | 02-0CT-96 | 23-0CT-96 | 1190 UGL | - 0 |
| ABB-ES | METALS/WATER/ICP | SS18 | MG | 57M-96-11X | MD5711x1 | DV4W*305 | OGDE | 02-0СТ-96 | 23-0CT-96 | 1190 UGL | . 0 |
| ABB-ES | METALS/WATER/ICP | SS18 | MN | 57M-96-11X | MD5711x1 | DV4W*305 | OGDE | 02-0CT-96 | 23-0СT-96 | 2100 UGL | 5.4 |
| ABB-ES | METALS/WATER/ICP | SS18 | MN | 57M-96-11X | MX5711x1 | DV4Wえ535 | OGDE | 02-0CT-96 | 23-0СТ-96 | 1990 UGL. | 5.4 |
| ABB-ES | METALS/WATER/ICP | SS18 | NA | 57M-96-11X | M05711x1 | DV4W*305 | OCDE | 02-0CT-96 | 23-0CT-96 | 4050 UGL | 1.5 |
| ABB-ES | METALS/WATER/ICP | SS18 | NA | 57M-96-11X | MX5711X1 | DV4W*535 | OGDE | 02-0СТ-96 | 23-0СТ-96 | 3990 UGL | 1.5 |
| ABB-ES | METALS/WATER/ICP | SS18 | NI | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | OCDE | 02-0CT-96 | 23-DCT-96 < | 7.11 UGL | . 0 |
| ABB-ES | METALS/WATER/ICP | SS18 | NI | 57M-96-11X | MD5711X1 | DV4W*305 | OGDE | 02-0СТ-96 | 23-0СT-96 < | 7.11 UGL | . 0 |
| ABB-ES | METALS/WATER/ICP | SS18 | $V$ | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | OCDE | 02-0CT-96 | 23-0CT-96 < | 4.69 UGL | . 0 |
| ABB-ES | METALS/WATER/ICP | SS18 | $V$ | 57M-96-11X | MD5711x1 | DV4W*305 | OGDE | 02-0СТ-96 | 23-0CT-96 < | 4.69 UGL | . 0 |
| ABB-ES | METALS/WATER/ICP | SS18 | 2N | 57M-96-11X | M $\times 5711 \times 1$ | DV4W\#535 | OCDE | 02-0CT-96 | 23-OCT-96< | 35.8 UGL | . 0 |
| ABB-ES | METALS/WATER/ICP | SS18 | 2N | 57M-96-11X | MD5711X1 | DV4W*305 | OCDE | 02-0СT-96 | 23-0CT-96 < | 35.8 UGL | . 0 |
| ABB-ES | TOTAL NITROGEN/WATER/TECH | TF26 | N2KJEL | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | SHOB | 02-0CT-96 | 28-0CT-96 | 448 UGL | 13.8 |
| ABB-ES | TOTAL NITROGEN/WATER/TECH | TF26 | N2KJEL | 57M-96-11X | MD5711x1 | DV4W*305 | SHOB | 02-0СT-96 | 28-0СT-96 | 390 UGL | 13.8 |
| ABB-ES | TOTAL NITROGEN/WATER/TECH | TF26 | N2KJEL | ZWN-96-19X | MDZW19X1 | DV4W*304 | SHOB | 30-SEP-96 | 28-0CT-96 < | 183 UGL | . 0 |
| ABB-ES | TOTAL NITROGEN/WATER/TECH | TF26 | N2KJEL | ZHN-96-19X | MXZW19x1 | DV4W*510 | SHOB | 30-SEP-96 | 28-0CT-96 < | 183 UGL | . 0 |
| ABB-ES | PHOSHATES/WATER/TECHNICON | TF27 | PO4 | 57M-96-11X | MD5711×1 | DV4W*305 | LHAC | 02-0CT-96 | 22-0СT-96 | 70.8 UGL | 7.6 |
| ABB-ES | PHOSHATES/WATER/TECHNICON | TF27 | $\mathrm{PO}_{4}$ | 57M-96-11X | MX5711x1 | DV4W*535 | WHAC | 02-0CT-96 | 22-0СT-96 | 65.6 UGL | 7.6 |
| ABB-ES | PHOSHATES/WATER/TECHNICON | TF27 | PO4 | 2WM-96-19x | MXZW19X1 | DV4W*510 | LHAC | 30-SEP-96 | 22-0СT-96 | 19.8 UGL | 6.3 |
| ABB-ES | PHOSHATES/WATER/TECHNICON | TF27 | PO4 | ZWM-96-19X | MDZW19X1 | DV4W*304 | LHAC | 30-SEP-96 | 22-0СT-96 | 18.6 UGL | 6.3 |

Appendix $D-3$
Table: D-18
FIELD DUPLCATE RESULTS
FT. DEVENS DV4 1996

| Contractor | Method Description | IRDMIS <br> Method Code | Test Name | IRDMIS <br> site ID | IRDMIS <br> Field <br> Sample <br> Number | Lab <br> Number | Lot | Sample Date | Analysis Date | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB016 | 57M-96-11X | MD5711x1 | DV4W*305 | SDaF | 02-0CT-96 | 13-0CT-96 < | . 16 UGL | - 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB016 | 57M-96-11X | MX5711x1 | DV4W*535 | SOQF | 02-0СT-96 | 14-0СТ-96 < | . 16 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB221 | 57M-96-11X | M05711x1 | DV4W*305 | SOQF | 02-0CT-96 | 13-0СT-96 < | . 16 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB221 | 57M-96-11X | MX5711x1 | DV4W*535 | SOQF | 02-0CT-96 | 14-0СТ-96 < | . 16 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB232 | 57M-96-11X | MX5711×1 | DV4W*535 | SDaF | 02-0CT-96 | 14-0СТ-96 < | . 16 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB232 | 57M-96-11X | MD5711x1 | DV4W*305 | SOQF | 02-0CT-96 | 13-0СТ-96 < | . 16 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB242 | 57M-96-11X | MX5711X1 | DV4W*535 | SDQF | 02-0CT-96 | 14-OCT-96 < | . 19 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB242 | 57M-96-11X | MD5711x1 | DV4W*305 | SDQF | 02-0СT-96 | 13-0СТ-96 < | . 19 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB248 | 57M-96-11X | M $\times 5711 \times 1$ | DV4 ${ }^{\star} \times 535$ | SOAF | 02-0ct-96 | 14-OCT-96 < | . 19 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB248 | 57M-96-11X | MD5711x1 | DV4W*305 | SOQF | 02-0CT-96 | 13-0СТ-96 < | . 19 UGL | . 0 |
| ABS-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB254 | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | SDQF | 02-0CT-96 | 14-OCT-96 < | . 19 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB254 | 57M-96-11X | MD5711x1 | DV4W*305 | SDQF | 02-0СТ-96 | 13-0СТ-96 < | . 19 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB260 | 57M-96-11X | MD5711x1 | DV4 ${ }^{*} \times 305$ | SDQF | 02-0СT-96 | 13-ОСТ-96 < | . 19 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UHO2 | PCB260 | 57M-96-11X | MX5711x1 | DV4W*535 | SDQF | 02-0СT-96 | 14-OCT-96 < | . 19 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ABHC | 57M-96-11X | MD5711×1 | DV4W*305 | TDBG | 02-0CT-96 | 31-OCT-96< | . 0385 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ABHC | 57M-96-11X | MX5711×1 | DV4W*535 | TDBG | 02-0CT-96 | 31-0СТ-96 < | . 0385 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ACLDAN | 57M-96-11X | MX5711×1 | DV4W*535 | TDBG | 02-0CT-96 | 31-OCT-96< | . 075 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ACLDAN | 57M-96-11X | MD5711X1 | DV4W*305 | TDBG | 02-0CT-96 | 31-OCT-96 < | . 075 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | AENSLF | 57M-96-11x | MD5711x1 | DV4W*305 | TDBG | 02-0CT-96 | 31-OCT-96< | . 023 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | AENSLF | 57M-96-11X | MX5711X1 | DV4W*535 | TDBG | 02-0CT-96 | 31-0СТ-96 < | . 023 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ALDRN | 57M-96-11X | MX5711X1 | DV4W*535 | TDBG | 02-0CT-96 | 31-OCT-96< | . 0918 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ALDRN | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-0СT-96 | 31-0СТ-96 < | . 0918 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | BBHC | 57M-96-11X | MX5711×1 | DV4W*535 | TDBG | 02-0СТ-96 | 31-DСТ-96 < | . 024 UGL | . 0 |

Appendix $\mathrm{D}-3$
Table: $\mathrm{D}-18$
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS <br> Field Sample Number | Lab Nunber | Lot | Sample Date | Analysis Date | < | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | BBHC | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-0CT-96 | 31-0CT-96 | < | . 024 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC. | UH13 | BENSLF | 57M-96-11X | MX5711×1 | DV4W*535 | TDBG | 02-0СT-96 | 31-0CT-96 | < | . 023 UGL | . 0 |
| ABS-ES | PESTICIDES/WATER/GCEC | UH13 | BENSLF | 57M-96-11X | M05711x1 | DV4W*305 | TDBG | 02-0CT-96 | 31-0CT-96 | < | . 023 UGL | . 0 |
| ABB-ES | PESTICIDES/HATER/GCEC | UH13 | DBHC | 57M-96-11X | mX5711×1 | DV4 ${ }^{\star}$ 535 | TDBG | 02-0CT-96 | 31-OCT-96 | < | . 0293 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DBHC | 57M-96-11X | MD5711X1 | DV4W*305 | TDBG | 02-0СT-96 | 31-0CT-96 | < | . 0293 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | MX5711x1 | DV4 ${ }^{\text {* }} 535$ | TDBG | 02-0CT-96 | 31-0СT-96 | < | . 024 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | HD5711x1 | DV4W*305 | TDBG | 02-0СT-96 | 31-0CT-96 | < | . 024 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ENDRN | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | TOBG | 02-0CT-96 | 31-0CT-96 | < | . 0238 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ENDRN | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-0СT-96 | 31-0СT-96 | < | . 0238 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ENDRNA | 57M-96-11X | MX5711×1 | DV4W*535 | TDBG | 02-OCT-96 | 31-OCT-96 | < | . 0285 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ENDRNA | 57M-96-11X | HD5711x1 | DV4W*305 | TDBG | 02-0СT-96 | 31-0CT-96 | < | . 0285 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ENDRNK | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | TDBG | 02-0CT-96 | 31-OCT-96 | < | . 0285 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ENDRNK | 57M-96-11X | MD5711x | DV4N*305 | TDBG | 02-0CT-96 | 31-0CT-96 | < | . 0285 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ESFSO4 | 57M-96-11X | M $\times 5711 \times 1$ | DV4 ${ }^{\text {\# }} 535$ | TDBG | 02-0СT-96 | 31-OCT-96 | < | . 0786 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ESFSO4 | 57M-96-11X | MD5711X1 | DV4N*305 | TDBG | 02-0СT-96 | 31-0СT-96 | < | . 0786 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | GCLDAN | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | TDBG | 02-OCT-96 | 31-OCT-96 | < | . 075 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | GCLDAN | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-0CT-96 | 31-OCT-96 | < | . 075 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | HPCL | 57M-96-11X | MX5711×1 | DV4 ${ }^{\star}$ 535 | TDBG | 02-OCT-96 | 31-0CT-96 | < | . 0423 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | HPCL | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-0СT-96 | 31-OCT-96 | < | . 0423 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | HPCLE | 57M-96-11X | MX571181 | DV4 ${ }^{\star}$ 535 | TDBG | 02-0CT-96 | 31-OCT-96 | < | . 0245 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | HPCLE | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-0СT-96 | 31-0CT-96 | < | . 0245 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ISCDR | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | TDBG | 02-OCT-96 | 31-0СT-96 | < | . 0562 UGL. | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | ISORR | 57M-96-11X | MD5711x 1 | DV4W*305 | TDBG | 02-0CT-96 | 31-0СT-96 | < | . 0562 UGL | . 0 |

FIELD DubLe: D-18 RESULTS
FT. DEVENS DV4 1996

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Number | Lab Number | Lot | Sample Date | Analysis Date | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | LIN | 57M-96-11X | MX5711x1 | DV4W*535 | TDBG | 02-0ct-96 | 31-0Ст-96 < | . 0507 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | LIN | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-0CT-96 | 31-0СТ-96 < | . 0507 UGL | . 0 |
| ABB-ES | PESticIdes/WATER/GCEC | UH13 | MEXCLR | 57M-96-11X | M $\times$ 5711x1 | DV4W*535 | tDBG | 02-OCT-96 | 31-OCT-96 < | . 057 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | MEXCLR | 57M-96-11X | MD5711X1 | DV4W*305 | TDBG | 02-OCT-96 | 31-0СT-96 < | . 057 UGL | . 0 |
| ABB-ES | PESticides/UATER/GCEC | UH13 | PPDDD | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | TDBG | 02-0CT- | 31-OCT-96 < | . 0233 UGL | . 0 |
| ABB-ES | PESTICIDES/HATER/GCEC | UH13 | PPDDD | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-OCT-96 | 31-0CT-96 < | . 0233 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | PPDDE | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | TDBG | 02-OCT-96 | 31-OCT-96 < | . 027 UGL | . 0 |
| ABB-ES | PESTICIDES/LATER/GCEC | UH13 | PPDDE | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-0CT-96 | 31-0СT-96 < | . 027 UGL | . 0 |
| ABB-ES | PEsticides/Water/gcec | UH13 | PPDDT | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | TDBG | 02-0CT-96 | 31-OCT-96 < | . 034 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | PPDDT | 57M-96-11X | MD5711x1 | DV4W^305 | TDBG | 02-0CT-96 | 31-0CT-96 < | . 034 UGL | . 0 |
| ABB-ES | PESTICIDES/HATER/GCEC | UH13 | TXPHEN | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | TDBG | 02-0CT-96 | 31-OCT-96 < | 1.35 UGL | . 0 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | TXPHEN | 57M-96-11X | MD5711x1 | DV4W*305 | TDBG | 02-OCT-96 | 31-0CT-96 < | 1.35 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 123 MM | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0CT-96 | 08-0СT-96 | 8 UGL | 46.2 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 123 TMB | 57M-96-11X | MX5711x1 | DV4W*535 | LDIM | 02-0CT-96 | 08-0CT-96 | 5 UGL | 46.2 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 124 TCB | 57M-96-11X | MX5711x1 | DV4W*535 | hDIM | 02-0CT-96 | 08-0СT-96 < | 1.8 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 124TCB | 57M-96-11X | MD5711x1 | DV4W*305 | LDIM | 02-0CT-96 | 08-0СТ-96 < | 1.8 UGL | . 0 |
| ABB-ES | ORGANICS/HATER/GCMS | UM18 | 120CLB | 57M-96-11X | MD5711x1 | DV4W*305 | hDIM | 02-0ct-96 | 08-0CT-96 | 3.4 UGL | 26.7 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 12 CLLB | 57M-96-11X | MX5711x1 | DV4W*535 | WDIM | 02-0CT-96 | 08-0СT-96 | 2.6 UGL | 26.7 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 13DCLB | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | WDIM | 02-OCT-96 | 08-OCT-96 < | 1.7 UGL | . 0 |
| ABb-ES | ORGANICS/WATER/GCMS | UM18 | 13DCLB | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0CT-96 | 08-0.5-96 < | 1.7 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 14DCLB | 57M-96-11X | M $\times 5711 \times 1$ | DV4W*535 | LDIM | 02-0CT-96 | 08-0CT-96 < | 1.7 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 14DCLB | 57M-96-11X | MD5711x1 | DV4W*305 | W0 | 02-0ct-96 | 08-0СT-96 < | 1.7 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 245 TCP | 57M-96-11X | MX5711X1 | DV4W*535 | LDIM | 02-0CT-96 | 08-0CT-96 < | 5.2 UGL | . 0 |

FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS <br> Field <br> Sample <br> Number | Lab Number | Lot | Sample Date | Analysis Date | $<$ | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 245TCP | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0СT-96 | 08-0CT-96 | < | 5.2 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 246TCP | 57M-96-11X | MX5711X1 | DV4W*535 | LDIM | 02-0Ст-96 | 08-0Ст-96 | < | 4.2 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | $246 T C P$ | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0CT-96 | 08-0СT-96 | < | 4.2 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 24DCLP | 57M-96-11X | MX5711x1 | DV4W*535 | WDIM | 02-0СT-96 | 08-0CT-96 | < | 2.9 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 24DCLP | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0СT-96 | 08-0СТ-96 | < | 2.9 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UN18 | 24DHPN | 57M-96-11X | MX5711x1 | DV4W*535 | LDIM | 02-0Ст-96 | 08-0СТ-96 | < | 5.8 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 24DMPN | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0СT-96 | 08-0СТ-96 | < | 5.8 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 240NP | 57M-96-11X | MX5711x1 | DV4W*535 | LDIM | 02-0CT-96 | 08-0СT-96 | < | 21 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 24DNP | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0СT-96 | 08-DCT-96 | < | 21 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 24DNT | 57M-96-11X | MX5711x1 | DV4W*535 | LDIM | 02-0СT-96 | 08-0СT-96 | < | 4.5 UCL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 24DNT | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0CT-96 | 08-0CT-96 | < | 4.5 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 260NT | 57M-96-11X | MX5711x1 | DV4W*535 | WDIM | 02-0СT-96 | 08-0CT-96 | < | . 79 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 260NT | 57M-96-11X | MD5711x1 | DV4W*305 | LDIM | 02-0CT-96 | 08-0СT-96 | < | . 79 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UN18 | 2CLP | 57M-96-11X | MX5711x1 | DV4W*535 | WDIM | 02-0СT-96 | 08-0СT-96 | < | . 99 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2CLP | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0СТ-96 | 08-0СT-96 | < | . 99 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2CNAP | 57M-96-11X | MX5711x1 | DV4W*535 | WDIM | 02-0СT-96 | 08-0CT-96 | < | . 5 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | LM18 | 2CNAP | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0СT-96 | 08-0CT-96 | $<$ | . 5 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2MNAP | 57M-96-11X | MX5711x1 | DV4W*535 | WDIM | 02-0CT-96 | 08-0CT-96 | < | 1.7 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | ZMNAP | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0СТ-96 | 08-0CT-96 | < | 1.7 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2 MP | 57M-96-11X | MX5711×1 | DV4W*535 | WDIM | 02-0CT-96 | 08-0СT-96 | < | 3.9 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2MP | 57M-96-11X | MD5711x1 | DV4W*305 | WDIM | 02-0CT-96 | 08-0СT-96 | < | 3.9 UGL | . 0 |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | ORGANICS/WATER/GCMS ORGANICS/WATER/GCMS | UM18 UM18 | 2NANIL 2NANIL | $57 M-96-11 X$ $57 M-96-11 X$ | MX5711x1 MD5711x1 | DV4W*535 DV4W*305 | WDIM | 02-0CT-96 02-0CT-96 | 08-OCT-96 08-0CT-96 | $<$ | 4.3 UGL 4.3 UGL | . 0 |

FIELD DUPLICATE RESULTS


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FIELD DUPLICATE RESULTS
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 MM 1．9 UG 6．7 UG
4．8 UGL 1.6 $\stackrel{~}{3}$
 $\begin{array}{ll} & \begin{array}{c}\text { IRDMIS } \\ \text { Field }\end{array} \\ \text { IRDMIS } & \begin{array}{c}\text { Sample }\end{array} \\ \text { Site ID } & \text { Number }\end{array}$
DV4 ${ }^{\text {® } 535 ~ W D I M ~ 02-O C T-96 ~ 08-O C T-96 ~<~}$

 $\begin{array}{ll}\text { 57M－96－11x MX5711x1 } & \text { DV4 } W^{\star} 535 \text { WDIM 02－OCT－96 08－OCT－96 }< \\ \text { 57M－96－11X MD5711x1 } & \text { DV4W } 305 \text { LDIM 02－OCT－96 08－OCT－96 }<\end{array}$ 57M－96－11X MX5711X1 DV4W＾535 LDIM 02－0CT－96 08－OCT－96＜
 DV4W＊305 WDIM 02－OCT－96 08－0CT－96＜ $\begin{array}{ll}\text { 57M－96－11x MD5711x1 } & \text { DV4W＊305 WDIM 02－OCT－96 08－OCT－96 } \\ 57 \mathrm{M}-96-11 \times & \\ \text { MX5711x } & \text { DV4W＊535 WDIM 02－OCT－96 08－OCT－96 }\end{array}$ $\begin{array}{ll}\text { 57M－96－11X MX5711x1 } & \text { DV4W＊535 WDIM 02－OCT－96 08－OCT－96 } \\ \text { 57M－96－11X M05711X1 } & \text { DV4W＊305 LDIM 02－OCT－96 08－OCT－96 }\end{array}$ 57M－96－11x MX5711x1 DV4W＾535 LDIM 02－OCT－96 08－OCT－96＜ $\begin{array}{ll}\text { 57M－96－11X MX5711X1 } & \text { DVLW＊535 WDIM 02－OCT－96 08－OCT－96 } \\ 57 M-96-11 \times \text { MD5711X1 } & \text { DV4W＊305 }\end{array}$ $\begin{array}{ll}\text { 57M－96－11X MX5711X1 } & \text { DV4W＊535 WDIM 02－OCT－96 08－OCT－96 }< \\ \text { 57M－96－11X M05711X1 } & \text { DV4W＊305 WDIM 02－OCT－96 08－OCT－96 }<\end{array}$ $\begin{array}{ll}\text { 57M－96－11X MX5711X1 } & \text { DVL }{ }^{\star} \text { 535 WDIM 02－OCT－96 08－OCT－96 } \\ \text { 57M－96－11X M05711X1 } & \text { DV4W＊305 WDIM 02－OCT－96 08－OCT－96 }\end{array}$ 57M－96－11X MX5711X1 DV4W夫535 LDIM 02－OCT－96 08－OCT－96＜


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ORGANICS／WATER／GCMS




ORGANICS／WATER／GCMS
ORGANICS／HATER／GCMS
ORGANICS／WATER／GCMS




ABB－ES
Contractor Method Description
Appendix D-3
Table: D-18
FIELD DUPLICATE RESULTS
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Appendix D-3
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

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8.6 UGL 4.8 UGL
4.8 UGL 3.3 UGL 헝 홍

FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996


Appendix D-3
Table: D-18
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996
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Appendix D-3
FIELD DUPLICATE RESULTS
FT. DEVENS DV4 1996

VOLATILES/WATER/GCMS VOLATILES/WATER/GCMS VOLATILES/WATER/GCMS VOLATILES/WATER/GCMS VOLATILES/WATER/GCMS
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VOLATILES/WATER/GCMS VOLATILES/WATER/GCMS

Table：D－18
FIELD DUPICAEE RESULTS
FT．DEVENS DV4 1996

| $\begin{gathered} \mathbf{S}^{-\dagger} .7 \\ \hline \end{gathered}$ | $\begin{aligned} & 790 \\ & \hline \end{aligned}$ | $\begin{aligned} & 96-120-60 \\ & 96-120-60 \end{aligned}$ | $\begin{aligned} & 96-100-20 \\ & 96-100-20 \end{aligned}$ | $\begin{aligned} & \operatorname{sic\alpha } \\ & \mathrm{s} 7 \alpha \mathrm{x} \end{aligned}$ |  | $\begin{aligned} & \text { LXLULSOW } \\ & \text { LXILLSXW } \end{aligned}$ | $\begin{aligned} & x 11-96-w<5 \\ & \times 11-96-w<5 \end{aligned}$ | N37 $1 \times$ Nヨา 1 x | $\begin{aligned} & \text { ozwn } \\ & \text { o己Wh } \end{aligned}$ | SWOJ／צ31甘M／S31IItion SWכэ／Уヨ1УM／SヨาII甘า0＾ | $\begin{aligned} & 53-894 \\ & 53-894 \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $0^{-}$ | าต o 0 | 96－150－60 | 96－150－20 | s7ax | 502＊Mヶへ0 | IXILLSCOW | X $15-96-625$ | Hzunn | ozwn | SWכэ／צヨ1\％M／S3าII＊าon | S3－88\％ |
| $0^{*}$ | 19n 01 | 96－130－60 | 96－100－20 | s70x | 5£5＊Нヶへ0 | LXLILSXW | Xll－96－WLS | lizunn | 02wn | SWכT／8ヨ1VM／S3711\％70＾ | S3－88\％ |
| $0 \cdot$ | \％O\％ | 96－150－60 | 96－130－20 | s70x | $50 \Sigma_{*} \times \dagger \wedge 0$ | IXILISSOW | XIL－96－WLS | zozunn | O2W7 | SWכэ／צヨivM／S31II＊Ton | S3－88\％ |
| $0{ }^{\circ}$ | 70n 01 | 96－130－60 | 96－130－20 | s70x | S¢5＊MケイO | LXLLLSXW | XLL－96－WLS | z0z\x | 02wn | SWอэ／8314M／S3าIIV70＾ | S3－894 |
| $0^{\circ}$ | 70n 2 | 96－130－60 | 96－190－20 | s70x | 50£＊Mクイロ | EXILLSCW | XIL－96－W25 | 86lynn | O2W7 |  | S3－89\％ |
| $0^{\circ}$ | $790 \sim$ | 96－120－60 | 96－130－20 | s70x |  | LXLILSXW | x1L－96－WLS | 86LxN | 02 wn | SWอэ／צヨ1vM／S3าIL＊า0＾ | S3－898 |
| $0 \cdot$ | $79 n 9$ | 96－130－60 | 96－150－20 | s70x |  | LxILCSOW | XIL－96－WLS | 26lynn | Ozwn | SWכэ／ช̇IVM／S3าIL＊า0＾ | S3－898 |
| $0^{*}$ | 7ตก 9 | 96－150－60 | 96－150－20 | s70x | S£5＊ハサイ | LXLLLSXW | XLL－96－W25 | 261xnn | O2Wn | SWD9／8ヨ1vM／S | S3－884 |
| $0{ }^{*}$ | าวก じし | 96－150－60 | 96－100－20 | sา0x | 50¢＊MヶイО | IXILISSOH | XIL－96－WLS | 3าכ1 | O2wn | S¢Јэ／צヨıทM／sэาII＊า0＾ | S3－898 |
| $0^{*}$ | 7ตก じし | 96－150－60 | 96－130－20 | s70x | S¢5＊Мทก0 | LXLILSXW | XIL－96－WLS | 3าวษ1 | O2Wn |  | S3－gat |
| 1－2 | 79n ぐゅ | 96－150－60 | 96－150－20 | S70x | 5¢5＊丹ヶへの | LXILLSXW | X $11-96-6<5$ | 33าว1 | O2un | SW59／8ヨ1VM／S37IIV70＾ | S3－89\％ |
| －2 | 70n 8 －\％ | 96－150－60 | 96－130－20 | S70x | 50£＊Mクイの | Exilicsow | XL6－96－W2S | 33751 | O2W |  | S3－884 |
| $0^{\circ}$ | $7{ }^{\text {¢ }}$ 15＊ | ＞96－100－60 | 96－100－20 | stox | 50£＊Mヶへイ | IXILISSW | XIL－96－WLS | ช37 | ozun | SWJ9／צヨ1vM／S37IIV70 | S3－884 |
| $0^{*}$ | 750 | ＞96－130－60 | 96－100－20 | S70x | S¢S＊MヶイO | IXLLLSXW | XLL－96－WLS | ＊ 3 フ1 | 02 W | SWD9／צGIVM／S37IIV70 | S3－884 |
| $0^{\circ}$ | 79n $L^{\circ}$ | ＞96－130－60 | 96－100－20 | s70x | $505 *$ M $\dagger$ ก0 | EXILLSOW | Xll－96－W2S | djasll | O2wn | SWD9／צヨIVM／S3IIIVา0＾ | S3－89\％ |
| $0^{*}$ | 70 $2^{\text {－}}$ | $>96-130-60$ | 96－130－20 | s70x | SES＊MYイО | LXLLLSXH | XIL－96－W2S | dJosh1 | 02 hn |  | S3－884 |
| $0 \times$ | \％ $5^{\circ}$ | 96－130－60 | 96－100－20 | S70x | 50£ $\times$ My $\ 0$ | IXILLS ${ }^{\text {a }}$ | XIL－96－WLS | y＜1s | Ozwn | SWכ9／8ヨ1＊M／S3าII甘า0＾ | S3－884 |
| Ody | 7 ！un mıen | әдеロ |  | 707 | Jequin | Jequnn | OI 2 l ！ 5 | auren | opoj |  | 5．J7403 |
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# 1998 OFF-SITE LABORATORY DATA (SUPPLEMENTAL RI) 

### 1.0 INTRODÚCTION

This Quality Control Summary Report (QCSR) provided a summary of quality control sample measurement associated with field sampling and analysis activities conducted during the 1998 Supplemental Field Investigation. Samples were analyzed at on-site and off-site laboratories. Data quality objectives and analytical methods for the 1998 investigation are the same as those described in Appendix D-2 and Appendix D-3 for the 1996 investigation. During the 1998 program, on-site analyses included only Total Recoverable Petroleum Hydrocarbon (TPHC) analysis. Off-site analyses included a subset of inorganics ( $\mathrm{As}, \mathrm{Ba}, \mathrm{Cu}, \mathrm{Mn}, \mathrm{Pb}, \mathrm{Sb}, \mathrm{Se}$, and Zn ), volatile, semivolatiles, pesticides, PCBs, TPHC, and Total Suspended Solids.

### 2.0 OFF-SITE DATA QUALITY CONTROL REVIEW

Quality control sample data associated with the off-site analytical program include method blanks, field QC blanks (rinse blanks and trip blanks), field duplicates, matrix spike/matrix spike duplicates (MS/MSD). Surrogate recovery data for volatile, semivolatiles, pesticides, and PCB analyses were also reviewed. Data quality interpretations were based on Quality Control limits specified by USEPA (USEPA, 1994; USEPA,1996; USEPA, 1989). With the exception of the items listed below, all analytical results generated during the field investigation met project QC goals and are usable without qualification. No results were rejected based on the QC review. A subset of results are considered estimated values.

### 2.1 Method Blanks

Method blanks results are summarized in Table D-1 and Table D-2. With the exception of the semivolatile compound bis(2-ethylhexyl)phthalate at $29 \mathrm{ug} / \mathrm{L}$, and the metal manganese at $11 \mu \mathrm{~g} / \mathrm{L}$, target analytes were not reported in aqueous method blanks. These results indicate the laboratory was free of laboratory introduced contamination for the majority of aqueous target analytes. Similar concentrations of bis(2ethylhexyl)phthalate and manganese in aqueous samples may represent laboratory contamination.

A small subset of target analytes were detected in soil method blanks including TPHC at $36.5 \mu \mathrm{~g} / \mathrm{g}$, barium ( $8.31 \mu \mathrm{~g} / \mathrm{g}$ ), manganese ( $21.2 \mu \mathrm{~g} / \mathrm{g}$ ), alpha-chlordane ( $.0058-.0082$ $\mu \mathrm{g} / \mathrm{g}$ ), gamma-chlordane (. $0092-.013 \mu \mathrm{~g} / \mathrm{g}$ ), diacetone alcohol as a semivolatile tentatively identified compound. With the exception of the above analytes, the laboratory soil analyses were free of laboratory introduced contamination. Similar concentrations of the analytes listed above in soil samples may represent laboratory introduced contamination.

### 2.2 Rinse Blanks

Rinse blank results are summarized in Table D-3. With the exception of low concentrations of arsenic ( $2.93 \mu \mathrm{~g} / \mathrm{L}$ ) and manganese ( $6.28 \mu \mathrm{~g} / \mathrm{L}$ ), no other target analytes were detected in rinse blanks. These results indicate that field sampling processes did not contribute to sample contamination for the majority of target analytes. The low concentration of arsenic and manganese in the rinse blanks is not interpreted to have an impact on sample data usability.

### 2.3 Trip Blanks

Trip blank results are summarized in Table D-4. No target compounds were detected in any of the three trip blanks associated with this data set. These results indicate that no cross contamination of samples occurred during shipment and storage.

### 2.4 Surrogate Recoveries

Surrogate data were reviewed for all volatile (Table D-5), semivolatile (Table D-6), and pesticide and PCB (Table D-7) analyses. Surrogate recoveries were compared to limits specified in the USEPA Contract Laboratory Program (CLP).

## Volatiles

Surrogate recoveries for all aqueous samples were within CLP limits indicating usable results were obtained for all water samples. Surrogate recoveries were within limits for all soils with the exception of DX570600 (57D-98-06X) and DX570800 (57D-98-08X) which had high recoveries of one of three surrogates. No volatile target analytes were

## Harding Lawson Associates

reported in sample DX570800. Results for benzene, chlorobenzene, and toluene in samples DX570600 are potentially biased high.

## Semivolatiles

Surrogate recoveries for all soil/sediment samples were within CLP limits indicating usable results were obtained. With the exception of water samples WX570300 (57W-9803X) and WX570400 (57W-98-04X), all surrogate recoveries for water samples met USEPA guidelines. Low recoveries ( $28 \%-30 \%$ ) were reported in two base/neutral surrogates for samples WX570300 (57W-98-03X) and WX570400 (57W-98-04X) indicating a low bias for base/neutral compounds in these samples. All non-detect and detected results for these samples are considered estimated and potentially biased low.

## Pesticides

With the exception of water sample MX570200 (57W-98-02X), sediment sample DX570500 (57D-98-05X), and soil samples SX570302 (57S-98-03X) and SX570701 (57S-98-07X), all samples had surrogate recoveries within CLP limits. Low recoveries were observed in the samples listed above, and all results for pesticides in water sample MX570200 (57W-98-02X), sediment sample DX570500 (57D-98-05X), and soil samples SX570302 (57S-98-03X) and SX570701 (57S-98-07X) are considered estimated and potentially biased low.

## PCBs

Surrogate recoveries for all soil/sediment samples were within CLP limits indicating usable results were obtained. With the exception of water sample WX570400 (57W-9804X) with low recoveries ( $19 \%-29 \%$ ), all water sample recoveries were within CLP limits. All results for water sample WX570400 (57W-98-04X) are considered estimated and potentially biased low.

### 2.5 Matrix Spike Results

Matrix spike data were reviewed for TOC, TPHC, and inorganics (Table D-8). Recoveries for all spike analytes were within USEPA Region I limits of $75 \%-125 \%$ for inorganic parameters with the exception of TOC, arsenic, and antimony in soils. TOC recoveries were $130 \%$ and $206 \%$. Arsenic recoveries ranged from $27 \%$ to $148 \%$. The

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## APPENDIX D-4

spike concentration of TOC and arsenic in the matrix spikes was relatively low compared to the concentrations reported in the original samples. No data use qualifications were applied to the TOC or arsenic data based on these results. Antimony recoveries in two sets of MS/MSD samples ranged from $33 \%-56 \%$. Based on these results all antimony soil results are for method JS16 are considered to be estimated and potentially biased low.

### 2.6 Field Duplicate Results

One water duplicate MX5711XX and one soil duplicate SX570700 were collected during the 1998 program. Duplicate results are presented in Table D-9 and Table D-10. Relative percent difference (RPD) of results was compared to USEPA Region I goals of $30 \%$ for waters and $50 \%$ for soils.

## Inorganics

All soil results were within USEPA limits. Results for barium and copper in water sample MX5711XX exceeded limits. Results for copper included detection at $8.54 \mu \mathrm{~g} / \mathrm{L}$ and a non-detect at $<5 \mu \mathrm{~g} / \mathrm{L}$. No data qualification was done because the detected concentration only slightly exceeded the reporting limit. Results for barium in all water samples should be considered estimated values.

## Pesticides/PCBs

Results for all aqueous samples were reported as non-detects with agreement between duplicates for absence of contamination. Target analytes DDT and aroclor 1260 were reported in the soil duplicate with RPDs within USEPA limits indicating good precision.

## Semivolatiles

No target compounds were reported in the soil duplicate pair. The compounds 1,2dichlorobenzene, 1,4 -dichlorobenzene, and naphthalene were detected in the aqueous samples. RPDs for all results exceeded the USEPA limits; however, concentrations were low ( $<7 \mu \mathrm{~g} / \mathrm{L}$ ) relative to reporting limits and no qualification of data was done based on these duplicate results.

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## Volatiles

With the exception of acetone in the soil duplicate, no VOCs were reported in soil samples demonstrating agreement for the absence of contamination. Acetone was reported at a concentration slightly greater than the reporting limit, and it was not interpreted to be a site related compound.

A number of target compounds were reported in the water duplicate pair. Detections include 1,2,4-trimethylbenzene, ethylbenzene, xylenes, trichloroethene, and tetrachloroethene. All RPDs were within USEPA limits indicating excellent precision for the sample pair.

## Total Suspended Solids

One aqueous duplicated pair was collected. An RPD of 191 was observed in the data set indicating a large difference in results. These data indicate that all TSS data should be considered estimated.

## TPHC

One soil duplicated pair was collected. An RPD of 108 was observed in the data set indicating a large difference in results. These data indicate that all off-site soil TPHC data should be considered estimated.

### 2.7 Tentatively Identified Compounds (TICs)

A subset of samples had non-target compounds reported as tentatively identified compounds (TICs) in the VOA and SVOA data. TICs are summarized on Table D-11.

The majority of SVOA non-target compounds were reported as unknowns. TICs included alkanes (C16-C29), $\beta$-sitosterol, and alpha-pinene. Sediment and soil samples contained numerous unknowns ranging in total concentration per sample from $<5 \mu \mathrm{~g} / \mathrm{g}$ to $171 \mu \mathrm{~g} / \mathrm{g}$. The $\beta$-sitosterol, and alpha-pinene are interpreted to represent natural organics. The alkanes and unknowns may represent fuel related contamination.

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No TICs were reported in VOA soils. A number of fuel related hydrocarbons were reported in aqueous samples including light alkanes, alkyl-substituted benzenes, and cyclohexanes which are indicators of possible gasoline contamination.

### 3.0 ONSITE DATA QUALITY CONTROL REVIEW

The 1998 field program included the on-site analysis of soil samples for Total Petroleum Hydrocarbons using a Modified USEPA Method 418.1 methodology. The data use objectives for the program was to provided data on the presence or absence of hydrocarbon contamination use in direction of the sampling program. Field data were used to locate explorations and select samples for off-site analysis. Data quality was assessed by evaluation of comparability of on-site results to split samples analyzed at the off-site laboratory.

### 3.1 Data Comparison and Evaluation

Comparability of the data was evaluated to determine if results were usable for defining the presence/absence and relative concentrations of TPH using the on-site data. Relative percent difference (RPD) calculations were used to determine the comparability of the on-site/off-site results. Results of the on-site/off-site analyses are summarized on Tables I-4 and I-5.

## Soil Matrix

Fourteen soil split samples were submitted for off-site TPH-IR analysis. Split sample data for TPH is presented for soil matrices on Table I-4

## Sediment Matrix

Eight sediment samples were submitted for off-site TPH-IR analysis. Split sample data for TPH is presented for sediment matrices on Table I-5.

### 3.1.1 Split-Sample Comparison Conclusions

There was a high degree of correlation between the on-site and off-site laboratories relative to soil and sediment data. Comparison of the on-site/off-site soil results indicate

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that 100 percent of the calculated soil sample results agree within the 100 percent RPD requirement set forth by the USEPA for field duplicates (USEPA, 1996). The remaining two soil samples were a duplicate pair (570700) that was reported below the reporting limit of the on-site lab but had positive detections in the off-site lab. Evaluation of the on-site results indicate that the sample matrix had a high water content, 25 percent and 27 percent total solids. This was a probable interference in the modified extraction procedure utilized by the on-site laboratory. The percent difference of the off-site duplicate result was 70 percent. This demonstrates a notable variance for the off-site results, and implies a high degree of variation within the homogeneity of the sample matrix for this sample.

For sediment samples, 75 percent of calculated RPDs were within the USEPA field duplicate limits. Two samples that exceeded RPDs of 100 had higher concentrations reported at the on-site laboratory. These results indicate a possible high bias at the on-site laboratory.

Based on the split sample results, field TPH results are usable for the determination of presence/absence and relative concentrations of TPH in the soil and sediment media.

TABLE D-4 Soil Comparison

| Sample | 570101 | 570200 | 570302 | 570401 | 570503 | 570601 | 570700 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| ID | On-site |  |  |  |  |  |  |
| On-sult | 1000 | 1400 | 14000 | 680 | 3200 | 2500 | $<800$ |
| Off-site <br> result | 393 | 1200 | 14800 | 1150 | 1750 | 4620 | 6170 |
| RPD | 87 | 15 | 6 | 51 | 59 | 60 | $*$ |
| Sample <br> ID | 570700 D | 570701 | 570800 | 570900 | 571301, | 571401 | 571503 |
| On-site <br> result | $<740$ | 32000 | $<800$ | 1500 | 1600 | 1200 | $<270$ |
| Off-site <br> result | 1830 | 17000 | 494 | 1930 | 951 | 895 | $<27.9$ |
| RPD | $*$ | 61 | 0 | 25 | 51 | 29 | 0 |

* Refer to "Split Sample Comparison Conclusions".


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## APPENDIX D-4

TABLE D-5 Sediment Comparison

| Sample <br> ID | 570100 | 570200 | 570300 | 570400 | 570500 | 570600 | 570700 | 570800 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| On-site <br> result | 2500 | $<31000$ | $<1800$ | $<1500$ | 5500 | $<380$ | 5500 | $<390$ |
| Off-site <br> result | 103 | 452 | 185 | 246 | 3540 | 160 | 200 | 109 |
| RPD | 184 | 0 | 0 | 0 | 43 | 0 | 186 | 0 |

## References:

U.S. Environmental Protection Agency (USEPA), 1989. "Region 1 Laboratory Data Validation Functional Guidelines For Evaluating Inorganic Analyses"; Hazardous Site Evaluation Division; February 1989.
U.S. Environmental Protection Agency (USEPA), 1994. "USEPA Contract Laboratory Program Statement of Work for Organic Analysis; OLM03.1; Office of Solid Waste and Emergency Response; EPA-540/R-94/073; August 1994.
U.S. Environmental Protection Agency (USEPA), 1996. "Region 1 EPA-NE Data Validation Guidelines For Evaluating Environmental Analyses"; Quality Assurance Unit Staff; Office of Environmental Measurement and Evaluation; December 1996

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TABLE D－1
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1998 SUPPLEMENTAL FIELD INVESTIGATION





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## METHOD BLANKS（Water） FT．DEVENS AOC 57

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| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB－ES | ORGANICS／WATER／GCMS | LM18 | NNDPA | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB016 | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB016 | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB221 | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB221 | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB232 | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB232 | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB242 | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB242 | WDIO | 01－JUN－98 | $16-J U N-98$ |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB248 | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB248 | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB254 | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB254 | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB260 | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCB260 | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCP | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PCP | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PHANTR | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PHANTR | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PHENOL | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PHENOL | WDI | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PPDDD | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PPDDD | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PPDDE | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PPDDE | WDI | 01－JUN－98 | 16－JUN－98 |
| ABS－ES | ORGANICS／WATER／GCMS |  | PPDDT | WDH0 | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PPDDT | WDI | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PYR | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | PYR | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | TXPHEN | WDHO | 28－MAY－98 | 15－JUN－98 |
| ABB－ES | ORGANICS／WATER／GCMS |  | TXPHEN | WDIO | 01－JUN－98 | 16－JUN－98 |
| ABB-ES | VOLATILES／WATER／GCMS | UM20 | 111TCE | XDG | 03－JUN－98 | 03－JUN－98 |
| ABB－ES | VOLATILES／WATER／GCMS |  | 112TCE |  | 03－JUN－98 | 03－JUN－98 |
| ABB－ES | VOLATILES／WATER／GCMS |  | 11DCE | XDG | 03－JUN－98 | 03－JUN－98 |
| ABB－ES | VOLATILES／WATER／GCMS |  | 11DCLE | XDG | 03－JUN－98 | 03－JUN－98 |


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## TABLE D－3

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TABLE D-5

## VOLATILE SURROGATE RESULTS

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TABLE D－5

## VOLATILE SURROGATE RESULTS

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TABLE D-6
SEMIVOLATILE SURROGATE RESULTS
1998 SUPPLEMENTAL FIELD INVESTIGATION

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> site ID | Field Sample Number | Lab Number |  | Sample Date | Analysis Date | Spike Value | Value Unit | Percent Recovery |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD14 | 57P-98-02X | MX5702XX | ADV1 ${ }^{*} 20$ | WDIO | 26-MAY-98 | 16-JUN-98 | 50 | 51 UGL | 102.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD14 | 57P-98-03X | MX5703XX | ADV1W*22 | WDIO | 26-MAY-98 | 16-JUN-98 | 50 | 48 UGL | 96.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD14 | 57P-98-04X | MX5704XX | ADV1W*24 | WDIO | 26-MAY-98 | 16-JUN-98 | 50 | 48 UGL | 96.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD 14 | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 | 50 | 55 UGL | 110.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD 14 | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 | 50 | 52 UGL | 104.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD 14 | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 | 50 | 46 UGL | 92.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD 14 | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 | 50 | 49 UGL | 98.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD 14 | S8K-98-001 | SBK98001 | LADVIW*2 | WDHO | 21-MAY-98 | 15-JUN-98 | 50 | 47 UGL | 94.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD 14 | 57W-98-02X | W×570200 | LADV1W*5 | WDHO | 21-MAY-98 | 15-JUN-98 | 50 | 47 UGL | 94.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD 14 | 57W-98-03X | WX570300 | LADV1W*7 | WDHO | 21-MAY-98 | 15-JUN-98 | 50 | 20 UGL. | 40.0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | TRPD 14 ********** | 57W-98-04X | WX570400 | LADV1W*9 | WDHO | 21-MAY-98 | 15-JUN-98 | 50 | 19 UGL | 38.0 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  | $\begin{array}{r} 83.9 \\ 38.0 \\ 110.0 \end{array}$ |







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## TABLE D－7 <br> PESTICIDE／PCB SURROGATE RESULTS

1998 SUPPLEMENTAL FIELD INVESTIGATION


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TABLE D-7

## PESTICIDE/PCB SURROGATE RESULTS

1998 SUPPLEMENTAL FIELD INVESTIGATION

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| ABB-ES | PESTICIDES/WATER/GCEC |
| :--- | :--- |
| ABB-ES |  |
|  |  |
|  |  |
|  |  |
| PESTICIDES/WATER/GCEC |  |

TABLE D-7

TABLE 8
MATRIX ．SPIKE／MATRIX SPIKE DUPLICATE RESULTS



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TABLE 8
MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Number | Lab <br> Number Lot | Sample Date | Analysis Date | Spike <br> Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | METALS/SOIL/ICP | JS16 | $\underset{* * * * * * * * * *}{ }$ | 57s-98-07X | SD570700 | ADV1S*27 UBZJ | 19-MAY-98 | 03-JUN-98 | 481 | 91.2 | 77.4 UGG | 95.8 | 2.5 |
|  |  |  | avg minimem maximum |  |  |  |  |  |  |  |  | $\begin{aligned} & 96.5 \\ & 95.8 \\ & 98.2 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC | $\begin{aligned} & \text { LH10 } \\ & \text { LH10 } \end{aligned}$ | AENSLF AENSLF $* * * * * * * * *$ | $\begin{aligned} & 57 s-98-14 x \\ & 57 s-98-14 x \end{aligned}$ | $\begin{aligned} & \text { sx571401 } \\ & \text { SX571401 } \end{aligned}$ | ADV1S*12 UFLG ADVIS*12 UFLG | $\begin{aligned} & \text { 20-MAY-98 } \\ & 20-\mathrm{MAY}-98 \end{aligned}$ | $\begin{aligned} & \text { 29-JUN-98 } \\ & 29-\mathrm{JUN}-98 \end{aligned}$ | $.0291$ | $.011<$ | $\begin{aligned} & .00602 \text { UGG } \\ & .00602 \text { UGG } \end{aligned}$ | 54.9 50.4 | 8.5 8.5 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  | 52.7 50.4 54.9 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC | $\begin{aligned} & \text { LH10 } \\ & \text { LH10 } \end{aligned}$ | $\begin{aligned} & \text { ALDRN } \\ & \text { ALDRN } \\ & * * * * * * * * \end{aligned}$ | $\begin{aligned} & 57 \mathrm{~s}-98-14 \mathrm{X} \\ & 57 \mathrm{~s}-98-14 \mathrm{X} \end{aligned}$ | SX571401SX571401 | ADV1S*12 UFLG ADV1S*12 UFLG | $\begin{aligned} & 20-\mathrm{MAY}-98 \\ & 20-\mathrm{MAY}-98 \end{aligned}$ | $\begin{array}{r} 29-\text { JUN-98 } \\ 29-J U N-98 \end{array}$ | $.0291$ | $\begin{aligned} & .0096< \\ & .00888< \end{aligned}$ | $\begin{aligned} & .00729 \text { UGG } \\ & .00729 \text { UGG } \end{aligned}$ | 48.0 44.4 | $\begin{aligned} & 7.8 \\ & 7.8 \end{aligned}$ |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  | 46.2 44.4 48.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & A B B-E S \end{aligned}$ | PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC | $\begin{aligned} & \text { LH10 } \\ & \text { LH10 } \end{aligned}$ | BENSLF <br> BENSLF <br>  | $\begin{aligned} & 57 \mathrm{~s}-98-14 x \\ & 57 \mathrm{~s}-98-14 x \end{aligned}$ | SX571401Sx571401 | ADV1S*12 UFLG ADV1S*12 UFLG | $\begin{aligned} & \text { 20-MAY-98 } \\ & \text { 20-MAY-98 } \end{aligned}$ | $\begin{aligned} & \text { 29-JUN-98 } \\ & 29-J U N-98 \end{aligned}$ | $\begin{aligned} & .0291 \\ & .0291 \end{aligned}$ | $.0103<$ | $\begin{aligned} & .00663 \text { UGG } \\ & .00663 \text { UGG } \end{aligned}$ | 51.4 42.7 | $\begin{aligned} & 18.7 \\ & 18.7 \end{aligned}$ |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  | 47.1 42.7 51.4 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC | $\begin{aligned} & \text { LH10 } \\ & \text { LH10 } \end{aligned}$ | DLDRN <br> DLDRN <br>  | $\begin{aligned} & 57 s-98-14 x \\ & 57 s-98-14 x \end{aligned}$ | $\begin{aligned} & \mathrm{SK571401} \\ & \mathrm{SX571401} \end{aligned}$ | ADV1s*12 UFLG ADV1s*12 UFLG | $\begin{aligned} & \text { 20-MAY-98 } \\ & 20-\text { MAY- } 98 \end{aligned}$ | $\begin{aligned} & \text { 29-JUN-98 } \\ & 29-J U N-98 \end{aligned}$ | $\begin{aligned} & .0291 \\ & .0291 \end{aligned}$ | $.00861<$ | $\begin{aligned} & .00629 \text { UGG } \\ & .00629 \text { UGG } \end{aligned}$ | 49.9 43.0 | 14.9 14.9 |
|  |  |  | avg minimum maximem |  |  |  |  |  |  |  |  | 46.5 43.0 49.9 |  |
| $\begin{gathered} A B B-E S \\ A B B-E S \end{gathered}$ | PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC | LH10 | ENDRN ENDRN ********** | $57 \mathrm{~S}-98-14 \times$$57 \mathrm{~S}-98-14 \mathrm{x}$s 571401Sx 51401 |  | ADV1S*12 UFLG 20-MAY-98 29-JUN-98 ADV1S*12 UFLG 20-MAY-98 29-JUN-98 |  |  | $\begin{aligned} & .0291 \\ & .0291 \end{aligned}$ | $.0104<$ | $\begin{aligned} & .00657 \text { UGG } \\ & .00657 \text { UGG } \end{aligned}$ | 51.9 46.9 | 10.3 10.3 |
|  |  |  | avg |  |  | 49.4 |  |  |  |  |  |  |





| Contractor | Method Description | MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS FT. DEVENS AOC 57 |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | IRDMIS Method Code | Test Name | IRDMIS <br> site ID | IRDMIS <br> Field <br> Sample <br> Number | Lab Number | Lot | Sample Date | Analysis Date | Spike Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
|  |  |  | minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{array}{r} 91.2 \\ 112.8 \end{array}$ |  |
| ABB-ES | METALS/WATER/ICP | SS18 | PB | 57M-96-11X | MX5711xX | ADV1W*26 | OGHG | 27-MAY- | 03-JUN-98 | 1000 | $1020<$ | 50 UGL | 102.0 | 2.0 |
| ABB-ES | METALS/WATER/ICP | ss18 | PB | 57M-96-11X | MX57111x | ADV1 ${ }^{*} 26$ | OGHG | 27-MAY- | 03-JUN-98 | 1000 | $1000<$ | 50 UGL | 100.0 | 2.0 |
| ABB-ES | METALS/WATER/ICP | SS18 | PB | 57M-96-11X | MX57111XX | ADV1 ${ }^{*}$ 27 | OGHG | 27-MAY- | 03-JUN-98 | 1000 | $1010<$ | 50 UGL | 101.0 | . 0 |
| ABB-ES | METALS/WATER/ICP | SS18 | PB | 57M-96-11X | MX5711xX | ADV1W*27 |  |  |  |  |  |  |  |  |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 101.0 \\ & 100.0 \\ & 102.0 \end{aligned}$ |  |
| ABB-ES | METALS/WATER/ICP | SS18 | SB | 57M-96-11X | MX57111x | ADV1W*26 | OGHG | 27-MAY- | O3-JUN-98 | 1000 | $1050<$ | 50 UGL | 105.0 | 3.9 3.9 |
| ABB-ES | METALS/WATER/ICP | SS18 | SB | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | OGHG | 27-MAY- | 03-JUN-98 | 1000 | $1010<$ | 50 UGL | 101.0 | 3.9 |
| ABB-ES | METALS/WATER/ICP | SS18 | SB | 57M-96-11X | MX57111X | ADV1 ${ }^{*} 27$ | OGHG | 27-MAY- | 03-JUN-98 | 1000 | $1030<$ | 50 UGL | 103. | 2.0 |
| ABB-ES | METALS/WATER/ICP | SS18 | SB | 57M-96-11X | MX5711xX | ADV1W*27 | OGHg | 27-MAY- | 03-JUN-98 | 1000 | 1010 < | 50 UGL | 101.0 | 2.0 |
|  | : |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 102.5 \\ & 101.0 \\ & 105.0 \end{aligned}$ |  |
| ABB-ES | METALS/WATER/ICP | SS18 | SE | 57M-96-11X | MX57111XX | ADV1W*26 | OGHG | 27-MAY- | 03-JUN-98 | 1000 | $991<$ | 50 UGL | 99.1 | . 5 |
| ABB-ES | METALS/WATER/ICP | SS18 | SE | 57M-96-11X | MK57111x | ADV1 ${ }^{*} 26$ | OGHG | 27-MAY- | 03-JUN-98 | 1000 | 986 < | 50 UGL | 98.6 | . 3 |
| ABB-ES | METALS/WATER/ICP | SS18 | SE | 57M-96-11X | MX57111X | ADV1 ${ }^{*} 27$ | OGHG | 27-MAY- | 03-JUN-98 | 1000 | 998 < |  | 99.8 | -3 |
| ABB-ES | METALS/WATER/ICP | SS18 | SE <br> ********** | 57M-96-11X | MX5711XX | ADV1W*27 | OGHG | 27-MAY- | 03-JUN-98 | 1000 |  |  |  |  |
|  |  |  | avg |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 98.6 99.8 |  |
| ABB-ES | METALS/WATER/ICP | SS18 | ZN | 57M-96-11X | MX5711xX | ADV1 ${ }^{*}$ * 26 | OGHG | 27-MAY- | 03-JUN-98 | 1000 | $986<$ | 35.8 UGL | 98.6 | .1 |
| ABB-ES | METALS/WATER/ICP | SS18 | ZN | 57M-96-11X | MX5711xX | ADV14*26 | OGHG | 27-MAY- | 03-JUN-98 | 1000 | $985<$ | 35.8 UGL | 98.5 | .1 |
| ABB-ES | METALS/WATER/ICP | SS18 | ZN | 57M-96-11X | MX5711XX | ADV1W*27 | OGHG | 27-MAY- | 03-JUN-98 | 1000 | 976 < | 35.8 UGL | 97.6 | . 0 |
| ABB-ES | METALS/WATER/ICP | SS18 | ZN <br>  | 57M-96-11X | MX5711XX | ADV1W*27 | OGHG | 27-MAY- | 03-JUN-98 | 1000 | 976 < | 35.8 UGL | 97.6 | . 0 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 98.1 97.6 |  |
|  |  |  | minimum maximu |  |  |  |  |  |  |  |  |  | 97.6 98.6 |  |


| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Nunber | Lab Number | Lot | Sample Date | Analysis Date | Spike Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UHO2 } \\ & \text { UHO2 } \end{aligned}$ | PCB016 | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $3.73<$ | . 16 UGL | 99.5 | 24.0 |
|  |  |  | PCBO16 | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $2.93<$ | . 16 UGL | 78.1 | 24.0 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 88.8 \\ & 78.1 \\ & 99.5 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UHO2 } \\ & \text { UHO2 } \end{aligned}$ | PCB260 | 57M-96-11X | MX5711XX | ADV1 ${ }^{*}$ 26 | SDWG | 27-MAY-98 | $24-J U N-98$ $24-J U N-98$ | 3.75 | $3.83<$ $3.56<$ | .19 UGL .19 UGL | 102.1 94.9 | 7.3 |
|  |  |  | $\begin{aligned} & \text { PCB260 } \\ & * * * * * * * * * \end{aligned}$ | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $3.56<$ | . 19 UGL | 94.9 | 7.3 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 98.5 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 94.9 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{aligned} & A B B-E S \\ & A B B-E S \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | AENSLF | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | $.368<$ | . 023 UGL | 73.6 | 17.1 |
|  |  |  | AENSLF <br>  | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 31 < | . 023 UGL | 62.0 | 17.1 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 67.8 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 62.0 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 73.6 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | ALDRN | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 299 < | . 0918 UGL | 59.8 | 24.4 |
|  |  |  | ALDRN ********** | 57M-96-11X | MX5711XX | ADV1 ${ }^{*}$ 26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 234 < | . 0918 UGL | 46.8 | 24.4 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 53.3 |  |
|  |  |  | minimum |  |  |  |  |  |  | . |  |  | 46.8 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 59.8 |  |
| ABB-ESABB-ES | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | BENSLF | 57M-96-11X | MX5711XX | ADV1 ${ }^{\star}$ 26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 339 < | . 023 UGL | 67.8 | 30.6 |
|  |  |  | BENSLF <br> ********** | 57M-96-11X | MX5711xX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 249 < | . 023 UGL | 49.8 | 30.6 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 58.8 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 49.8 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 67.8 |  |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 329 < | . 024 UGL | 65.8 | 26.5 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 252 < | . 024 UGL | 50.4 | 26.5 |


| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Nunber | Lab Number | Lot | Sample Date | Analysis Date | Spike Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UHO2 } \\ & \text { UHO2 } \end{aligned}$ | PCB016 | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $3.73<$ | . 16 UGL | 99.5 | 24.0 |
|  |  |  | PCBO16 | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $2.93<$ | . 16 UGL | 78.1 | 24.0 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 88.8 \\ & 78.1 \\ & 99.5 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UHO2 } \\ & \text { UHO2 } \end{aligned}$ | PCB260 | 57M-96-11X | MX5711XX | ADV1 ${ }^{*}$ 26 | SDWG | 27-MAY-98 | $24-J U N-98$ $24-J U N-98$ | 3.75 | $3.83<$ $3.56<$ | .19 UGL .19 UGL | 102.1 94.9 | 7.3 |
|  |  |  | $\begin{aligned} & \text { PCB260 } \\ & * * * * * * * * * \end{aligned}$ | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $3.56<$ | . 19 UGL | 94.9 | 7.3 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 98.5 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 94.9 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{aligned} & A B B-E S \\ & A B B-E S \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | AENSLF | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | $.368<$ | . 023 UGL | 73.6 | 17.1 |
|  |  |  | AENSLF <br>  | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 31 < | . 023 UGL | 62.0 | 17.1 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 67.8 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 62.0 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 73.6 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | ALDRN | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 299 < | . 0918 UGL | 59.8 | 24.4 |
|  |  |  | ALDRN ********** | 57M-96-11X | MX5711XX | ADV1 ${ }^{*}$ 26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 234 < | . 0918 UGL | 46.8 | 24.4 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 53.3 |  |
|  |  |  | minimum |  |  |  |  |  |  | . |  |  | 46.8 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 59.8 |  |
| ABB-ESABB-ES | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | BENSLF | 57M-96-11X | MX5711XX | ADV1 ${ }^{\star}$ 26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 339 < | . 023 UGL | 67.8 | 30.6 |
|  |  |  | BENSLF <br> ********** | 57M-96-11X | MX5711xX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 249 < | . 023 UGL | 49.8 | 30.6 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 58.8 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 49.8 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 67.8 |  |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 329 < | . 024 UGL | 65.8 | 26.5 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 252 < | . 024 UGL | 50.4 | 26.5 |


| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Nunber | Lab Number | Lot | Sample Date | Analysis Date | Spike Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UHO2 } \\ & \text { UHO2 } \end{aligned}$ | PCB016 | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $3.73<$ | . 16 UGL | 99.5 | 24.0 |
|  |  |  | PCBO16 | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $2.93<$ | . 16 UGL | 78.1 | 24.0 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 88.8 \\ & 78.1 \\ & 99.5 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UHO2 } \\ & \text { UHO2 } \end{aligned}$ | PCB260 | 57M-96-11X | MX5711XX | ADV1 ${ }^{*}$ 26 | SDWG | 27-MAY-98 | $24-J U N-98$ $24-J U N-98$ | 3.75 | $3.83<$ $3.56<$ | .19 UGL .19 UGL | 102.1 94.9 | 7.3 |
|  |  |  | $\begin{aligned} & \text { PCB260 } \\ & * * * * * * * * * \end{aligned}$ | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $3.56<$ | . 19 UGL | 94.9 | 7.3 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 98.5 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 94.9 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{aligned} & A B B-E S \\ & A B B-E S \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | AENSLF | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | $.368<$ | . 023 UGL | 73.6 | 17.1 |
|  |  |  | AENSLF <br>  | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 31 < | . 023 UGL | 62.0 | 17.1 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 67.8 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 62.0 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 73.6 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | ALDRN | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 299 < | . 0918 UGL | 59.8 | 24.4 |
|  |  |  | ALDRN ********** | 57M-96-11X | MX5711XX | ADV1 ${ }^{*}$ 26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 234 < | . 0918 UGL | 46.8 | 24.4 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 53.3 |  |
|  |  |  | minimum |  |  |  |  |  |  | . |  |  | 46.8 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 59.8 |  |
| ABB-ESABB-ES | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | BENSLF | 57M-96-11X | MX5711XX | ADV1 ${ }^{\star}$ 26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 339 < | . 023 UGL | 67.8 | 30.6 |
|  |  |  | BENSLF <br> ********** | 57M-96-11X | MX5711xX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 249 < | . 023 UGL | 49.8 | 30.6 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 58.8 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 49.8 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 67.8 |  |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 329 < | . 024 UGL | 65.8 | 26.5 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 252 < | . 024 UGL | 50.4 | 26.5 |


| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Nunber | Lab Number | Lot | Sample Date | Analysis Date | Spike Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UHO2 } \\ & \text { UHO2 } \end{aligned}$ | PCB016 | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $3.73<$ | . 16 UGL | 99.5 | 24.0 |
|  |  |  | PCBO16 | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $2.93<$ | . 16 UGL | 78.1 | 24.0 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 88.8 \\ & 78.1 \\ & 99.5 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UHO2 } \\ & \text { UHO2 } \end{aligned}$ | PCB260 | 57M-96-11X | MX5711XX | ADV1 ${ }^{*}$ 26 | SDWG | 27-MAY-98 | $24-J U N-98$ $24-J U N-98$ | 3.75 | $3.83<$ $3.56<$ | .19 UGL .19 UGL | 102.1 94.9 | 7.3 |
|  |  |  | $\begin{aligned} & \text { PCB260 } \\ & * * * * * * * * * \end{aligned}$ | 57M-96-11X | MX5711XX | ADV1W*26 | SDWG | 27-MAY-98 | 24-JUN-98 | 3.75 | $3.56<$ | . 19 UGL | 94.9 | 7.3 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 98.5 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 94.9 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{aligned} & A B B-E S \\ & A B B-E S \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | AENSLF | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | $.368<$ | . 023 UGL | 73.6 | 17.1 |
|  |  |  | AENSLF <br>  | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 31 < | . 023 UGL | 62.0 | 17.1 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 67.8 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 62.0 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 73.6 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | ALDRN | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 299 < | . 0918 UGL | 59.8 | 24.4 |
|  |  |  | ALDRN ********** | 57M-96-11X | MX5711XX | ADV1 ${ }^{*}$ 26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 234 < | . 0918 UGL | 46.8 | 24.4 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 53.3 |  |
|  |  |  | minimum |  |  |  |  |  |  | . |  |  | 46.8 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 59.8 |  |
| ABB-ESABB-ES | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 UH13 | BENSLF | 57M-96-11X | MX5711XX | ADV1 ${ }^{\star}$ 26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 339 < | . 023 UGL | 67.8 | 30.6 |
|  |  |  | BENSLF <br> ********** | 57M-96-11X | MX5711xX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 249 < | . 023 UGL | 49.8 | 30.6 |
|  |  |  | avg |  |  |  |  |  |  |  |  |  | 58.8 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 49.8 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 67.8 |  |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 329 < | . 024 UGL | 65.8 | 26.5 |
| ABB-ES | PESTICIDES/WATER/GCEC | UH13 | DLDRN | 57M-96-11X | MX5711XX | ADV1W*26 | TDOI | 27-MAY-98 | 27-JUN-98 | . 5 | . 252 < | . 024 UGL | 50.4 | 26.5 |禹$\infty$

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| table 8 <br> MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS FT. DEVENS AOC 57 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS <br> Field <br> Sample <br> Number | Lab Number | Lot | Sample Date | Analysis Date | Spike <br> Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
|  |  |  | ********** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 58.1 50.4 65.8 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | ENDRN ENDRN | $57 \mathrm{M}-96-1$ $57 \mathrm{M}-96-1$ | M M 5711 MX | ADV1 ${ }^{*} 26$ ADV1 | TDOI | 27-MAY- | $\begin{aligned} & 27-\text { JUN-98 } \\ & 27-\text { JUN-98 } \end{aligned}$ | . 5 | $\begin{aligned} & .371< \\ & .28< \end{aligned}$ | $\begin{aligned} & .0238 \text { UGL } \\ & .0238 \text { UGL } \end{aligned}$ | 74.2 56.0 | $\begin{aligned} & 28.0 \\ & 28.0 \end{aligned}$ |
|  |  |  | ********** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 65.1 56.0 74.2 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | HPCL | 57M-96-1 $57 \mathrm{M}-96-1$ | MX5711XX MX5711XX | ADV1 $W^{*} 26$ ADV1 | TDOI TDOI | 27-MAY- | $\begin{aligned} & 27-\mathrm{JUN}-98 \\ & 27-\mathrm{JUN}-98 \end{aligned}$ | . 5 | . $327<$ | $\begin{aligned} & .0423 \text { UGL } \\ & .0423 \text { UGL } \end{aligned}$ | 65.4 52.0 | $\begin{aligned} & 22.8 \\ & 22.8 \end{aligned}$ |
|  |  |  | HPCL <br> ********** | $57 M-96-1$ | MX5711XX | ADV1W*26 |  |  | 27-JUN-98 |  |  |  |  |  |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 58.7 52.0 65.4 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | $\begin{aligned} & \text { ISOOR } \\ & \text { ISOOR } \end{aligned}$ | $\begin{aligned} & 57 \mathrm{M}-96-1 \\ & 57 \mathrm{M}-96-1 \end{aligned}$ | MK5711xX | ADV1W*26 <br> ADV1W*26 | $\begin{aligned} & \text { TDOI } \\ & \text { TDOI } \end{aligned}$ | $\begin{aligned} & \text { 27-MAY- } \\ & 27-\text { MAY- } \end{aligned}$ | $\begin{aligned} & \text { 27-JUN-98 } \\ & 27-J U N-98 \end{aligned}$ | 1 | . $526<$ | $\begin{aligned} & .0562 \text { UGL } \\ & .0562 \text { UGL. } \end{aligned}$ | $\begin{aligned} & 66.0 \\ & 52.2 \end{aligned}$ | $\begin{aligned} & 23.4 \\ & 23.4 \end{aligned}$ |
|  |  |  | ********** <br> avg <br> minimum <br> maximum |  |  |  |  |  |  |  |  |  | 59.1 52.2 66.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UH13 } \\ & \text { UH13 } \end{aligned}$ |  | $\begin{aligned} & 57 \mathrm{M}-96-1 \\ & 57 \mathrm{M}-96-1 \end{aligned}$ | MX5711XX MX5711XX | ADV1 ${ }^{*}$ 26 ADV1W*26 | TDOI TDOI | $27 \text {-MAY- }$ 27-MAY | $\begin{aligned} & 27-\mathrm{JUN}-98 \\ & 27-\mathrm{JUN}-98 \end{aligned}$ | $\begin{aligned} & .5 \\ & .5 \end{aligned}$ | $.294<$ | $\text { . } 0507 \text { UGL UGL }$ | $\begin{aligned} & 58.8 \\ & 48.6 \end{aligned}$ | $\begin{aligned} & 19.0 \\ & 19.0 \end{aligned}$ |
|  |  |  | $\operatorname{LIN}_{* * * * * * * * *}$ | 57M-96- |  |  |  |  |  |  |  |  |  |  |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 53.7 48.6 58.8 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | $\begin{aligned} & \text { UH13 } \\ & \text { UH13 } \end{aligned}$ | MEXCLR | 57M-96-11 | MX5711xX | ADV1W*26 | TDOI | 27-maY- | 27-JUN-98 | 1 | . 844 < | . 057 UGL | 84.4 | 43.9 |
|  |  |  | MEXCLR <br> ********** | 57M-96- | MX5711xX | ADV1W*26 | TDOI | 27-MAY- | 27-JUN-98 | 1 | . $54<$ | . 057 UGL | 54.0 | 43.9 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 69.2 \\ & 54.0 \\ & 84.4 \end{aligned}$ |  |


| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMISsite ID | MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS FT. DEVENS AOC 57 |  |  |  |  |  | Value | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | IRDMIS Field Sample Number | Lab Number |  | Sample Date | Analysis Date | Spike Value |  |  |  |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | PESTICIDES/WATER/GCEC PESTICIDES/WATER/GCEC | UH13 <br> UH13 | PPDDT <br> PPDDT | $\begin{aligned} & 57 M-96-11 \\ & 57 M-96-11 \end{aligned}$ | MX5711XX MX5711XX | ADV1 ${ }^{*}$ 26 ADV1 ${ }^{*}$ 26 | $\begin{aligned} & \text { TDOI } \\ & \text { TDOI } \end{aligned}$ | $\begin{aligned} & 27 \text {-MAY- } \\ & 27-\text { MAY- } \end{aligned}$ | $\begin{aligned} & 27-J U N-98 \\ & 27-J U N-98 \end{aligned}$ | $\begin{aligned} & .5 \\ & .5 \end{aligned}$ | $\begin{aligned} & .347< \\ & .229< \end{aligned}$ | $\begin{aligned} & .034 \text { UGL } \\ & .034 \text { UGL } \end{aligned}$ | 69.4 45.8 | $\begin{aligned} & 41.0 \\ & 41.0 \end{aligned}$ |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 57.6 45.8 69.4 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | ORGANICS/WATER/GCMS ORGANICS/WATER/GCMS | UM18 <br> UM18 | $\begin{aligned} & 12 \mathrm{TTCB} \\ & 12 \mathrm{~T} C \mathrm{TCB} \\ & * * * * * * * * \end{aligned}$ | $\begin{aligned} & 57 M-96-11 \\ & 57 M-96-11 \end{aligned}$ | MX5711xX MX5711XX | ADV1 ${ }^{*}$ *2 ADV1 ${ }^{*}$ 26 |  | $\begin{aligned} & 27 \text {-MAY- } \\ & 27-M A Y- \end{aligned}$ | $\begin{aligned} & 16-J U N-98 \\ & 16-J U N-98 \end{aligned}$ | 50 50 | $\begin{aligned} & 32< \\ & 28< \end{aligned}$ | $\begin{aligned} & 1.8 \text { UGL } \\ & 1.8 \mathrm{UGL} \end{aligned}$ | 64.0 56.0 | 13.3 13.3 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 60.0 56.0 64.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | ORGANICS/WATER/GCMS ORGANICS/WATER/GCMS | UM18 UM18 | $\begin{aligned} & \text { 14DCLB } \\ & \text { 14CLLB } \\ & * * * * * * * * \end{aligned}$ | $\begin{aligned} & 57 \mathrm{M}-96-11 \\ & 57 \mathrm{M}-96-11 \end{aligned}$ | MX5711XX MX5711XX | ADV1 ${ }^{*}$ *2 ADV1W*26 | $\begin{aligned} & \text { WDIO } \\ & \text { WDIO } \end{aligned}$ | $\begin{aligned} & 27-\mathrm{MAY}- \\ & 27-M A Y- \end{aligned}$ | $\begin{aligned} & 16-\text { JUN }-98 \\ & 16-\mathrm{JUN}-98 \end{aligned}$ | $\begin{aligned} & 50 \\ & 50 \end{aligned}$ | $\begin{aligned} & 28 \\ & 24 \end{aligned}$ | $\begin{aligned} & 2.7 \text { UGL } \\ & 2.7 \text { UGL } \end{aligned}$ | 56.0 48.0 | 15.4 15.4 |
|  |  |  | avg <br> minimum maximm |  |  |  |  |  |  |  |  |  | 52.0 48.0 56.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | ORGANICS/WATER/GCMS | UM18 | 240NT | 57M-96-11 | MX5711xX | ADV1 ${ }^{*}$ 26 | hDIO | 27-maY- | 16-JUN-98 | 50 | $37<$ | 4.5 UGL | 74.0 | 8.5 |
|  | ORGANICS/WATER/GCMS | UM18 | ${ }_{* * * * * * * * * *}^{240 N T}$ | 57M-96-11 | MX5711XX | ADV1W*26 | WDIO | 27-MAY- | 16-JUN-98 | 50 | 34 < | 4.5 UGL | 68.0 | 8.5 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 71.0 \\ & 68.0 \\ & 74.0 \end{aligned}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | ORGANICS/WATER/GCMS | UM18 | 2CLP | 57M-96-11 | MX5711x | ADV1 ${ }^{*}$ 26 | WDIO | 27-maY- | 16- JUN-98 | 100 | $1.4<$ | . 99 UGL | 1.4 | . 0 |
|  | ORGANICS/WATER/GCMS | LM18 | $\frac{2 c i p}{* * * * * * * *}$ | 57M-96-11 | MX5711XX | ADV1 ${ }^{\star}$ 26 | WDIO | 27-mAY- | 16-JUN-98 | 100 | 1.4 < | . 99 UGL | 1.4 | . 0 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 1.4 1.4 1.4 |  |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | $4 \mathrm{4C3C}$ | 57M-96-11 | MX5711XX | ADV1 ${ }^{*} \times 26$ ADV1 | wolo | 27-MAY- | $16-J U N-98$ $16-J U N-98$ | 100 100 | $4<$ | 4 4 4 UGL | 4.0 4.0 | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4CL3C | 57M-96-1 | MX5711XX | ADV1W*26 | holo | 27-MAY-9 | 16-JuN-98 |  |  |  |  |  |


| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS Site ID | IRDMIS Field Sample Number | Lab Number |  | Sample Date | $\begin{aligned} & \text { Analysis } \\ & \text { Date } \end{aligned}$ | Spike Value | Value < | Original Sample Value Unit | Percent Recovery | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | ********** |  |  |  |  |  |  |  |  |  | -------- |  |
|  |  |  | avg minimum |  |  |  |  |  | . |  |  |  | 4.0 4.0 4.0 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 4.0 |  |
| ABB-ESABB-ES | ORGANICS/WATER/GCMS ORGANICS/WATER/GCMS | $\begin{aligned} & \text { UM18 } \\ & \text { UM18 } \end{aligned}$ | $4_{4 N P}$ | 57M-96-1 | MX5711XX | ADV1 ${ }^{\star} \times$ ADV1 |  | 27-MAY-98 27-MAY-98 | $16-J U N-98$ $16-J U N-98$ | 100 100 | $\begin{aligned} & 12< \\ & 12< \end{aligned}$ | $\begin{aligned} & 12 \text { UGL } \\ & 12 \text { UGL } \end{aligned}$ | 12.0 12.0 | . 0 |
|  |  |  | ${ }_{* * * * * * * * * *}^{\text {NP }}$ | 57M-96-1 | MX5711XX | ADV1W* |  | 27-MAY-98 | $16-\mathrm{JUN}-98$ |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | avg minimum |  |  |  |  |  |  |  |  |  | 12.0 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 12.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABS-ES } \end{aligned}$ | ORGANICS/WATER/GCMS ORGANICS/WATER/GCMS | UM18 | ANAPNE | 57M-96-1 | MX5711XX | ADV1 ${ }^{*}$ | hDIO | 27-MAY-98 | 16-JUN-98 | 50 | $37<$ | 1.7 UGL | 74.0 | 11.4 |
|  |  |  | anAPNE | $57 \mathrm{M}-96-1$ | MX5711XX | ADV1W* |  | 27-MAY-98 | 16-JUN-98 | 50 |  | 1.7 UGL | 6.0 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  | 70.0 |  |
|  |  |  | avg minimum |  |  |  |  |  |  |  |  |  | 66.0 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 74.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | ORGANICS/WATER/GCMS ORGANICS/WATER/GCMS | $\begin{aligned} & \text { UM18 } \\ & \text { UM18 } \end{aligned}$ | NNDNPA | 57M-96-1 | MX5711XX | ADV1 ${ }^{*}$ | h010 | 27-MAY-98 | 16-JUN-98 | 50 | $39<$ | 4.4 UGL | 78.0 | 10.8 |
|  |  |  | NNDNPA | 57M-96-11 | MX5711XX | ADV1W* |  | 27-MAY-98 | 16-JUN-98 | 50 | 35 < | 4.4 UGL | 70.0 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  | 74.0 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 70.0 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 78.0 |  |
| ABB-ESABB-ES | ORGANICS/WATER/GCMS ORGANICS/WATER/GCMS | UM18UM18 | PCP | 57M-96-1 | MX5711XX | ADV1 ${ }^{*}$ | holo | 27-MAY-98 | 16-JUN-98 | 100 | $60<$ | 18 UGL | 60.0 | 6.9 |
|  |  |  | PCP | 57M-96-1 | MX5711XX | ADV1W* |  | 27-MAY-98 | 16-JUN-98 | 100 | 56 < | 18 UGL | 56.0 | 6.9 |
|  |  |  | ********** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | avg minimum |  |  |  |  |  |  |  |  |  | 56.0 |  |
|  |  |  | maximum |  |  |  |  |  |  |  |  |  | 60.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | ORGANICS/WATER/GCMS ORGANICS/WATER/GCMS | UM18 | PHENOL | 57M-96-1 | MX5711XX | ADV1 ${ }^{*}$ |  | 27-MAY-98 | 16-JUN-98 | 100 | $9.2<$ | 9.2 UGL | 9.2 | . 0 |
|  |  |  | PHENOL <br> い14 | 57M-96-1 | MX5711XX | ADV1W* |  | 27-MAY-98 | 16-JUN-98 | 100 | $9.2<$ | 9.2 UGL | 9.2 | . 0 |
|  |  |  |  |  |  |  |  |  |  |  |  |  | 9.2 |  |
|  |  |  | minimum |  |  |  |  |  |  |  |  |  | 9.2 |  |
|  |  |  | maximum |  |  |  |  |  | * |  |  |  | 9.2 |  |


| MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS <br> FT. DEVENS AOC 57 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Contractor Method Description |  | IRDMIS Method Code | Test | IRDMIS Site ID | IRDMIS <br> Field <br> Sample <br> Number | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | $\begin{aligned} & \text { Sample } \\ & \text { Date } \end{aligned}$ | Analysis Date | Value <br> Spike Value | Value | Original Sample Value Unit | Percent Recovery | RPD |
| ABB-ES ABB-ES | ORGANICS/WATER/GCMS ORGANICS/HATER/GCMS | UM18 | PYR <br> PYR PYR <br>  | $\begin{aligned} & 57 \mathrm{M}-96-11 \\ & 57 \mathrm{M}-96-11 \end{aligned}$ | $\begin{aligned} & \text { MX5711xX } \\ & \text { KX5711XX } \end{aligned}$ | ADV1 ${ }^{*} 26$ ADV1W*26 | $3 \text { holo }$ | $\begin{aligned} & 27-\text { MAY-9 } \\ & 27-\text { MAY-9 } \end{aligned}$ | $\begin{aligned} & \text { 16-JUN-98 } \\ & \text { 16-JUN-98 } \end{aligned}$ | $\begin{aligned} & 50 \\ & 50 \end{aligned}$ | $39 \ll$ | $2.8 \text { UGLL }$ | 78.0 74.0 | 5.3 5.3 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 76.0 74.0 78.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & A B B-E S \end{aligned}$ | VOLATILES/WATER/GCMS VOLATILES/WATER/GCMS | $\begin{aligned} & \text { UM20 } \\ & \text { UM20 } \end{aligned}$ | $\begin{aligned} & 11 \text { 11DEE } \\ & 1100 \mathrm{E} \\ & * * * * * * * * * \end{aligned}$ | 57M-96-11 $57 \mathrm{M}-96-11$ | Mx5711XX | ADV1 ${ }^{\star}$ 2 26 ADV1w*26 | XDGV XDGV | 27-MAY-9 | 03-JUN-98 03-JUN-98 | 50 50 | 45< | .5 UGL | 98.0 88.0 | 2.2 2.2 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 89.0 88.0 90.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | VOLATILES/WATER/GCMS VOLATILES/WATER/GCMS | $\begin{aligned} & \text { UM20 } \\ & \text { UM20 } \end{aligned}$ | C6H6 <br> C6H6 <br> ********** | $\begin{aligned} & 57 M-96-11\rangle \\ & 57 M-96-11\rangle \end{aligned}$ | MX5711XX MX5711XX | ADV1 $W^{*} 26$ <br> ADV1W*26 | $\begin{aligned} & 3 \text { XDGV } \\ & 3 \text { XDGG } \end{aligned}$ | $\begin{aligned} & 27-\mathrm{MAY}-9 \\ & 27-\mathrm{MAY}-9 \end{aligned}$ | $\begin{aligned} & 03-\text { JUN }-98 \\ & 03-\text { JUN-98 } \end{aligned}$ | $\begin{aligned} & 50 \\ & 50 \end{aligned}$ | $\begin{aligned} & 49 \ll \\ & 47< \end{aligned}$ | $\begin{aligned} & .5 \mathrm{UGL} \\ & .5 \mathrm{UGL} \end{aligned}$ | 98.0 | 4.2 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | 96.0 94.0 98.0 |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | VOLATILES/WATER/GCMS VOLATILES/WATER/GCMS | $\begin{aligned} & \text { UM20 } \\ & \text { UM20 } \end{aligned}$ | CLCGH5 CLCGH5 <br>  | $\begin{aligned} & 57 M-96-11\rangle \\ & 57 M-96-11\rangle \end{aligned}$ | MX5711xX MX5711XX | ADV1W*26 <br> ADV1W*26 | $\begin{aligned} & \text { XDGV } \\ & 3 \text { XDGG } \end{aligned}$ | $\begin{aligned} & \text { 27-MAY-9 } \\ & 27-\text { MAY-9 } \end{aligned}$ | $\begin{aligned} & 03-\text { JUN-98 } \\ & 03-\text { JUN-98 } \end{aligned}$ | $\begin{aligned} & 50 \\ & 50 \end{aligned}$ | $\begin{aligned} & 50< \\ & 49< \end{aligned}$ | .5 UGL | 100.0 88.0 | 2.0 2.0 |
|  |  |  | avg minimum maximum |  |  |  |  |  |  |  |  |  | $\begin{array}{r} 99.0 \\ 99.0 \\ 100.0 \end{array}$ |  |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | VOLATILES/HATER/GCMS VOLATILES/WATER/GCMS | $\begin{aligned} & \text { UM20 } \\ & \text { UM20 } \end{aligned}$ | MEC6H5 MEC6H5 <br>  | $\begin{aligned} & 57 M-96-11\rangle \\ & 57 M-96-11\rangle \end{aligned}$ | M×5711xX MX5711XX | ADV1W*26 ADV11**26 | $\begin{aligned} & \mathrm{XDGV} \\ & 30 \mathrm{OGV} \end{aligned}$ | $\begin{aligned} & \text { 27-MAY-9 } \\ & 27-M A Y-9 \end{aligned}$ | 03-JUN-98 03-JUN-98 | 50 50 | 47 < | . 5 UGL | 94.0 94.0 | . 0 |
|  |  |  | avg minimum maximm |  |  |  |  |  |  |  |  |  | 94.0 94.0 94.0 |  |
| ${ }_{\text {ABB }}^{\text {ABB-ES }}$ | VOLATILES/NATER/GCMS VOLATILES/WATER/GCMS | UM20 | ${ }_{\text {TRCLE }}^{\text {TRCLE }}$ | 57M-96-11 $57 \mathrm{M}-96-11$ | MX5711\% | ADV1 $1{ }^{*} \times 26$ ADV1 $W^{*} 26$ | XDGV | 27-MAY-9 | O3-JUN-98 $03-\mathrm{JUN}-98$ | 50 50 | 51 48 | 3.7 3.7 UGL | 102.0 96.0 | 6.1 6.1 |

\%

| Contractor Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | TABLE 8 <br> MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS FT. DEVENS AOC 57 |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | IRDMIS <br> Field <br> Sample <br> Number | Lab Number | Lot | Sample Date | Analysis Date | Spike <br> Value |
|  |  | ***** |  |  |  |  |  |  |  |
|  |  | avg minim maxim |  |  |  |  |  |  |  |

TABLE D-9
field duplicate result filtered samples

TABLE D-10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
FT. DEVENS AOC 57 TABLE D-10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
FT. DEVENS AOC 57

| Value Unit | RPD |
| :---: | ---: |
| 2120000 UGL | 191.4 |
| 46700 UGL | 191.4 |

1998 SUPPLEMENTAL FIELD INVESTIGATION

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS Site ID | Field Sample Number | Lab Number | Lot | Sample Date | Analysis Date |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB } \end{aligned}$ |  | $\begin{aligned} & 1602 \\ & 1602 \end{aligned}$ | $\begin{aligned} & \text { TSS } \\ & \text { TSS } \end{aligned}$ | $\begin{aligned} & 57 \mathrm{M}-96-11 \mathrm{X} \\ & 57 \mathrm{M}-96-11 \mathrm{X} \end{aligned}$ | $\begin{aligned} & \text { MX5711XX } \\ & \text { MD5711XX } \end{aligned}$ | ADV1W*26 ADV1W*28 |  | $\begin{aligned} & \text { 27-MAY-98 } \\ & 27-\text { MAY-98 } \end{aligned}$ | $\begin{aligned} & 02-\text { JUN-98 } \\ & 02-J U N-98 \end{aligned}$ |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ |  | $\begin{aligned} & 9071 \\ & 9071 \end{aligned}$ | $\begin{aligned} & \text { TPHC } \\ & \text { TPHC } \end{aligned}$ | $\begin{aligned} & 57 \mathrm{~s}-98-07 x \\ & 57 \mathrm{~s}-98-07 \mathrm{x} \end{aligned}$ | $\begin{aligned} & \text { SX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADV1S*7 ADV1S*27 |  | $\begin{aligned} & \text { 19-MAY-98 } \\ & \text { 19-MAY-98 } \end{aligned}$ | $\begin{aligned} & 11-\text { JUN-98 } \\ & 16-\text { JUN-98 } \end{aligned}$ |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-E } \end{aligned}$ | METALS/SOIL/ICP-MS METALS/SOIL/ICP-MS | $\begin{aligned} & \mathrm{J} 301 \\ & \mathrm{~J} 301 \end{aligned}$ | $\begin{aligned} & \text { AS } \\ & \text { AS } \end{aligned}$ | $\begin{aligned} & 57 s-98-07 x \\ & 57 s-98-07 x \end{aligned}$ | $\begin{aligned} & \text { sX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADVIS*7 ADV1S*27 |  | $\begin{aligned} & \text { 19-MAY-9 } \\ & \text { 19-MAY-9 } \end{aligned}$ | $\begin{aligned} & 30-J U N-98 \\ & 30-J U N-98 \end{aligned}$ |
| $\begin{aligned} & \text { ABB-ES } \\ & A B B-E S \end{aligned}$ | METALS/SOIL/ICP-MS METALS/SOIL/ICP-MS | $\begin{aligned} & \text { J301 } \\ & \text { J301 } \end{aligned}$ | $\begin{aligned} & \text { SE } \\ & \mathrm{SE} \end{aligned}$ | $\begin{aligned} & 57 \mathrm{~s}-98-07 x \\ & 57 \mathrm{~s}-98-07 x \end{aligned}$ | $\begin{aligned} & \text { sX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADV1S*7 ADV1S*27 |  | $\begin{aligned} & \text { 19-MAY-98 } \\ & \text { 19-MAY-98 } \end{aligned}$ | $\begin{aligned} & 30-\text { JUN-98 } \\ & 30-J U N-98 \end{aligned}$ |
| $\begin{aligned} & \text { ABB-ES } \\ & A B B-E S \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \mathrm{BA} \\ & \mathrm{BA} \end{aligned}$ | $\begin{aligned} & 57 s-98-07 x \\ & 575-98-07 x \end{aligned}$ | $\begin{aligned} & \text { SX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADV1S*7 ADV1S*27 | $\begin{aligned} & \text { UBZJ } \\ & \text { UBZJ } \end{aligned}$ | $\begin{aligned} & \text { 19-MAY-98 } \\ & \text { 19-MAY-98 } \end{aligned}$ | $\begin{aligned} & 03-J U N-98 \\ & 03-J U N-98 \end{aligned}$ |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \mathrm{CU} \\ & \mathrm{CU} \end{aligned}$ | $\begin{aligned} & 57 \mathrm{~s}-98-07 x \\ & 575-98-07 x \end{aligned}$ | $\begin{aligned} & \text { SX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADV1S*7 <br> ADV1S*27 |  | $\begin{aligned} & \text { 19-MAY-98 } \\ & \text { 19-MAY-98 } \end{aligned}$ | $\begin{aligned} & 03-\mathrm{JUN}-98 \\ & 03-\mathrm{JUN}-98 \end{aligned}$ |
| $\begin{aligned} & \text { ABB-ES } \\ & A B B-E S \end{aligned}$ | $\begin{aligned} & \text { METALS/SOIL/ICP } \\ & \text { METALS/SOIL/ICP } \end{aligned}$ | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \text { MN } \\ & \text { MN } \end{aligned}$ | $\begin{aligned} & 57 \mathrm{~s}-98-07 x \\ & 57 \mathrm{~s}-98-07 x \end{aligned}$ | $\begin{aligned} & \text { SX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADV1S*7 ADV1S*27 | UBZJ | $\begin{aligned} & \text { 19-MAY-98 } \\ & \text { 19-MAY-98 } \end{aligned}$ | $\begin{aligned} & 03-\mathrm{JUN}-98 \\ & 03-\mathrm{JUN}-98 \end{aligned}$ |
| $\begin{aligned} & \text { ABB-ES } \\ & A B B-E S \end{aligned}$ | $\begin{aligned} & \text { METALS/SOIL/ICP } \\ & \text { METALS/SOIL/ICP } \end{aligned}$ | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & P B \\ & P B \end{aligned}$ | $\begin{aligned} & 57 s-98-07 x \\ & 575-98-07 x \end{aligned}$ | $\begin{aligned} & \text { SX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADV1S*7 <br> ADV1S*27 | $\begin{aligned} & \text { UBZJ } \\ & \text { UBZJ } \end{aligned}$ | $\begin{aligned} & \text { 19-MAY-98 } \\ & \text { 19-MAY-98 } \end{aligned}$ | $\begin{aligned} & 03-\mathrm{JUN}-98 \\ & 03-\mathrm{JUN}-98 \end{aligned}$ |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB- } \end{aligned}$ | METALS/SOIL/ICP METALS/SOIL/ICP | $\begin{aligned} & \text { Js16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \text { SB } \\ & \text { SB } \end{aligned}$ | $\begin{aligned} & 57 s-98-07 x \\ & 57 s-98-07 x \end{aligned}$ | $\begin{aligned} & \text { sX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADV1S*7 <br> ADV1S*27 | $\begin{aligned} & \text { UBZJ } \\ & \text { UBZJ } \end{aligned}$ | $\begin{aligned} & \text { 19-MAY-98 } \\ & \text { 19-MAY-98 } \end{aligned}$ | $\begin{aligned} & 03-J U N-98 \\ & 03-J U N-98 \end{aligned}$ |
| $\begin{aligned} & \text { ABB-ES } \\ & \text { ABB-ES } \end{aligned}$ | $\begin{aligned} & \text { METALS/SOIL/ICP } \\ & \text { METALS/SOIL/ICP } \end{aligned}$ | $\begin{aligned} & \mathrm{JS} 16 \\ & \mathrm{JS} 16 \end{aligned}$ | $\begin{aligned} & \text { SE } \\ & \text { SE } \end{aligned}$ | $\begin{aligned} & 575-98-07 x \\ & 575-08-07 x \end{aligned}$ | $\begin{aligned} & \text { SX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADV1S*7 <br> ADV1S*27 |  | $\begin{aligned} & \text { 19-MAY-98 } \\ & \text { 19-MAY-98 } \end{aligned}$ | $\begin{aligned} & 03-\mathrm{JUN}-98 \\ & 03-\mathrm{JUN}-98 \end{aligned}$ |
| $\begin{aligned} & A B B-E S \\ & A B B-E S \end{aligned}$ | $\begin{aligned} & \text { METALS/SOIL/ICP } \\ & \text { METALS/SOIL/ICP } \end{aligned}$ | $\begin{aligned} & \text { JS16 } \\ & \text { JS16 } \end{aligned}$ | $\begin{aligned} & \mathrm{ZN} \\ & \mathrm{ZN} \end{aligned}$ | $\begin{aligned} & 57 \mathrm{~s}-98-07 x \\ & 57 \mathrm{~s}-98-07 x \end{aligned}$ | $\begin{aligned} & \text { SX570700 } \\ & \text { SD570700 } \end{aligned}$ | LADV1S*7 <br> ADV1S*27 |  | $\begin{aligned} & \text { 19-MAY-98 } \\ & \text { 19-MAY-98 } \end{aligned}$ | $\begin{aligned} & 03-\mathrm{J} N \mathrm{~N}-98 \\ & 03-\mathrm{JUN}-98 \end{aligned}$ |

TABLE D-10
 Contractor Method Description -----PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC PESICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC
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PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC
PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC
PESTICIDES/SOIL/GCEC Contractor

TABLE D-10

## FIELD DUPLICATE RESULTS UNFILTERED SAMPLES

1998 SUPPLEMENTAL FIELD INVESTIGATION
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 Contractor Method Description ABB-ES PESTICIDES/SOIL/GCEC ABB-ES PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC PESTIICIDESSS/SOIL/GCEC PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC PESTICIDES/SOIL/GCEC
PESTICIDES/SOIL/GCEC
ORGANICS/SOIL/GCMS
 -anics/sollacus ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS
 n ABB-ES

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table d-10


| Contractor | Method Description | Method Code | Test Name | IRDMIS <br> Site ID | Sample Number | Lab Number | Lot | Sample Date | Analysis Date | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DCLP | 575-98-07x | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 9 UGG | 133.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DCLP | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-9 | 29-MAY-98 < | . 18 UGG | 133.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DMPN | 57s-98-07x | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 3 UGG | 125.2 |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | 24DMPN | 57s-98-07X | S0570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 69 UGG |  |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DNP | 57s-98-07X | sx570700 | LabV1s*7 | OEXL | 19-MAY-9 | 28-MAY-98 < | 6 UGG | 133.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DNP | 57s-98-07X | SD570700 | ADV15*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | 1.2 UGG |  |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DNT | 57s-98-07x | sx570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 7 UGG | 133.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 24DNT | 57s-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 14 UGG |  |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 260NT | 575-98-07X | 5x570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 4 UGG | 129.9 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 260NT | 575-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 085 UGG |  |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2 CLP | 57s-98-07x | sx570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 3 UGG | 133.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2CLP | 57s-98-07X | SD570700 | ADV1s*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 06 UGG | 133.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2 NNAP | 57s-98-07X | S×570700 | LADV1S*7 | DEXL | 19-MAY-98 | 28-MAY-98 < | . 2 UGG | 139.0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2 NNAP | 57s-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 036 UGG | 139.0 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2 MNAP | 57s-98-07X | Sx570700 | LADV1S*7 | OEXL | 19-MAY-9 | 28-MAY-98 < | -2 UGG | 121.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2 MNAP | 57s-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 049 UGG |  |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2MP | 575-98-07x | S×570700 | L.ADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | .1 UGG | 110.1 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2 MP | 57s-98-07X | SD570700 | ADV1s*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 029 UGG | 110.1 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2NANIL | 57s-98-07X | 5x570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 3 UGG | 131.5 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2NANIL | 578-98-07X | SD570700 | ADV1s*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 062 UGG | 131.5 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2NP | 57s-98-07X | s×570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 7 UGG | 133.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 2 NP | 575-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 14 UGG | 133.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | 33DCBD | 575-98-07X | s×570700 | LADV1s*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 30 UGG | 130.6 |

table d-10
Field duplicate results unfiltered samples
1998 SUPPLEMENTAL FIELD INVESTIGATION

| est lame | IRDMIS <br> Site ID | Sample Number | Lab Number | Lot | Sample Date | $\begin{aligned} & \text { Analysis } \\ & \text { Date } \end{aligned}$ | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 33DCBD | 578-98-07X | s5570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | 6.3 UGG | 130.6 |
| SNANIL | 57s-98-07X | SX570700 | LADV1s*7 | OEXL | 19-maY-98 | 28-MAY-98 < | 2 UGG | 126.5 |
| SNANIL | 57S-98-07X | S0570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 45 UGG | 126.5 |
| 46DN2C | 575-98-07X | Sx570700 | LADV1s*7 | OEXL | 19-maY-98 | 28-mAY-98 < | 3 UGG | 138.0 |
| 46DN2C | 57s-98-07x | S0570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 55 UGG | 138.0 |
| 4RRPPE | 575-98-07x | Sx570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 2 UGG | 143.3 |
| BRPPE | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 033 UGG |  |
| CANIL | 578-98-07x | SX570700 | LADV1S*7 | OEXL | 19-maY-98 | 28-MAY-98 < | 4 UGG | 132.6 |
| CANIL | 57s-98-07X | S5570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 81 UGG | 132.6 |
| CL3C | 575-98-07X | Sx570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 5 UGG | 136.1 |
| CL3C | 575-98-07X | S5570700 | ADV1S*27 | DEXL | 19-MAY-98 | 29-MAY-98 < | . 095 UGG | 136.1 |
| CLPPE | 57s-98-07x | Sx570700 | LADV1S*7 | OEXL | 19-maY-98 | 28-MAY-98 < | . 2 UGG | 143.3 |
| CLPPE | 57S-98-07X | S5570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 033 UGG | 143.3 |
| 4MP | 575-98-07X | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 1 UGG | 122.6 |
| MP | 57S-98-07X | S5570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 24 UGG | 122.6 |
| NANIL | 575-98-07X | 5×570700 | LADV1S*7 | OEXL | 19-maY-98 | 28-MAY-98 < | 2 UGG | 132.0 |
| NANIL | 57s-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 41 UGG | 132.0 |
| NP | 575-98-07X | sX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 7 UGg | 133.3 |
| NP | 575-98-07X | S5570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | 1.4 UGG | 133.3 |
| ALPHPN | 57s-98-07x | sx570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 | 10 UGG | 163.6 |
| ALPHPN | 57S-98-07X | S5570700 | ADV15*27 | OEXL | 19-MAY-98 | 29-MAY-98 | 1 UGG | 163.6 |
| NAPNE | 575-98-07x | Sx570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 2 UGG | 139.0 |
| ANAPNE | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 036 UGG | 139.0 |

 Contractor Method Description ABB-ES ORGANICS/SOIL/GCMS ABB-ES ORGANICS/SOIL/GCMS RGANICS ORGANICS/SOIL/GCMS RRGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS aranics/soilacis ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS ORGANICS/SOIL/GCMS
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ORGANICS/SOIL/GCMS




## table D－10

field duplicate results unfiltered samples
1998 SUPPLEMENTAL FIELD INVESTIGATION
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TABLE D-10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
FT. DEVENS AOC 57
1998 SUPPLEMENTAL FIELD INVE

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | Field <br> Sample <br> Number | Lab Number | Lot | Sample Date | Analysis Date | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | DNOP | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 19 UGG | 136.1 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | FANT | 575-98-07X | S×570700 | LADV1S*7 |  | 19-MAY-98 | 28-MAY-98 < | . 3 UGG | 126.1 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | FANT | 57s-98-07x | SD570700 | ADV1S*27 |  | 19-MAY-98 | 29-MAY-98 < | . 068 UGG |  |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | flrene | 57s-98-07X | SX570700 | LADV1s*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 2 UGG | 143.3 |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | FLRENE | 57s-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 033 UGG | 143.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | HCBD | 57s-98-07X | Sx570700 | LADV1s*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 1 UGG | 125.2 |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | HCBD | 575-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 23 UGG | 125.2 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | ICDPYR | 57s-98-07X | SX570700 | LADV1s*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 1 UGG | 110.1 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | ICDPYR | 575-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 29 UGG | 110.1 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | ISOPHR | 57s-98-07X | Sx570700 | LADV1S*7 | OEXL | 19-mAY-98 | 28-MAY-98 < | . 2 UGG | 143.3 |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | ISOPHR | 575-98-07X | SD570700 | ADV1s*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 033 UGG | 143.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | NAP | 57s-98-07X | 5x570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | . 2 UGG | 137.6 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | NAP | 57s-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 037 UGG |  |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | NB | 57s-98-07X | SX570700 | LADV1S*7 |  | 19-MAY-98 | 28-MAY-98 < | . 2 UGG | 126.5 |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | NB | 57s-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 045 UGG | 126.5 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | NNDNPA | 57s-98-07X | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 1 UGG | 133.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | NNDNPA | 57s-98-07X | SD570700 | ADV15*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 2 UGG | 133.3 |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | NNDPA | 57s-98-07X | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 1 UGG | 136.1 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | NNDPA | 57s-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 19 UGG | 136.1 |
| ABb-ES | ORGANICS/SOIL/GCMS | LM18 | PCP | 57s-98-07X | SX570700 | LADV1s*7 | OEXL | 19-MAY-98 | 28-MAY-98 < | 6 UGG | 128.8 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | PCP | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | 1.3 UGG | 128.8 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | PHANTR | 57s-98-07x | SX570700 | LADV1S*7 |  | 19-MAY-98 | 28-MAY-98 < | . 2 UGG | 143.3 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | PHANTR | 575-98-07X | SD570700 | ADV1s*27 | OEXL | 19-MAY-98 | 29-MAY-98 < | . 033 UGG | 143.3 |

TABLE $\mathrm{D}-10$
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
FT. DEVENS AOC 57 TABLE $\mathrm{D}-10$
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
FT. DEVENS AOC 57
1998 SUPPLEMENTAL FIELD INVESTIGATION

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| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | Field Samole Number | Lab Number | Lot | Sample Date | Analysis Date |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | PHENOL | 57s-98-07X | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | PHENOL | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | PYR | 57s-98-07X | S×570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | PYR | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 < |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK651 | 575-98-07X | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK651 | 57S-98-07X | S0570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK653 | 57S-98-07X | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK653 | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK659 | 575-98-07X | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK659 | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK662 | 57S-98-07X | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK662 | 575-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK663 | 57s-98-07X | 5×570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK663 | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK669 | 575-98-07X | SX570700 | LADV1S*7 | OEXL | 19-MAY-98 | 28-MAY-98 |
| ABB-ES | ORGANICS/SOIL/GCMS | LM18 | UNK669 | 57S-98-07X | SD570700 | ADV1S*27 | OEXL | 19-MAY-98 | 29-MAY-98 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 111TCE | 575-98-07x | S×570700 | LADV1S*7 | YGOL | 19-MAY-98 | 28-MAY-98 < |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 111TCE | 575-98-07X | SD570700 | ADV1S*27 | YGOL | 19-MAY-98 | 29-MAY-98 < |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 112TCE | 57S-98-07X | SD570700 | ADV1S*27 | YGOL | 19-MAY-98 | 29-MAY-98 < |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 112TCE | 57S-98-07X | SX570700 | LADV1S*7 | YGOL | 19-MAY-98 | 28-MAY-98 < |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 110 CE | 57S-98-07X | SD570700 | ADV1S*27 | YGOL | 19-MAY-98 | 29-MAY-98 < |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 11DCE | 57S-98-07X | SX570700 | LADV1S*7 | YGOL | 19-MAY-98 | 28-MAY-98 < |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 110 CLE | 57S-98-07X | SD570700 | ADV1S*27 | YGOL | 19-MAY-98 | 29-MAY-98 < | TABLE D-10

FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
FT. DEVENS AOC 57

1998 SUPPLEMENTAL FIELD INVESTIGATION

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample Number | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | Sample Date | $\begin{aligned} & \text { Analysis } \\ & \text { Date } \end{aligned}$ | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 110 CLE | 57S-98-07x | SX570700 | LADV1S*7 |  | 19-MAY-98 | 28-MAY-98 | . 0023 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 12DCE | 57s-98-07x | SD570700 | ADV1s*27 |  | 19-MAY-98 | 29-MAY-98 < | . 003 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 12DCE | 57S-98-07X | SX570700 | LADV1S*7 | YgoL | 19-MAY-98 | 28-MAY-98 < | . 003 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 12 CLLE | 575-98-07x | SD570700 | ADV1S*27 | YGOL | 19-MAY-98 | 29-MAY-98 < | . 0017 UGG | 0 |
| ABB-ES | VOLATILES/SOIL/GCMS. | LM19 | 12 CLLE | 57S-98-07X | SX570700 | LADV1S*7 |  | 19-MAY-9 | 28-MAY-98 < | . 0017 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 120 CLP | 575-98-07x | SD570700 | ADV1S*27 | YGOL | 19-MAY-9 | 29-MAY-98 < | . 0029 UGG | - |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | 120CLP | 57S-98-07X | SX570700 | LADV1S*7 | YGOL | 19-MAY-98 | 28-MAY-98 < | . 0029 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | ACET | 575-98-07x | SX570700 | LADV1S* |  | 19-MAY | 28-MAY-98 | . 33 UGG | 180.4 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | ACET | 57s-98-07X | SD570700 | ADV1s*27 |  | 19-MAY-98 | 29-MAY-98 < | . 017 UGG |  |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | BRDCLM | 575-98-07X | SD570700 | ADV1S*27 |  | 19-MAY-98 | 29-MAY-98 < | . 0029 UGG | - 0 |
| ABb-ES | VOLATILES/SOIL/GCMS | LM19 | BRDCLM | 57s-98-07X | SX570700 | LADV1S*7 |  | 19-MAY-98 | 28-MAY-98 < | . 0029 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | C13DCP | 575-98-07X | SD570700 | ADV1s*27 |  | 19-MAY-98 | 29-MAY-98 < | . 0032 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | C13DCP | 57S-98-07X | sx570700 | LADV1S*7 |  | 19-MAY-98 | 28-MAY-98 < | . 0032 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | Czave | 575-98-07X | SD570700 | ADV1s*27 |  | 19-MAY-98 | 29-MAY-98 < | . 032 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | C2AVE | 57s-98-07X | SX570700 | LADV1S*7 | YGOL | 19 | 28-MAY-98 < | . 032 UGG | . 0 |
| ABb-ES | VOLATILES/SOIL/GCMS | LM19 | C2H3CL | 575-98-07X | SD570700 | ADV1S*27 |  | 19-MAY-98 | 29-MAY-98 < | . 0062 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | C2H3CL | 57S-98-07X | SX570700 | LADV1S*7 | YGOL | 19-MA | 28-MAY-98 < | . 0062 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | $\mathrm{CLH5CL}^{\text {che }}$ | 575-98-07X | SD570700 | ADV1S*27 |  | 19-MAY-98 | 29-MAY-98 < | . 012 UGG | . 0 |
| ABb-ES | VOLATILES/SOIL/GCMS | LM19 | C2H5CL | 575-98-07X | SX570700 | LADV1s*7 | YGOL | 19-MAY-98 | 28-MAY-98 < | . 012 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | C6H6 | 575-98-07x | SD570700 | ADV1s*27 | YGOL | 19-MAY-98 | 29-MAY-98 < | . 0015 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | C6H6 | 57s-98-07X | SX570700 | LADV1S*7 |  | 19-MAY-98 | 28-MAY-98 < | . 0015 UGG | . 0 |
| ABb-ES | VOLATILES/SOIL/GCMS | LM19 | CCL3F | 575-98-07X | SD570700 | ADV1S*27 |  | 19-MAY-98 | 29-MAY-98 < | . 0055 UGG | . 0 |
| ABB-ES | VOLATILES/SOIL/GCMS | LM19 | CCL3F | 57S-98-07X | SX570700 | LADV1S* ${ }^{\text {a }}$ | YGOL | 19-MAY-98 | 28-MAY-98 < | . 0559 UGG | . 0 |

TABLE D-10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
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| TABLE D-10 |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| FIELD DUPLICATE RESULTS UNFILTERED SAMPLES FT. DEVENS AOC 57 |  |  |  |  |  |  |  |  |
| 1998 SUPPLEMENTAL FIELD INVESTIGATION |  |  |  |  |  |  |  |  |
| IRDMIS |  |  | IRDMIS Field <br> Samp |  |  |  |  |  |
| Method Code | Test Name | IRDMIS <br> Site ID | Sample Number | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | Sample <br> Date | $\begin{aligned} & \text { Analysis } \\ & \text { Date } \end{aligned}$ | Value Unit |
| LM19 | CCL4 | 575-98-01 | SD570700 | ADV1S*2 | Ygol | 19-MAY- | 29-MAY-98 < | . 007 UGG |
| LM19 | CCL4 | 57s-98-07 | SX570700 | LADV1S* | YGOL | 19-MAY-9 | 28-MAY-98 < | . 007 UGG |
| LM19 | CH2CL2 | 57s-98-01 | SD570700 | ADV1S*27 | YGOL | 19-MAY- | 29-MAY-98 < | . 012 UGg |
| LM19 | CH2CL2 | 575-98-07 | SX570700 | LADV1S*7 | YGOL | 19-MAY- | 28-MAY-98 < | . 012 UGG |
| LM19 | CH38R | 57s-98-070 | SD570700 | ADV15*27 |  | 19-MAY | 29-MAY-98 < | . 0057 UGG |
| LM19 | CH3BR | 575-98-07 | sx570700 | LADV1S* |  | 19-MAY-9 | 28-MAY-98 < | . 0057 UGG |
| LM19 | CH3CL | 575-98-070 | SD570700 | ADV11*27 |  | 19-MAY- | 29-MAY-98 < | . 0088 UGG |
| LM19 | CH3CL | 57s-98-07 | SX570700 | LADV1S* |  | 19-MAY-9 | 28-MAY-98 < | . 0088 UGG |
| LM19 | CHBR3 | 57s-98-01 | SD570700 | ADV1S*27 | YGOL | 19-MAY- | 29-MAY-98 < | . 0069 UGG |
| LM19 | CHBR3 | 575-98-07 | Sx570700 | LADV1S* |  | 19-MAY-9 | 28-MAY-98 < | . 0069 UGG |
| L.M19 | CHCL3 | 575-98-01 | SD570700 | ADV1S*2 |  | 19-MAY- | 29-MAY-98 < | . 00087 UGG |
| LM19 | CHCL3 | 575-98-07 | SX570700 | LADV1S*7 | YGOL | 19-MAY-9 | 28-MAY-98 < | . 00087 UGG |
| LM19 | CLCOH5 | 57s-98-0 | SD570700 | ADV1S*27 |  | 19-MAY-9 | 29-MAY-98 < | . 00086 UGG |
| LM19 | CLC6H5 | 57s-98-07 | SX570700 | LADV1S* | YGOL | 19-MAY-9 | 28-MAY-98 < | . 00086 UGG |
| LM19 | cs2 | 57s-98-01 | SD570700 | ADV1S*27 |  | 19-MAY- | 29-MAY-98 < | . 0044 UGG |
| LM19 | CS2 | 575-98-07 | SX570700 | LADV1S*7 | YGOL | 19-MAY-9 | 28-MAY-98 < | . 0044 UGG |
| LM19 | DBRCLM | 57s-98-07x | SD570700 | ADV1S*27 |  | 19-MAY- | 29-MAY-98 < | . 0031 UGG |
| LM19 | DBRCLM | 575-98-07 | Sx570700 | LADV1S* | YGOL | 19-MAY-9 | 28-MAY-98 < | . 0031 UGG |
| LM19 | ETC6H5 | 57s-98-01 | S 5570700 | LADV19*7 | YGOL | 19-MAY-9 | 28-MAY-98 < | . 0017 UGG |
| LM19 | ETC6H5 | 575-98-07 | SD570700 | ADV1S*27 |  | 19-MAY-9 | 29-MAY-98 < | . 0017 UGG |
| LM19 | MEC6H5 | 57s-98-07 | SX570700 | LADV1S* |  | 19-MAY-98 | 28-MAY-98 < | . 00078 UGG |
| LM19 | MEC6H5 | 57s-98-07 | SD570700 | ADV1S*27 | YGOL | 19-MAY-98 | 29-MAY-98 < | . 00078 UGG |
| $\begin{aligned} & \text { LM19 } \\ & \text { LM19 } \end{aligned}$ | MEX MEK | $\begin{aligned} & 575-98-1 \\ & 575-98-1 \end{aligned}$ | $\begin{aligned} & \text { SD570700 } \\ & \text { SX570700 } \end{aligned}$ | ADV1S*2 LADV1S* | YGOL | $\begin{aligned} & 19-\mathrm{MAY}-¢ \\ & 19-\mathrm{MAY}-\oint \end{aligned}$ | $\begin{aligned} & \text { 29-MAY-98 } \\ & \text { 28-MAY-98 } \end{aligned}$ | $\begin{aligned} & .07 \text { UGG } \\ & .07 \text { UGG } \end{aligned}$ |

Contractor Method Description
 ABB-ES VOLATILES/SOIL/GCMS VOLATILES/SOIL/GCMS VOLATILES/SOIL/GCMS VOLATILES/SOIL/GCMS VOLATILES/SOIL/GCMS VOLATILES/SOIL/GCMS vatilessolus VOLATILES/SOIL/GCMS VOLATILES/SOIL/GCMS bolatiles/soilgas VOLATILES/SOIL/GCMS
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VOLATILES/SOIL/GCMS VOLATILES/SOIL/GCMS VOLATILES/SOIL/GCMS VOLATILES/SOIL/GCMS
VOLATILES/SOIL/GCMS


TABLE D－10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES FT．DEVENS AOC 5

## 1998 SUPPLEMENTAL FIELD INVESTIGATION

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 IRDMIS
Method Contractor Method Description









 57M－96－11X MX5711XX
57M－96－11X MD5711XX 57M－96－11X MD5711XX $\begin{array}{llllll}\text { 57M－96－11X MD5711XX } & \text { ADV1W＊28 OGHG } 27-M A Y-98 & \text { O3－JUN－98 } \\ \text { 57M－96－11X MX5711XX } & \text { ADV1W＊26 OGHG } 27-M A Y-98 & 03-J U N-98\end{array}$ 57M－96－11x MD5711xX ADV1 ${ }^{\star}$ ²8 OGHG 27－MAY－98 03－JUN－98＜
 $\begin{array}{llllll}\text { 57M－96－11X MD5711XX } & \text { ADV1W＊28 OGHG 27－MAY－98 O3－JUN－98 } \\ \text { 57M－96－11X MX5711XX } & \text { ADV1W＊26 OGHG } 27 \text {－MAY－98 } & 03-J U N-98<\end{array}$

 $\begin{array}{llll}\text { PCBO16 } & 57 M-96-11 \times \text { MX5711XX } & \text { ADV1 } W^{\star} \text { 26 } & \text { SDWG 27－MAY－98 } 24-\text { JUN－98 } \\ \text { PCBO16 } & 57 M-96-11 X ~ M D 5711 X X ~ & \text { ADV1 }\end{array}$











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PESTICIDES／WATER／GCEC
PESTIICIDES／WATER／GCEC
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TABLE
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
FT. DEVENS AOC 57
1998 SUPPLEMENTAL FIELD INVE

TABLE D－10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES TABLE D－10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
1998 SUPPLEMENTAL FIELD INVE


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## 1998 SUPPLEMENTAL FIELD INVESTIGATION

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 27－MAY－98 28－JUN－98＜  ADV1 ${ }^{*}$ ²8 TDOI 27 －MAY－98 28－JUN－98 $<$
ADV1 ${ }^{*} 26$ TDOI 27 －MAY－98 27 －JUN－98 $<~$ ADV1W＊28 TDOI 27－MAY－98 28－JUN－98＜
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 ADV1 ${ }^{*}$＊28 TDOI 27 －MAY－98 28 －JUN－98＜ ADV1 ${ }^{*}$ 28 TDOI 27－MAY－98 28－JUN－98＜

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PESTICIDES／WATER／GCEC PESTICIDES／WATER／GCEC
 PESTICIDES／WATER／GCEC PESTICIDES／WATER／GCEC PESTICIDES／WATER／GCEC


TABLE D-10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
FT. DEVENS AOC 57
1998 SUPPLEMENTAL FIELD INVESTIGATION Q:苞:
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES

1998 SUPPLEMENTAL FIELD INVESTIGATION

| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS <br> Field <br> Sample <br> Number | $\begin{aligned} & \text { Lab } \\ & \text { Number } \end{aligned}$ | Lot | Sample Date | Analysis Date | Value Unit | RPD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2 CLP | 57M-96-11X | MX5711xX | ADV1W*26 |  | 27-MAY-98 | $16-\mathrm{JUN}-98$ | . 99 UGL | 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2CNAP | 57M-96-11x | MD5711XX | ADV1 $W^{*} 28$ |  | 27-mAY-98 | $16-\mathrm{JUN}-98<$ | . 5 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2 CNAP | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ |  | 27-MAY-98 | $16-\mathrm{JUN}-98$ < | . 5 UGL | . 0 |
| ABb-ES | ORGANICS/HATER/GCMS | UM18 | 2MNAP | 57M-96-11X | MD5711XX | ADV1W^28 |  | 27-mAY-98 | 16-JUN-98 < | 1.7 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2 MNAP | 57M-96-11X | MX5711xX | ADV1 ${ }^{*} 26$ |  | 27-MAY-98 | $16-J U N-98<$ | 1.7 UGL | . 0 |
| ABB-ES | ORGANICS/HATER/GCMS | UM18 | 2 MP | 57M-96-11X | MX5711xX | ADV1W*26 |  | 27-MAY-98 | 16-JUN-98 < | 3.9 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2 MP | 57M-96-11X | MD5711XX | ADV1 ${ }^{*} 28$ |  | 27-MAY-98 | $16-\mathrm{JUN}-98$ < | 3.9 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2NANIL | 57M-96-11X | MD5711xX | ADV1 ${ }^{*} 28$ |  | 27-MAY-98 | 16-JUN-98 < | 4.3 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2NANIL | 57M-96-11X | MX5711XX | ADV1W*26 |  | 27-MAY-98 | 16-JUN-98 | 4.3 UGL | . 0 |
| ABB-ES | ORGANICS/HATER/GCMS | UM18 | 2 NP | 57M-96-11X | MD5711xX | ADV1 ${ }^{*}$ 28 |  | 27-mAY-98 | 16-JUN-98 < | 3.7 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 2NP | 57M-96-11X | MX5711XX | ADV1W*26 | W010 | 27-MAY-98 | 16-JUN-98 < | 3.7 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 33DCBD | 57M-96-11x | MD5711xX | ADV1 ${ }^{*} 28$ |  | 27-MAY-98 | 16-JUN-98 < | 12 UGL. | . 0 |
| ABb-ES | ORGANICS/WATER/GCMS | UM18 | 33DCBD | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 < | 12 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 3NANIL | 57M-96-11X | MX5711xX | ADV1 ${ }^{*}$ * 26 |  | 27-MAY-98 | 16-JUN-98 < | 4.9 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 3NANIL | 57M-96-11X | MD5711XX | ADV1W*28 | hDIo | 27-MAY-98 | 16-JUN-98 < | 4.9 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 46DN2C | 57M-96-11X | MD5711XX | ADV1 ${ }^{*}$ 28 |  | 27-MAY-98 | $16-\mathrm{JUN}$-98 < | 17 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 460 N 2 C | 57M-96-11X | MX5711XX | ADV1W*26 |  | 27-MAY-98 | $16-\mathrm{JUN}-98$ < | 17 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | LM18 | 4BRPPE | 57M-96-11X | MD5711xX | ADV1W*28 |  | 27-MAY-98 | 16-JUN-98 < | 4.2 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4 BRPPE | 57M-96-11X | MX5711XX | ADV1W*26 |  | 27-MAY-98 | 16-JUN-98 < | 4.2 UGL | . 0 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4 CANIL | 57M-96-11X | MD5711xX | ADV1 ${ }^{\star} 28$ |  | 27-MAY-98 | 16-JUN-98 < | 7.3 UGL | . 0 |
| ABE-ES | ORGANICS/WATER/GCMS | UM18 | 4CANIL | 57M-96-11X | MX5711xX | ADV1W*26 |  | 27-MAY-98 | $16-\mathrm{JUN}-98$ < | 7.3 UGL | . 0 |
| Abb-ES | ORGANICS/WATER/GCMS | UM18 | 4CL3C | 57M-96-11X | MD5711xX | ADV1W*28 |  | 27-MAY-98 | 16-JUN-98 < | 4 UGL | . 0 |
| ABS-ES | ORGANICS/WATER/GCMS | UM18 | 4CL3C | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 < | 4 UGL | . 0 |

TABLE D-10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES


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| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> Site ID | IRDMIS Field Sample | Lab Number | Lot | Sample Date | Analysis Date |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4CLPPE | 57M-96-11X | MD5711xX | ADV1 ${ }^{*}$ *28 | WDIO | 27-MAY-98 | 16-JUN-98 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4CLPPE | 57M-96-11X | MK5711XX | ADV1W*26 |  | 27-MAY | 16-JUN-98 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4MP | 57M-96-11X | MD5711xX | ADV1W*28 | hDIO | 27-MAY | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4MP | 57M-96-11X | MX5711XX | ADV1W*26 |  | 27-MAY | 16-JUN-98 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4NANIL | 57M-96-11X | MD57111X | ADV1 ${ }^{*} 28$ | hDIO | 27-MAY | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4NANIL |  | MX5711XX | ADV1W* |  |  |  |
| ABB | ORGANICS/WATER/GCMS | UM18 | 4 NP | 57M-96-1 | MX5711xX | ADV1W*26 | WDIO | 27-MAY-9 | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | 4NP | 57M-96-11X |  |  |  |  |  |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | ANAPNE | 57M-96-11X | MD5̊7111x | ADV1W*28 |  | 27-MAY-9 | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | ANAPNE | 57M-96-11X |  |  |  |  |  |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | ANAPYL | 57M-96-11X | MD5711XX | ADV1 ${ }^{*} 28$ |  | 27-MAY-98 | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | ANAPYL | 57M-96-11X | MX5711XX | ADV1W*26 |  | 27-MAY-9 | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | ANTRC | 57M-96-11x | MD57111x | ADV1W*28 | h010 | 27-MAY-98 | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | ANTRC | 57M-96 | MX5711XX | ADV1W*26 |  | 27-MAY-98 | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | B2CEXM | 57M-96-11X | MD5711XX | ADV1 ${ }^{*} 28$ | WDIO | 27-MAY-98 | 6-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | B2CEXM | 57M-96-11X | MX5711XX | ADV1 ${ }^{*}$ 26 |  | 27-MAY- | 16-JUN-98 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | B2CIPE | 57M-96-11X | MD5711xx | ADVIW*28 | WD10 | 27-MAY-98 | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | B2CIPE | 57M-96-11X | MX5711XX | ADV1W*26 |  | 27-MAY-98 | 8 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | B2CLEE | 57M-96-11x | MD5711xX | ADV1W*28 | WD10 | 27-MAY-98 | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | B2CLEE | 57M-96-11X | MX5711XX | ADV1W*26 |  |  |  |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | B2EHP | 57M-96-11X | MD5711xX | ADV1 ${ }^{*} 28$ |  | 27-MAY-98 | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | B2EHP | 57M-96-11X | MX5711XX | ADV1W*26 |  | 27-MAY-9 |  |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BAANTR | 57M-96-11x | MD5711xX | ADV |  | 27-MA | 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BAANTR | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY- | 16-JUN-98 < |

TABLE D-10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
1998 SUPPLEMENTAL FIELD INVESTIGATION

| IRDMIS |  |  | Field |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Method | Test | IRDMIS | Sample |  |  | Sample | Analysis |
| code | Name | Site ID | Number | Number | Lot | Date | Date |


| ABB-ES ABB-ES | ORGANICS/WATER/GCMS ORGANICS/WATER/GCMS | UM18 UM18 | BAPYR BAPYR | 57M-96-11X MD5711XX <br> 57M-96-11X MX5711XX | ADV1W*28 WDIO 27-MAY-98 16-JUN-98 ADV1W*26 WDIO 27-MAY-98 16-JUN-98 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BbFANT | 57M-96-11X MD5711XX | ADV1W*28 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BBFANT | 57M-96-11X MX5711XX | ADV1W*26 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BBZP | 57M-96-11X MD5711XX | ADV1W*28 LDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BBZP | 57M-96-11X MX5711XX | ADV1W*26 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | benzoa | 57M-96-11X MD5711XX | ADV1/ *28 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BENZOA | 57M-96-11X MX5711XX | ADV1W*26 LDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BGHIPY | 57M-96-11X MD5711XX | ADV1W*28 LDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BGHIPY | 57M-96-11X MX5711XX | ADV1W*26 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | bKFANT | 57M-96-11X MD5711xX | ADV1W*28 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | BKFANT | 57M-96-11X MX5711XX | ADV1W*26 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | LM18 | BZALC | 57M-96-11X MD5711XX | ADV11*28 LDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | LM18 | BZALC | 57M-96-11X MX5711XX | ADV1W*26 LDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | carbaz | 57M-96-11X MD5711xX | ADV14*28 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | CARBAZ | 57M-96-11X MX5711XX | ADV1W*26 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | CHRY | 57M-96-11X MD5711XX | ADV1W*28 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | CHRY | 57M-96-11X MX5711XX | ADV1W*26 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | cl6BZ | 57M-96-11X MD5711XX | ADV1W*28 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | CL6BZ | 57M-96-11X MX5711XX | ADV1W*26 WDIO 27-MAY-98 16-JUN-98 < |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | CL6CP | 57M-96-11X MD5711XX | ADV1W*28 WDIO 27-MAY-98 16-JUN-98 < |
| ABb-ES | ORGANICS/WATER/GCMS | UM18 | CL6CP | 57M-96-11X MX5711XX | ADV1W*26 WDIO 27-MAY-98 16-JUN-98 |
| ABB-ES | ORGANICS/WATER/GCMS | UM18 | CL6ET | 57M-96-11X MD5711XX | ADV1W*28 WDIO 27-MAY-98 16-JUN-98 |


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Contractor Method Description ABB－ES ORGANICS／WATER／GCMS ABB－ES ORGANICS／WATER／GCMS GANICS／WATER／GCMS ORGANICS／WATER／GCMS ORGANICS／WATER／GCMS ORGANICS／WATER／GCMS ORGANICS／WATER／GCMS ORGANICS／WATER／GCMS ORGANICS／WATER／GCMS
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ORGANICS／WATER／GCMS
1998 SUPPLEMENTAL FIELD INVESTIGATION IRDMIS
Field
Lab
Number
Sample

Date | Analysis |
| :--- |
| Date | ＜


IRDMIS

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& \text { TABLE D-10 } \\
& \text { FIELD DUPLICATE RESULTS UNFILTERED SAMPLES } \\
& \text { FT. DEVENS AOC } 57
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\end{aligned}
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TABLE D-10
FIELD DUPLICATE RESULTS UNFILTERED SAMPLES FT. DEVENS AOC 57


1998 SUPPLEMENTAL FIELD INVESTIGATION

| Test | IRDMIS | Field Sample | Lab |  | Sample | Analysis |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Name | Site ID | Number | Number | Lot | Date | Date < |
| NAP | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 |
| NAP | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 |
| NB | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| NB | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| NNDNPA | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| NNDNPA | 57M-96-11X | MX5711XX | ADV1 ${ }^{*} 26$ | hDIO | 27-MAY-98 | 16-JUN-98 < |
| NNDPA | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| NNDPA | 57M-96-11X | MX5711XX | ADV1W*26 | hDIO | 27-MAY-98 | 16-JUN-98 < |
| PCP | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| PCP | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| PHANTR | 57M-96-11X | MD5711xX | ADV1 ${ }^{*} 28$ | WDIO | 27-MAY-98 | 16-JUN-98 < |
| PHANTR | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| PHENOL | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| PHENOL | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| PYR | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| PYR | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 < |
| UNK530 | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 |
| UNK530 | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 |
| UNK538 | 57M-96-11X | MX5711xX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 |
| UNK538 | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 |
| UNK621 | 57M-96-11X | MD5711XX | ADV1W*28 | WDIO | 27-MAY-98 | 16-JUN-98 |
| UNK621 | 57M-96-11X | MX5711XX | ADV1W*26 | WDIO | 27-MAY-98 | 16-JUN-98 |
| 111TCE | 57M-96-11X | MD5711XX | ADV1 ${ }^{*}$ 28 | XDGV | 27-MAY-98 | 03-JUN-98 < | SIWay菖





TABLE D－10
field duplicate results unfiltered samples




|  | IRDMIS <br> Field <br> IRDMIS <br> Sample | Lab |
| :--- | :--- | :--- |
| Siter in |  |  |

Analysis
Date
：


57M－96－11X MX5711XX ADV1W＊26 XDGV 27－MAY－98 03－JUN－98＜ ADV1W＊26 XDGV 27－MAY－98 03－JUN－98＜

ADV1w＊26 XDGV 27－MAY－98 03－JUN－98＜
ADV1w＊28 XDGV 27－MAY－98 03 －JUN－98 $<$ ADV1W＊26 XDGV 27－MAY－98 03－JUN－98＜
ADV1W＊28 XDGV $27-M A Y-98$ 03－JUN－98＜ ADV1 ${ }^{*}$ 26 XDGV 27－MAY－98 03－JUN－98 $<$
ADV1W＊28 XDGV 27－MAY－98 03－JUN－98 $<$
ADV1W＊26 XDGV 27－MAY－98 03－JUN－98＜ ADV1W＊26 XDGV 27－MAY－98 03－JUN－98＜ ADV1W＊28 XDGV 27－MAY－98 03－JUN－98＜ $\begin{aligned} & \text { ADV1W＊26 XDGV } 27-\text { MAY－98 } \\ & \text { 03－JUN－} 98\end{aligned}<$

 XXLLESXW XLl－96－N． 57M－96－11X MX57111XX
57M－96－11X MD5711XX 57M－96－11x MX5711XX 57M－96－11X MD5711XX 57M－96－11X MX5711XX
57M－96－11X MD5711XX 57M－96－11X MX5711XX 57M－96－11X MX5711XX 57M－96－11X MD5711XX 57M－96－11X MX5711XX XXLLLSXW XLL－96－WLS 57M－96－11X MSS711XX 57M－96－11X MX5711XX
57M－96－11X MD5711XX 57M－96－11X MX5711XX
57M－96－11X MD5711XX 57M－96－11X MX5711XX
57M－96－11X MD5711XX 57M－96－11X MX5711XX 57M－96－11X MX5711XX ＝ BRDCLM 는
쓴山 썽 C2H3CL
C2H3CL⿹ㅓN
Nㅓ̃ C6H6
C6H6岗 CCL4 CL4 ${ }^{\mathrm{CH} \mathrm{H} 2 \mathrm{CL} 2}$ CH3BR 를 CHBR3
CHBR3 IRDMIS
Method Contractor Method Description Code UM20
LM2O 우ㄷㅜㅗㄱ unio${ }^{\text {minco }}$ 를蹬䠉 unco登登璒 숟욱 꾹 Nㅜㄱㅜㅜㄱ ABB－ES VOLATILES／WATER／GCMS ABB－ES WOLATILES／WATER／GCM ABB－ES VOLATILES／WATER／GCMS OLATILES／WAIER VOLATILES／WATER／GCMS － VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GGMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS VOLATILES／WATER／GCMS
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1998 SUPPLEMENTAL FIELD INVESTIGATION


> TABLE D-10

> FIELD DUPLICATE RESULTS UNFILTERED SAMPLES FT. DEVENS AOC 57

| 1998 SUPPLEMENTAL FIELD INVESTIGATION |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Contractor | Method Description | IRDMIS Method Code | Test Name | IRDMIS <br> site ID | $\begin{aligned} & \text { IRDMIS } \\ & \text { Field } \\ & \text { Sample } \\ & \text { Number } \end{aligned}$ | Lab Number | Lot | Sample Date | Analysis Date | Value Unit | RPD |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | CHCL3 | 57M-96-1 | MX5711xX | ADV1W*26 |  | 27-maY | 03-JUN-98 < | . 5 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | CHCL3 | 57M-96-11 | MD5711xX | ADV1W*28 | XDGV | 27-MAY | 03-JUN-98 < | . 5 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | CL2BZ | 57M-96-11 | Mx5711xx | ADV1W*26 | XDGV | 27-MAY | 03-JUN-98 | 19 UGL | 5.4 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | CL2BZ | 57M-96-1 | MD5711xX | ADV1W*28 | KDGV | 27-MAY- | 03-JUN-98 | 18 UGL | 5.4 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | CLC6H5 | 57M-96-1 | Mx5711xx | ADV1W*26 |  | 27-MAY | 03-JUN-98 < | . 5 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | CLC6H5 | 57M-96-11 | MD5711x | ADV1W*28 |  | 27-MAY-9 | 03-JUN-98 < |  | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | CS2 | 57M-96-11 | Mx5711xx | ADV1W*26 |  | 27-maY | 03-JUN-98 < | . 5 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | CS2 | 57M-96-11 | MD5711XX | ADV1W*28 |  | 27-MAY-9 | 03-JUN-98 < |  | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | CYHX | 57M-96-11 | mx5711xx | ADV1W*26 |  | 27-MAY | 03-JUN-98 | 20 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM2O | CYHX | 57M-96-11 | MD5711x | ADV1W*28 |  | 27-MAY-9 | 03-JUN-98 |  | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | DBRCLM | 57M-96-11 | Mx57111x | ADV1W*26 | XDGV | 27-MAY-9 | 03-JUN-98 < | . 67 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | DBRCLM | 57M-96-11 | MD5711x | ADV1W*28 |  | 27-MAY-9 | 03-JUN-98 | . 67 UGL | . 0 |
| ABb-ES | VOLATILES/WATER/GCMS | UM20 | ETC6H5 | 57M-96-11 | mx5711xx | ADV1W*26 | XDGV | 27-MAY-9 | 03-JUN-98 | 20 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | ETC6H5 | 57M-96-11 | MD5711XX | ADV1W*28 |  | 27-MAY-9 | 03-JUN-98 | 20 UGL | . 0 |
| ABB-es | VOLATILES/WATER/GCMS | UM20 | MEC6H5 | 57M-96-11 | .Mx5711xX | ADV1W*26 | XDGV | 27-MAY-9 | 03-JUN-98 < | . 5 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | MEC6H5 | 57M-96-11 | MD5711XX | ADV1W*28 | XDGV | 27-MAY-9 | 03-JUN-98 < | . 5 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM2O | MECYPE | 57M-96-11 | MX5711xX | ADV1W*26 | XDGV | 27-MAY-9 | 03-JUN-98 | 20 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | MECYPE | 57M-96-11 | MD5711XX | ADV1W*28 | XDGV | 27-MAY-9 | 03-JUN-98 | 20 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | MEK | 57M-96-11 | Mx5711xX | ADV1W*26 |  | 27-MAY-9 | 03-JUN-98 < | 6.4 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | MEK | 57M-96-11 | MD5711XX | ADV1W*28 | XDGV | 27-MAY-9 | 03-JUN-98 < | 6.4 UGL | . 0 |
| ABb-es | VOLATILES/WATER/GCMS | UM20 | MIBK | 57M-96-11 | MX57111x | ADV1W*26 | XDGV | 27-MAY-9 | 03-JUN-98 < | 3 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM20 | MIBK | 57M-96-11 | MD5711XX | ADV1W*28 | XDGV | 27-MAY-9 | 03-JUN-98 < | 3 UGL | . 0 |
| ABB-ES | VOLATILES/WATER/GCMS | UM2O | MNBK | 57M-96-11 | MX5711XX | ADV1W*26 | XDGV | 27-MAY-9 | 03-JUN-98 < | 3.6 UGL | . 0 |

## table D-10

FIELD DUPLICATE RESULTS UNFILTERED SAMPLES
1998 SUPPLEMENTAL FIELD INVESTIGATION


TABLE D-11
SUMMARY OF TENTATIVELY IDENTIFIED COMPOUNDS
AOC 571998 SUPPLEMENTAL FIELD INVESTIGATION DEVENS, MASSACHUSETTS

| MEDIA | SITE ID | $\begin{gathered} \text { FIELD SAMPLE } \\ \text { NUMBER } \end{gathered}$ | IRDMIS <br> TEST NAME | PARAMETER NAME | VALUE | $\begin{aligned} & \text { FLAG } \\ & \text { CODE } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| SVOA sediment (LM18) | 57D-98-01X | DX570100 | $\begin{array}{\|l\|} \hline \text { C29 } \\ \text { UNK646-687 } \\ \hline \end{array}$ | nonacosane unknown (7) | 6.71 | $\begin{aligned} & \hline S \\ & s \\ & \hline \end{aligned}$ |
|  | 57D-98-02X | DX570200 | C16A <br> C27 <br> SMOLE <br> UNK532-687 | hexadecanoic acid heptacosane sulfur unknown (20) | $\begin{array}{\|ll\|} \hline 1.6 & \\ 5.2 & \\ 2.1 & \\ & 145 \\ \hline \end{array}$ | $\begin{array}{\|l} \hline s \\ s \\ s \\ s \\ \hline \end{array}$ |
|  | 57D-98-03X | DX570300 | $\left.\begin{array}{\|l\|} \hline \text { C29 } \\ \text { UNK644-687 } \end{array} \right\rvert\,$ | nonacosane unknown (12) | 9.4 | $\begin{aligned} & \hline s \\ & s \\ & \hline \end{aligned}$ |
|  | 57D-98-04X | DX570400 | C29 <br> PHENAA <br> UNK597-689 | nonacosane phenacetin unknown (32) | $\begin{array}{\|ll\|} \hline 13 & \\ 1.3 & \\ & 121 \\ \hline \end{array}$ | $\begin{aligned} & \hline s \\ & S \\ & S \\ & \hline \end{aligned}$ |
|  | 57D-98-05X | DX570500 | C16A <br> C27 <br> SMOLE <br> UNK517-695 | hexadecane heptacosane sulfur unknown (18) | 5.5  <br> 7.4  <br> 1.8  <br>  54 | $\begin{aligned} & \hline s \\ & s \\ & s \\ & s \\ & \hline \end{aligned}$ |
|  | 57D-98-06X | DX570600 | C29 UNK538-687 | nonacosane unknown (21) | ${ }^{7.2} 6$ | $\begin{array}{\|l} \hline s \\ s \\ \hline \end{array}$ |
|  | 57D-98-07X | DX570700 | $\begin{array}{\|l\|} \hline 3 S 5 E 3 L \\ \text { UNK597-687 } \\ \hline \end{array}$ | B-sitosterol unknown (30) | ${ }^{1.8} \begin{aligned} & \\ & \\ & \\ & \end{aligned}$ | $\begin{aligned} & \hline s \\ & s \\ & \hline \end{aligned}$ |
|  | 57D-98-08X | DX570800 | $\begin{array}{\|l\|} \hline \text { 3S5E3L } \\ \text { UNK612-687 } \\ \hline \end{array}$ | B-sitosterol unknown (21) | .$^{66} \quad 31$ | $\begin{aligned} & \hline s \\ & s \\ & \hline \end{aligned}$ |
| SVOA soils <br> (LM18) | 57S-98-01X | SX570101 | UNK636-695 | unknown (3) |  | S |
|  | 57S-98-02X | SX570200 | UNK645-669 | unknown (6) | 59 | S |
|  | 57S-98-03X | SX570302 | UNK667 | unknown | 20 | S |
|  | 57S-98-05X | SX570503 | UNK667 | unknown |  | S |
|  | 57S-98-06X | SX570601 | UNK653-669 | unknown (5) | 21 | S |
|  | 57S-98-07X | SD570700 | ALPHPN <br> C27 <br> UNK526-682 | alpha-pinene heptacosane unknown (10) | $\begin{array}{\|ll\|} \hline 1 & \\ 1.5 & \\ & \\ \hline \end{array}$ | $\begin{aligned} & \text { SD } \\ & \text { SD } \\ & \text { SD } \\ & \hline \end{aligned}$ |
|  | 57S-98-07X | SX570700 | ALPHPN <br> UNK645-669 | alpha-pinene unknown (8) | 10  <br>  170 <br>   <br>   | $\begin{aligned} & \hline \mathrm{S} \\ & \mathrm{~s} \\ & \hline \end{aligned}$ |
|  | 57S-98-07X | SX570701 | UNK577-628 | unknown (4) | 50 | S |
|  | 57S-98-08X | SX570800 | $\begin{array}{\|l\|} \hline \text { C29 } \\ \text { UNK636-695 } \\ \hline \end{array}$ | nonacosane unknown (6) | 111 | $\begin{aligned} & \hline \mathrm{S} \\ & \mathrm{~s} \\ & \hline \end{aligned}$ |
|  | 57S-98-09X | SX570900 | UNK653-695 | unknown (6) | 56 | S |
|  | 57S-98-13X | SX571301 | UNK653 | unknown | . 8 | S |
|  | 57S-98-14X | SX571401 | UNK667 | unknown | 1 | S |
|  | 57S-98-15X | SX571503 | UNK695 | unknown | 4 | S |
| $\begin{array}{\|l\|} \hline \text { SVOA } \\ \text { water } \\ \text { (UM18) } \end{array}$ | 57M-96-11X | MD5711XX | UNK525-621 | unknown (4) | 49 | SD |
|  | 57M-96-11X | MX5711XX | ETC6H5 PRC6H5 UNK519-621 | $\begin{aligned} & \text { ethylbenzene } \\ & \text { propylbenzene } \end{aligned}$ unknown (4) |  | s |
|  | 57P-98-02X | MX5702XX | UNK519-582 | unknown (2) | 19 | S |
|  | 57P-98-03X | MX5703XX | PRC6H5 <br> UNK530-592 <br> XYLEN | $\begin{aligned} & \text { propyibenzene } \\ & \text { unknown (15) } \\ & \text { xylene } \\ & \hline \end{aligned}$ | $\begin{array}{\|ll\|} \hline 5 & 171 \\ 5 & \\ \hline \end{array}$ | $\begin{aligned} & \hline \mathrm{S} \\ & \mathrm{~s} \\ & \mathrm{~s} \end{aligned}$ |
|  | 57W-98-05X | WX570500 | UNK528-666 | unknown (3) |  | S |

TABLE D-11
SUMMARY OF TENTATIVELY IDENTIFIED COMPOUNDS AOC 571998 SUPPLEMENTAL FIELD INVESTIGATION DEVENS, MASSACHUSETTS

| MEDIA | SITE ID | FIELD SAMPLE NUMBER | IRDMIS TEST NAME | PARAMETER NAME | VALUE | $\begin{aligned} & \text { FLAG } \\ & \text { CODE } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 57W-98-08X | WX570800 | UNK662 | unknown | 4 | S |
| VOA water (UM20) | 57M-96-11X | MD5711XX | $\begin{aligned} & \text { 124TMB } \\ & \text { 1E2MB } \\ & \text { 2MEPEN } \\ & \text { 3MEPEN } \\ & \text { CL2BZ } \\ & \text { CYHX } \\ & \text { MECYPE } \\ & \text { NAP } \\ & \text { PRC6H5 } \\ & \text { UNK219 } \end{aligned}$ | 1,2,4-trimethylbenzene 1-ethyl-2-methylbenzene 2-methylpentane 3-methylpentane chlorobenzene cyclohexane methylcyclopentane naphthalene propylbenzene unknown | 20 20 10 30 18 20 20 10 10 10 | $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ |
|  | 57M-96-11X | MX5711XX | 124TMB 1E2MB $3 M E P E N$ CL2BZ CYHX INDAN MECYPE NAP PCYMEN PRC6H5 | 1,2,4-trimethylbenzene 1-ethyl-2-methylbenzene 3-methylpentane chlorobenzene cyclohexane indan methylcyclopentane naphthalene 4-(1-methylethyl)toluene propylbenzene | 10 20 20 10 19 20 10 20 10 10 10 | $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ $S$ |
|  | 57P-98-03X | MX5703XX | $\begin{aligned} & \hline \text { 124TMB } \\ & \text { 1E2MB } \\ & \text { INDAN } \\ & \text { NAP } \\ & \text { UNK237 } \\ & \hline \end{aligned}$ | 1,2,4-trimethylbenzene 1-ethyl-2-methylbenzene indan naphthalene unknown | $\begin{aligned} & \hline 70 \\ & 10 \\ & 6 \\ & 8 \\ & 7 \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline \mathrm{S} \\ & \mathrm{~S} \\ & \mathrm{~S} \\ & \mathrm{~S} \\ & \mathrm{~S} \end{aligned}$ |

Notes:
soils $=\mu \mathrm{g} / \mathrm{g}$ wates $=\mu \mathrm{g} / \mathrm{L}$
$S=$ non-target compound; $D=$ duplicate
Unknown (\#) = total concentration of specified number of unidentified non-target compounds
SVOA = semivolatile organic analysis
VOA = volatile organic analysis

1999 OFF-SITE LABORATORY DATA (AREA 3 SOIL REMOVAL)

A data quality review was completed on analytical data collected during confirmation sampling associated with the AOC 57 Source Area 3 Removal Action. Samples were analyzed for extractable petroleum hydrocarbon (EPH), volatile petroleum hydrocarbon (VPH), organochlorine pesticides by USEPA Method 8081, and polychlorinated biphenyls (PCBs) by USEPA Method 8082 (USEPA, 1996). Soil samples were analyzed for EPH/VPH using Massachusetts Department of Environmental Protection (MADEP) procedures (MADEP, 1998). Samples were analyzed by Katahdin Analytical Services in Westbrook, Maine. Soil samples were collected during field investigations completed in March, April, and June 1999. Data were validated to evaluate quality control measurement data associated with the laboratory analytical results, and to determine the usability of reported results.

Based on the data quality review described below, all VPH/EPH and PCB results are considered to be usable for quantitative and qualitative assessment of the presence and concentration of specified target analytes. Results for some hydrocarbon groups and target compounds have been qualified J indicating that reported results are interpreted to be estimated values. A subset of pesticide results has been qualified rejected R or estimated J due to poor matrix spike performance. Qualified sample results are discussed in detail below.

## Data Review

The data quality review was performed by the HLA project chemist in accordance with reduced data validation guidance provided by the USACE New England. During the validation process, the major QC measurement specified in the analytical data sets are evaluated. Data validation actions were based on qualification procedures outlined in the USEPA validation guidance documents (USEPA, 1994). The following QC measurement and method requirements were evaluated:

- holding time compliance
- sample shipping and custody records
- laboratory control sample (LCS) results
- matrix spike (MS) results
- surrogate recoveries
- laboratory and field QC blank results
- field duplicate results


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## APPENDIX D-5

## VPH

All soil samples were preserved in methanol and analyzed within the 28 day holding time specified in the method. No target analytes were reported in laboratory method blanks, trip blanks, or rinse blanks associated with the data sets. LCS recoveries and duplicate data associated with the soil samples were within method specified limits indicating the analytical method was in control during the analysis of all samples in the data set. No matrix spike analyses were completed on samples in the data set due to lack of adequate volume of samples supplied to the laboratory. With the exception of samples discussed below, surrogate recoveries were within method specified limits for all samples.

A subset of samples was run at dilutions due to the presence of C9-C12 non-target compounds in the sample analysis. Reporting limits for BTEX and MTBE were elevated due to dilution in samples EX57W11X, EX57W14X, EX57W15X and the associated field duplicate, EX57W16X, and EX57W17X. It is possible that BTEX and MTBE might be present at concentrations below these elevated reporting limits; however, the overall VPH target compound results suggest that the contamination is primarily weathered hydrocarbons with the majority of BTEX has degraded.

The following data qualification actions and data use considerations should be incorporated into assessments made with this data set:

1. Aromatic fractions and target compound results in samples EX57W15X and the associated field duplicate, and EX57W 17X, were qualified estimated J due to surrogate recovery outside the method specified limits of $70 \%-130 \%$. Surrogate recovery for the aromatic fraction was $62 \%-67 \%$ indicating a slight low bias in the results.
2. All results for sample EX57W13X were qualified estimated $J$ because of surrogate recovery outside the method specified limits of $70 \%-130 \%$. Surrogate recovery for the aromatic and aliphatic fractions were $66 \%-69 \%$ indicating a slight low bias in the results.
3. Results for the C9-C10 aromatic fraction in sample EX57W 02X and the associated duplicate were qualified estimated $J$ due to differences in the field duplicate results.

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## EPH

All samples were analyzed within the 14 day soil holding time specified in the method. LCS and MS recoveries, and duplicate data were within method specified limits for the majority of analytes indicating the analytical method was in control during the analyses. With the exception of two samples discussed below, surrogate recoveries were within method specified limits for all samples.

The following data qualification actions and data use considerations should be incorporated into assessments made with this data set:

1. Aromatic fraction and target compound results for soil sample EX57W13X were qualified estimated $J$ due to low surrogate recovery (34\%). Results for these samples are considered potentially biased low.
2. Aliphatic fraction and target compound results for soil sample EX57W12X were qualified estimated J due to low surrogate recovery ( $19 \%$ ). Results for these samples are considered potentially biased low.
3. Naphthalene results for a subset of samples were qualified estimated J due to low matrix spike recoveries of ( $31 \%-43 \%$ ).
4. In samples EX57W02X, EX57W06X, EX57W08X, and EX57W12X results reported for C19-C36 aliphatics were qualified non-detect $U$ due to similar concentrations being reported in the laboratory method blank.

## Pesticides

All samples were analyzed within the14 day soil holding time specified in the method. LCS recoveries, and duplicate data were within method specified limits. All reported surrogate recoveries were within method limits. Data from the MS/MSD pairs analyzed with each of the 3 data delivery groups indicate that there were matrix effects limiting the accuracy of the pesticide results. Different matrix effects were observed for each MS/MSD pair including inconsistent low and high recoveries in a subset of the target compounds. In two of three MS/MSD samples, high concentrations of PCBs were present in the samples causing interference in the data. No clean up steps were taken during the analysis of these samples. It is possible that more reliable data could have been obtained if clean up steps including Forisil or Silica clean ups were undertaken at the laboratory. Results were qualified based on USEPA guidelines.

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1. Results for dieldrin, 4,4'-DDD, 4,4'-DDT, alpha-chlorodane, beta-BHC, endosulfan I and II, endosulfan sulfate, endrin, gama-BHC, gama-chlordane, and heptachlor epoxide were qualified estimated J in a subset of samples due to matrix spike recoveries outside limits.
2. A subset of methoxychlor results were rejected $R$ due to low MS recoveries.

## PCBs

All samples were analyzed within the 14 day soil holding time specified in the method. LCS, MS, surrogate recoveries, and duplicate data were within method specified limits indicating the analytical method was in control during the analyses. No data qualification was done on the PCB data sets.

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## Reference:

Massachusetts Department of Environmental Protection (MADEP), 1998. "Method for the Determination of Volatile Petroleum Hydrocarbons (VPH)"; Division of Environmental Analysis; Office of Research and Standards; Bureau of Waste Site Cleanup; January 1998.

Massachusetts Department of Environmental Protection (MADEP), 1998. "Method for the Determination of Extractable Petroleum Hydrocarbons (EPH)"; Division of Environmental Analysis; Office of Research and Standards; Bureau of Waste Site Cleanup; January 1998.
U.S. Environmental Protection Agency (USEPA), 1996. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Emergency Response; Washington, DC; SW-846; November 1986; Revision 4 -December 1996.
U.S. Environmental Protection Agency (USEPA), 1994. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review"; Office of Solid Waste and Emergency Response; EPA-540/R-94/012; February 1994.


[^0]:    sQL＞updata chem aet meth＝rtrim（meth）；
    
    SQL＞Cf：Xnbonlina
    SQL＞update cqe get methartrim（meth）；
    SQL＞conmit；

[^1]:    
    늑눅ㅇ․ㅇㄱㄱ

