

FAO World Reference Laboratory for Foot-and-Mouth Disease (WRLFMD)

Genotyping Report

Report Date for this Batch: 30 July 2014

FMDV type O

Country: Pakistan

Period: 2012-2014

No. of samples: 23

BATCH: WRLFMD/2014/00021



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FAO World Reference Laboratory for FMD Genotyping Report

IAH-P-EP-MEG-FOR-005-3

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/58/2012	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK07	
Location: Islamabad, Pakistan	Topotype: ME-SA
Date collected: 24/07/2012	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK12-58.SEQ
Date received for sequencing: 23/07/2014	Date sequence last updated: 28/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 25/06/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3928
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 7 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/23/2014	PAK14-23	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/12/2014	PAK14-12	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/2/2014	PAK14-02	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/26/2013	PAK13-26	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/27/2013	PAK13-27	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/3/2014	PAK14-03	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/14/2014	PAK14C14	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/14/2014	PAK14D14	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/18/2014	PAK14-18	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/5/2014	PAK14-05	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	609	0	95.31	4.69	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	594	0	92.96	7.04	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	588	0	92.02	7.98	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	587	0	91.86	8.14	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	585	0	91.55	8.45	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	582	0	91.08	8.92	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	574	1	89.97	10.03	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	574	0	89.83	10.17	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O WRLFMD Ref No: PAK/59/2012 Batch No: WRLFMD/2014/00021 Sender Ref: PK25 Location: Hafizabad, Pakistan Date collected: 16/10/2012 Date received by WRLFMD: 22/05/2014 Date received for sequencing: 23/07/2014 Species: Water Buffalo Material used: BTy1 26/06/2014 Region sequenced: VP1 RT-PCR primers: O-1C244F/EUR-2B52R O-1C272F/EUR-2B52R	Report date: 30/07/2014 Reported by: N.J. Knowles Checked by: J. Wadsworth Topotype: ME-SA Genotype/strain: PanAsia-2 ^{ANT-10} Sequence filename: PAK12-59.SEQ Date sequence last updated: 28/07/2014 No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639 Total no. of comparisons: 3928 Min. no. of nt for comparison: 600 Total turn-around time: 69 days Sequencing time: 7 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/12/2012	PAK12-12	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/23/2012	PAK12-23	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/17/2012	PAK12-17	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
4	O/AFG/235/2010	AFG10235	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
5	O/AFG/244/2010	AFG10244	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
6	O/IRN/93/2010	IRN10-93	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/20/2012	PAK12-20	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
8	O/AFG/253/2010	AFG10253	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{ANT-10}
9	O/IRN/44/2010	IRN10-44	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{ANT-10}
10	O/IRN/55/2010	IRN10-55	639	632	0	98.90	1.10	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	629	0	98.44	1.56	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/8/2005	IRN05-08	639	598	0	93.58	6.42	ME-SA	PanAsia-2
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	598	0	93.58	6.42	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/31/2009	IRN09-31	639	597	0	93.43	6.57	ME-SA	PanAsia-2 ^{FAR-09}
5	O/IRN/18/2010	IRN10-18	639	593	0	92.80	7.20	ME-SA	PanAsia-2 ^{BAL-09}
6	O/TUR/264/2009* (FMDI)	TUR09-AK	639	593	0	92.80	7.20	ME-SA	PanAsia-2 ^{SAN-09}
7	O/PAK/16/2010	PAK10-16	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{PUN-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	579	0	90.61	9.39	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	568	1	89.03	10.97	ME-SA	Irn-2001
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	567	0	88.73	11.27	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/26/2013	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK18	
Location: Lasbella, Pakistan	Topotype: ME-SA
Date collected: 05/12/2013	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK13-26.SEQ
Date received for sequencing: 09/07/2014	Date sequence last updated: 11/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 02/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 21 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/23/2014	PAK14-23	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/58/2012	PAK12-58	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/12/2014	PAK14-12	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/2/2014	PAK14-02	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/27/2013	PAK13-27	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/3/2014	PAK14-03	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/14/2014	PAK14C14	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/18/2014	PAK14-18	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/5/2014	PAK14-05	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/13/2014	PAK14-13	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	608	0	95.15	4.85	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	593	0	92.80	7.20	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	586	0	91.71	8.29	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	581	0	90.92	9.08	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	573	1	89.81	10.19	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	573	0	89.67	10.33	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/27/2013	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK01	
Location: Khanewal, Pakistan	Topotype: ME-SA
Date collected: 17/12/2013	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK13-27.SEQ
Date received for sequencing: 09/07/2014	Date sequence last updated: 11/07/2014
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTy1 02/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 21 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/12/2014	PAK14-12	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/3/2014	PAK14-03	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/23/2014	PAK14-23	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/58/2012	PAK12-58	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/13/2014	PAK14-13	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/2/2014	PAK14-02	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/26/2013	PAK13-26	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/4/2014	PAK14-04	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/11/2014	PAK14-11	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/14/2014	PAK14C14	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	610	0	95.46	4.54	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	595	0	93.11	6.89	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	589	0	92.18	7.82	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	588	0	92.02	7.98	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
6	O/TUR/264/2009* (FMDI)	TUR09-AK	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{SAN-09}
7	O/PAK/16/2010	PAK10-16	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{PUN-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	581	0	90.92	9.08	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	574	0	89.83	10.17	ME-SA	Pak-98
10	O/IRN/61/2001 (DQ164896)	IRN01-61	638	573	1	89.81	10.19	ME-SA	Irn-2001

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/1/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK22	
Location: Quetta, Pakistan	Topotype: ME-SA
Date collected: 03/01/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-01.SEQ
Date received for sequencing: 09/07/2014	Date sequence last updated: 11/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 02/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 21 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/9/2014	PAK14-09	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/130/2010	IRN10130	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
3	O/IRN/137/2010	IRN10137	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
4	O/IRN/14/2010	IRN10-14	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
5	O/IRN/30/2010	IRN10-30	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
6	O/IRN/4/2010	IRN10-04	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/3/2010	PAK10-03	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/4/2010	PAK10-04	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/9/2010	PAK10-09	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
10	O/KHI/PAK/41/2011* (JX170756)	PAK11-AB	633	612	0	96.68	3.32	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	616	0	96.40	3.60	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{FAR-09}
3	O/IRN/8/2005	IRN05-08	639	588	0	92.02	7.98	ME-SA	PanAsia-2
4	O/TUR/257/2008* (FMDI)	TUR08-AD	639	588	0	92.02	7.98	ME-SA	PanAsia-2 ^{TER-08}
5	O/IRN/18/2010	IRN10-18	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{BAL-09}
6	O/TUR/264/2009* (FMDI)	TUR09-AK	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{SAN-09}
7	O/PAK/16/2010	PAK10-16	639	578	0	90.45	9.55	ME-SA	PanAsia-2 ^{PUN-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	575	0	89.98	10.02	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	560	0	87.64	12.36	ME-SA	Pak-98
10	O/UAE/4/2008	UAE08-04	636	557	0	87.58	12.42	ME-SA	Ind-2001c

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/2/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK02	
Location: Bhimber, Pakistan	Topotype: ME-SA
Date collected: 04/01/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-02.SEQ
Date received for sequencing: 09/07/2014	Date sequence last updated: 11/07/2014
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTy1 02/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 21 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/23/2014	PAK14-23	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/5/2014	PAK14-05	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/58/2012	PAK12-58	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/12/2014	PAK14-12	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/26/2013	PAK13-26	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/27/2013	PAK13-27	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/3/2014	PAK14-03	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/14/2014	PAK14C14	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/18/2014	PAK14-18	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/13/2014	PAK14-13	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	608	0	95.15	4.85	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	593	0	92.80	7.20	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	586	0	91.71	8.29	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	581	0	90.92	9.08	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	575	1	90.13	9.87	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	575	0	89.98	10.02	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/3/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK03	
Location: Mirpur, Pakistan	Topotype: ME-SA
Date collected: 04/01/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-03.SEQ
Date received for sequencing: 09/07/2014	Date sequence last updated: 11/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 02/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 21 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/12/2014	PAK14-12	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/27/2013	PAK13-27	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/23/2014	PAK14-23	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/58/2012	PAK12-58	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/13/2014	PAK14-13	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/2/2014	PAK14-02	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/26/2013	PAK13-26	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/4/2014	PAK14-04	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/11/2014	PAK14-11	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/14/2014	PAK14C14	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	610	0	95.46	4.54	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	595	0	93.11	6.89	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	589	0	92.18	7.82	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	588	0	92.02	7.98	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
6	O/TUR/264/2009* (FMDI)	TUR09-AK	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{SAN-09}
7	O/PAK/16/2010	PAK10-16	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{PUN-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	581	0	90.92	9.08	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	574	0	89.83	10.17	ME-SA	Pak-98
10	O/IRN/61/2001 (DQ164896)	IRN01-61	638	573	1	89.81	10.19	ME-SA	Irn-2001

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/4/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK05	
Location: Multan, Pakistan	Topotype: ME-SA
Date collected: 09/01/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-04.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTy1 08/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/12/2014	PAK14-12	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/27/2013	PAK13-27	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/3/2014	PAK14-03	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/23/2014	PAK14-23	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/58/2012	PAK12-58	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/13/2014	PAK14-13	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/2/2014	PAK14-02	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/26/2013	PAK13-26	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/11/2014	PAK14-11	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/14/2014	PAK14C14	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	608	0	95.15	4.85	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	593	0	92.80	7.20	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	586	0	91.71	8.29	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{BAL-09}
6	O/TUR/264/2009* (FMDI)	TUR09-AK	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{SAN-09}
7	O/PAK/16/2010	PAK10-16	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{PUN-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	579	0	90.61	9.39	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	572	0	89.51	10.49	ME-SA	Pak-98
10	O/IRN/61/2001 (DQ164896)	IRN01-61	638	571	1	89.50	10.50	ME-SA	Irn-2001

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/5/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK04	
Location: Kotli, Pakistan	Topotype: ME-SA
Date collected: 10/03/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-05.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 08/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/2/2014	PAK14-02	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/23/2014	PAK14-23	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/58/2012	PAK12-58	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/12/2014	PAK14-12	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/16/2014	PAK14-16	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/26/2013	PAK13-26	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/27/2013	PAK13-27	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/3/2014	PAK14-03	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/14/2014	PAK14C14	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/18/2014	PAK14-18	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	608	0	95.15	4.85	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	593	0	92.80	7.20	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	586	0	91.71	8.29	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	581	0	90.92	9.08	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	575	1	90.13	9.87	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	575	0	89.98	10.02	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/6/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK13	
Location: Gilgit, Pakistan	Topotype: ME-SA
Date collected: 12/01/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-06.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 09/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/7/2014	PAK14-07	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/14/2014	PAK14C14	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/23/2014	PAK14-23	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/58/2012	PAK12-58	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/12/2014	PAK14-12	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/13/2014	PAK14-13	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/2/2014	PAK14-02	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/26/2013	PAK13-26	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/27/2013	PAK13-27	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/3/2014	PAK14-03	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	604	0	94.52	5.48	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	589	0	92.18	7.82	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	582	0	91.08	8.92	ME-SA	PanAsia-2
5	O/PAK/16/2010	PAK10-16	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{PUN-10}
6	O/IRN/18/2010	IRN10-18	639	580	0	90.77	9.23	ME-SA	PanAsia-2 ^{BAL-09}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	580	0	90.77	9.23	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	579	0	90.61	9.39	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	571	1	89.50	10.50	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	571	0	89.36	10.64	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/7/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK14	
Location: Gilgit, Pakistan	Topotype: ME-SA
Date collected: 12/01/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-07.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 09/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/6/2014	PAK14-06	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/14/2014	PAK14C14	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/23/2014	PAK14-23	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/58/2012	PAK12-58	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/12/2014	PAK14-12	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/2/2014	PAK14-02	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/26/2013	PAK13-26	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/27/2013	PAK13-27	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/3/2014	PAK14-03	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/18/2014	PAK14-18	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	605	0	94.68	5.32	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	583	0	91.24	8.76	ME-SA	PanAsia-2
5	O/PAK/16/2010	PAK10-16	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{PUN-10}
6	O/IRN/18/2010	IRN10-18	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{BAL-09}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	580	0	90.77	9.23	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	572	1	89.66	10.34	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	572	0	89.51	10.49	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/9/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK21	
Location: Quetta, Pakistan	Topotype: ME-SA
Date collected: 15/01/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-09.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTy1 09/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/1/2014	PAK14-01	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/130/2010	IRN10130	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
3	O/IRN/137/2010	IRN10137	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
4	O/IRN/14/2010	IRN10-14	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
5	O/IRN/30/2010	IRN10-30	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
6	O/IRN/4/2010	IRN10-04	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/3/2010	PAK10-03	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/4/2010	PAK10-04	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/9/2010	PAK10-09	639	618	0	96.71	3.29	ME-SA	PanAsia-2 ^{ANT-10}
10	O/KHI/PAK/41/2011* (JX170756)	PAK11-AB	633	612	0	96.68	3.32	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	616	0	96.40	3.60	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{FAR-09}
3	O/IRN/8/2005	IRN05-08	639	588	0	92.02	7.98	ME-SA	PanAsia-2
4	O/TUR/257/2008* (FMDI)	TUR08-AD	639	588	0	92.02	7.98	ME-SA	PanAsia-2 ^{TER-08}
5	O/IRN/18/2010	IRN10-18	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{BAL-09}
6	O/TUR/264/2009* (FMDI)	TUR09-AK	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{SAN-09}
7	O/PAK/16/2010	PAK10-16	639	578	0	90.45	9.55	ME-SA	PanAsia-2 ^{PUN-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	575	0	89.98	10.02	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	560	0	87.64	12.36	ME-SA	Pak-98
10	O/UAE/4/2008	UAE08-04	636	557	0	87.58	12.42	ME-SA	Ind-2001c

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/11/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK08	
Location: Multan, Pakistan	Topotype: ME-SA
Date collected: 30/01/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-11.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 08/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/13/2014	PAK14-13	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/12/2014	PAK14-12	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/27/2013	PAK13-27	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/3/2014	PAK14-03	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/23/2014	PAK14-23	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/58/2012	PAK12-58	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/15/2014	PAK14-15	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/2/2014	PAK14-02	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/26/2013	PAK13-26	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/4/2014	PAK14-04	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	609	0	95.31	4.69	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	594	0	92.96	7.04	ME-SA	PanAsia-2 ^{FAR-09}
3	O/IRN/8/2005	IRN05-08	639	587	0	91.86	8.14	ME-SA	PanAsia-2
4	O/TUR/257/2008* (FMDI)	TUR08-AD	639	586	0	91.71	8.29	ME-SA	PanAsia-2 ^{TER-08}
5	O/IRN/18/2010	IRN10-18	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	578	0	90.45	9.55	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	573	0	89.67	10.33	ME-SA	Pak-98
10	O/IRN/61/2001 (DQ164896)	IRN01-61	638	570	1	89.34	10.66	ME-SA	Irn-2001

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/12/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK09	
Location: Rahim Yar Khan, Pakistan	Topotype: ME-SA
Date collected: 11/02/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-12.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 08/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/27/2013	PAK13-27	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/3/2014	PAK14-03	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/23/2014	PAK14-23	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/58/2012	PAK12-58	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/13/2014	PAK14-13	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/2/2014	PAK14-02	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/26/2013	PAK13-26	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/4/2014	PAK14-04	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/11/2014	PAK14-11	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/14/2014	PAK14C14	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	610	0	95.46	4.54	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	595	0	93.11	6.89	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	589	0	92.18	7.82	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	588	0	92.02	7.98	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
6	O/TUR/264/2009* (FMDI)	TUR09-AK	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{SAN-09}
7	O/PAK/16/2010	PAK10-16	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{PUN-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	581	0	90.92	9.08	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	574	0	89.83	10.17	ME-SA	Pak-98
10	O/IRN/61/2001 (DQ164896)	IRN01-61	638	573	1	89.81	10.19	ME-SA	Irn-2001

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/13/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK17	
Location: Attock, Pakistan	Topotype: ME-SA
Date collected: 11/02/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-13.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 10/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/11/2014	PAK14-11	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/12/2014	PAK14-12	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/27/2013	PAK13-27	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/3/2014	PAK14-03	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/23/2014	PAK14-23	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/58/2012	PAK12-58	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/2/2014	PAK14-02	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/26/2013	PAK13-26	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/4/2014	PAK14-04	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/14/2014	PAK14C14	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	610	0	95.46	4.54	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	595	0	93.11	6.89	ME-SA	PanAsia-2 ^{FAR-09}
3	O/IRN/8/2005	IRN05-08	639	588	0	92.02	7.98	ME-SA	PanAsia-2
4	O/TUR/257/2008* (FMDI)	TUR08-AD	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{TER-08}
5	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	579	0	90.61	9.39	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	574	0	89.83	10.17	ME-SA	Pak-98
10	O/IRN/61/2001 (DQ164896)	IRN01-61	638	571	1	89.50	10.50	ME-SA	Irn-2001

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/14/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK12	
Location: Sargodha, Pakistan	Topotype: ME-SA
Date collected: 20/02/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14C14.SEQ
Date received for sequencing: 23/07/2014	Date sequence last updated: 28/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 10/07/2014 & RS1 11/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R O-1C272F/EUR-2B52R	Total no. of comparisons: 3927
	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 7 days
Comments: Two FMD type A viruses was also detected in this sample (RS1 only).	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/23/2014	PAK14-23	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/58/2012	PAK12-58	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/12/2014	PAK14-12	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/2/2014	PAK14-02	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/26/2013	PAK13-26	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/27/2013	PAK13-27	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/3/2014	PAK14-03	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/18/2014	PAK14-18	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/5/2014	PAK14-05	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/7/2014	PAK14-07	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	609	0	95.31	4.69	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	592	0	92.64	7.36	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	586	0	91.71	8.29	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	585	0	91.55	8.45	ME-SA	PanAsia-2
5	O/PAK/16/2010	PAK10-16	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{PUN-10}
6	O/IRN/18/2010	IRN10-18	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{BAL-09}
7	O/UKG/35/2001 (AJ539141)	UKG01-35	639	582	0	91.08	8.92	ME-SA	PanAsia
8	O/TUR/264/2009* (FMDI)	TUR09-AK	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{SAN-09}
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	574	1	89.97	10.03	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	572	0	89.51	10.49	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/15/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK19	
Location: Karachi, Pakistan	Topotype: ME-SA
Date collected: 06/03/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-15.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 10/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/12/2014	PAK14-12	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/27/2013	PAK13-27	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/3/2014	PAK14-03	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/11/2014	PAK14-11	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/23/2014	PAK14-23	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/5/2014	PAK14-05	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/58/2012	PAK12-58	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/13/2014	PAK14-13	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/16/2014	PAK14-16	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/2/2014	PAK14-02	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	609	0	95.31	4.69	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	594	0	92.96	7.04	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	588	0	92.02	7.98	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	587	0	91.86	8.14	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	585	0	91.55	8.45	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	580	0	90.77	9.23	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	573	0	89.67	10.33	ME-SA	Pak-98
10	O/IRN/61/2001 (DQ164896)	IRN01-61	638	572	1	89.66	10.34	ME-SA	Irn-2001

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/16/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK28	
Location: Lahore, Pakistan	Topotype: ME-SA
Date collected: 10/03/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-16.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTy1 12/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/23/2014	PAK14-23	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/5/2014	PAK14-05	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/58/2012	PAK12-58	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/12/2014	PAK14-12	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/2/2014	PAK14-02	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/26/2013	PAK13-26	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/27/2013	PAK13-27	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/3/2014	PAK14-03	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/14/2014	PAK14C14	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/18/2014	PAK14-18	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	609	0	95.31	4.69	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	594	0	92.96	7.04	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	588	0	92.02	7.98	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	587	0	91.86	8.14	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	585	0	91.55	8.45	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	580	0	90.77	9.23	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	572	1	89.66	10.34	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	572	0	89.51	10.49	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/17/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK16	
Location: Sialkot, Pakistan	Topotype: ME-SA
Date collected: 17/03/2014	Genotype/strain: unnamed
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-17.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTy1 12/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/40/2012	PAK12-40	639	628	0	98.28	1.72	ME-SA	unnamed
2	O/PAK/41/2012	PAK12-41	639	628	0	98.28	1.72	ME-SA	unnamed
3	O/PAK/51/2012	PAK12-51	639	626	0	97.97	2.03	ME-SA	unnamed
4	O/PAK/53/2012	PAK12-53	639	625	0	97.81	2.19	ME-SA	unnamed
5	O/PAK/22/2013	PAK13-22	639	624	0	97.65	2.35	ME-SA	unnamed
6	O/PAK/55/2012	PAK12-55	639	624	0	97.65	2.35	ME-SA	unnamed
7	O/IRN/1/2014	IRN14-01	639	621	0	97.18	2.82	ME-SA	unnamed
8	O/IRN/31/2013	IRN13-31	639	620	0	97.03	2.97	ME-SA	unnamed
9	O/PAK/31/2007	PAK07-31	639	605	0	94.68	5.32	ME-SA	PanAsia-2
10	O/IRN/29/2006	IRN06-29	639	604	0	94.52	5.48	ME-SA	PanAsia-2
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/TUR/264/2009* (FMDI)	TUR09-AK	639	598	0	93.58	6.42	ME-SA	PanAsia-2 ^{SAN-09}
2	O/IRN/31/2009	IRN09-31	639	597	0	93.43	6.57	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	597	0	93.43	6.57	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/18/2010	IRN10-18	639	594	0	92.96	7.04	ME-SA	PanAsia-2 ^{BAL-09}
5	O/IRN/8/2005	IRN05-08	639	592	0	92.64	7.36	ME-SA	PanAsia-2
6	O/PAK/16/2010	PAK10-16	639	592	0	92.64	7.36	ME-SA	PanAsia-2 ^{PUN-10}
7	O/IRN/88/2009	IRN09-88	639	590	0	92.33	7.67	ME-SA	PanAsia-2 ^{ANT-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	585	0	91.55	8.45	ME-SA	PanAsia
9	O/KUW/3/97 (DQ164904)	KUW97-03	639	580	0	90.77	9.23	ME-SA	Ind-2001a
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	577	0	90.30	9.70	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/18/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK20	
Location: Karachi, Pakistan	Topotype: ME-SA
Date collected: 20/03/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-18.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTy1 13/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/23/2014	PAK14-23	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/58/2012	PAK12-58	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/12/2014	PAK14-12	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/2/2014	PAK14-02	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/26/2013	PAK13-26	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/27/2013	PAK13-27	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/3/2014	PAK14-03	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/14/2014	PAK14C14	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/5/2014	PAK14-05	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/13/2014	PAK14-13	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	607	0	94.99	5.01	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	593	0	92.80	7.20	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	587	0	91.86	8.14	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	585	0	91.55	8.45	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	580	0	90.77	9.23	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	572	1	89.66	10.34	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	572	0	89.51	10.49	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/21/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK33	
Location: Karachi, Pakistan	Topotype: ME-SA
Date collected: 02/04/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-21.SEQ
Date received for sequencing: 16/07/2014	Date sequence last updated: 21/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 12/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 14 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/23/2014	PAK14-23	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/58/2012	PAK12-58	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/12/2014	PAK14-12	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/2/2014	PAK14-02	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/26/2013	PAK13-26	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/27/2013	PAK13-27	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/3/2014	PAK14-03	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/14/2014	PAK14C14	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/18/2014	PAK14-18	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/5/2014	PAK14-05	639	633	0	99.06	0.94	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	607	0	94.99	5.01	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	592	0	92.64	7.36	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	588	0	92.02	7.98	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	587	0	91.86	8.14	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{BAL-09}
6	O/TUR/264/2009* (FMDI)	TUR09-AK	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{SAN-09}
7	O/PAK/16/2010	PAK10-16	639	582	0	91.08	8.92	ME-SA	PanAsia-2 ^{PUN-10}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	582	0	91.08	8.92	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	572	1	89.66	10.34	ME-SA	Irn-2001
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	571	0	89.36	10.64	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/23/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK29	
Location: Lahore, Pakistan	Topotype: ME-SA
Date collected: 10/04/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-23.SEQ
Date received for sequencing: 23/07/2014	Date sequence last updated: 28/07/2014
Species: Water Buffalo	No. of Nt determined: 639
Material used: BTy1 12/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C272F/EUR-2B52R	Total no. of comparisons: 3927
	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 7 days
Comments: FMD type A virus was also detected in this sample.	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/58/2012	PAK12-58	639	639	0	100.00	0.00	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/12/2014	PAK14-12	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/2/2014	PAK14-02	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/26/2013	PAK13-26	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/27/2013	PAK13-27	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/3/2014	PAK14-03	639	638	0	99.84	0.16	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/14/2014	PAK14C14	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/18/2014	PAK14-18	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/5/2014	PAK14-05	639	637	0	99.69	0.31	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/13/2014	PAK14-13	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	609	0	95.31	4.69	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	594	0	92.96	7.04	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	588	0	92.02	7.98	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/8/2005	IRN05-08	639	587	0	91.86	8.14	ME-SA	PanAsia-2
5	O/IRN/18/2010	IRN10-18	639	585	0	91.55	8.45	ME-SA	PanAsia-2 ^{BAL-09}
6	O/PAK/16/2010	PAK10-16	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	583	0	91.24	8.76	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	582	0	91.08	8.92	ME-SA	PanAsia
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	574	1	89.97	10.03	ME-SA	Irn-2001
10	O/PAK/16/2003 (DQ165068)	PAK03-16	639	574	0	89.83	10.17	ME-SA	Pak-98

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O	Report date: 30/07/2014
WRLFMD Ref No: PAK/24/2014	Reported by: N.J. Knowles
Batch No: WRLFMD/2014/00021	Checked by: J. Wadsworth
Sender Ref: PK34	
Location: Karachi, Pakistan	Topotype: ME-SA
Date collected: 14/04/2014	Genotype/strain: PanAsia-2 ^{ANT-10}
Date received by WRLFMD: 22/05/2014	Sequence filename: PAK14-24.SEQ
Date received for sequencing: 23/07/2014	Date sequence last updated: 28/07/2014
Species: Cattle	No. of Nt determined: 639
Material used: BTy1 15/07/2014	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3927
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 69 days
	Sequencing time: 7 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/PAK/23/2014	PAK14-23	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
2	O/PAK/58/2012	PAK12-58	639	636	0	99.53	0.47	ME-SA	PanAsia-2 ^{ANT-10}
3	O/PAK/12/2014	PAK14-12	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
4	O/PAK/2/2014	PAK14-02	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
5	O/PAK/26/2013	PAK13-26	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
6	O/PAK/27/2013	PAK13-27	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
7	O/PAK/3/2014	PAK14-03	639	635	0	99.37	0.63	ME-SA	PanAsia-2 ^{ANT-10}
8	O/PAK/14/2014	PAK14C14	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
9	O/PAK/18/2014	PAK14-18	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
10	O/PAK/5/2014	PAK14-05	639	634	0	99.22	0.78	ME-SA	PanAsia-2 ^{ANT-10}
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/IRN/88/2009	IRN09-88	639	606	0	94.84	5.16	ME-SA	PanAsia-2 ^{ANT-10}
2	O/IRN/31/2009	IRN09-31	639	591	0	92.49	7.51	ME-SA	PanAsia-2 ^{FAR-09}
3	O/TUR/257/2008* (FMDI)	TUR08-AD	639	585	0	91.55	8.45	ME-SA	PanAsia-2 ^{TER-08}
4	O/IRN/18/2010	IRN10-18	639	584	0	91.39	8.61	ME-SA	PanAsia-2 ^{BAL-09}
5	O/IRN/8/2005	IRN05-08	639	584	0	91.39	8.61	ME-SA	PanAsia-2
6	O/PAK/16/2010	PAK10-16	639	581	0	90.92	9.08	ME-SA	PanAsia-2 ^{PUN-10}
7	O/TUR/264/2009* (FMDI)	TUR09-AK	639	580	0	90.77	9.23	ME-SA	PanAsia-2 ^{SAN-09}
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	579	0	90.61	9.39	ME-SA	PanAsia
9	O/PAK/16/2003 (DQ165068)	PAK03-16	639	573	0	89.67	10.33	ME-SA	Pak-98
10	O/IRN/61/2001 (DQ164896)	IRN01-61	638	571	1	89.50	10.50	ME-SA	Irn-2001

nt, nucleotides

*, not a WRLFMD reference number

Assembled with Report Generator v4.3

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Report on FMDV O in Pakistan in 2012-2014

Batch: WRLFMD/2014/00021

◆ indicates viruses in this batch

Software: MEGA 6.06

Analysis

Analysis ----- Phylogeny Reconstruction

Scope ----- All Selected Taxa

Statistical Method ----- Neighbor-joining

Phylogeny Test

Test of Phylogeny ----- Bootstrap method

No. of Bootstrap Replications ----- 1000

Substitution Model

Substitutions Type ----- Nucleotide

Model/Method ----- Kimura 2-parameter model

Substitutions to Include ----- d: Transitions + Transversions

Rates and Patterns

Rates among Sites ----- Uniform rates

Pattern among Lineages ----- Same (Homogeneous)

Data Subset to Use

Gaps/Missing Data Treatment ----- Pairwise deletion

Codons Included ----- 1st+2nd+3rd+Non-Coding

No. of Sites : 642

No Of Bootstrap Reps = 1000

Only bootstrap values of 70% and above are shown

*, not a WRLFMD Ref. No.

N.J. Knowles, J. Wadsworth & K. Bachanek-Bankowska,
30 July 2014

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