Figure 1

Nucleotide gene sequences for modified A/Vietnam/1203/04 Strain

NCRs derived from A/Hong Kong/213/03 are underlined.

HA

AGCAAAAGCAGGGGTTCAATCTGTCAAAATGGAGAAAATAGTGCTTCTTTTTGCAATA
GTCAGTCTTGTTAAAAGTGATCAGATTTGCATTGGTTACCATGCAAACAACTCGACAG
AGCAGGTTGACACAATAATGGAAAAGAACGTTACTGTTACACATGCCCAAGACATACT
GGAAAAGAAACACAACGGGAAGCTCTGCGATCTAGATGGAGTGAAGCCTCTAATTTT
GAGAGATTGTAGCGTAGCTGGATGGCTCCTCGGAAACCCAATGTGTGACGAATTCAT
CAATGTGCCGGAATGGTCTTACATAGTGGAGAAGGCCAATCCAGTCAATGACCTCTG
TTACCCAGGGGATTTCAATGACTATGAAGAATTGAAACACCTATTGAGCAGAATAAAC
CATTTTGAGAAAATTCAGATCATCCCCAAAAGTTCTTGGTCCAGTCATGAAGCCTCAT
TAGGGGTGAGCTCAGCATGTCCATACCAGGGAAAGTCCTCCTTTTTCAGAAATGTGG
TATGGCTTATCAAAAAGAACAGTACATACCCAACAATAAAGAGGAGCTACAATAATAC
CAACCAAGAAGATCTTTTGGTACTGTGGGGGATTCACCATCCTAATGATGCGGCAGA
GCAGACAAAGCTCTATCAAAACCCAACCACCTATATTTCCGTTGGGACATCAACACTA
AACCAGAGATTGGTACCAAGAATAGCTACTAGATCCAAAGTAAACGGGCAAAATGGA
AGGATGGAGTTCTTCTGGACAATTTTAAAGCCGAATGATGCAATCAACTTCGAGAGTA
ATGGAAATTTCATTGCTCCAGAATATGCATACAAAATTGTCAAGAAAGGGGACTCAAC
AATTATGAAAAGTGAATTGGAATATGGTAACTGCAACACCAAGTGTCAAACTCCAATG
GGGGCGATAAACTCTAGCATGCCATTCCACAATATACACCCTCTCACCATTGGGGAA
TGCCCCAAATATGTGAAATCAAACAGATTAGTCCTTGCGACTGGGCTCAGAAATAGC
CCTCAAACCGAGACCCGAGGATTATTTGGAGCTATAGCAGGTTTTATAGAGGGAGGA
TGGCAGGGAATGGTAGATGGTTGGTATGGGTACCACCATAGCAATGAGCAGGGGAG
TGGGTACGCTGCAGACAAAGAATCCACTCAAAAGGCAATAGATGGAGTCACCAATAA
GGTCAACTCGATCATTGACAAAATGAACACTCAGTTTGAGGCCGTTGGAAGGGAATT
TAACAACTTAGAAAGGAGAATAGAGAATTTAAACAAGAAGATGGAAGACGGGTTCCT
AGATGTCTGGACTTATAATGCTGAACTTCTGGTTCTCATGGAAAATGAGAGAACTCTA
GACTTTCATGACTCAAATGTCAAGAACCTTTACGACAAGGTCCGACTACAGCTTAGG
GATAATGCAAAGGAGCTGGGTAACGGTTGTTTCGAGTTCTATCATAAATGTGATAATG
AATGTATGGAAAGTGTAAGAAATGGAACGTATGACTACCCGCAGTATTCAGAAGAAG
CGAGACTAAAAAGAGAGGAAATAAGTGGAGTAAAATTGGAATCAATAGGAATTTACCA
AATACTGTCAATTTATTCTACAGTGGCGAGTTCCCTAGCACTGGCAATCATGGTAGCT
GGTCTATCCTTATGGATGTGCTCCAATGGATCGTTACAATGCAGAATTTGCATTTAAA
TTTGTGAGTTCAGATTGTAGTTAAAAACACCCTTGTTTCTACT (SEQ ID NO: 1)

NA

AGCAAAAGCAGGAGTTCAAAATGAATCCAAATCAGAAGATAATAACCATCGGATCAAT
CTGTATGGTAACTGGAATAGTTAGCTTAATGTTACAAATTGGGAACATGATCTCAATA
TGGGTCAGTCATTCAATTCACACAGGGAATCAACACCAATCTGAACCAATCAGCAATA
CTAATTTTCTTACTGAGAAAGCTGTGGCTTCAGTAAAATTAGCGGGCAATTCATCTCT
TTGCCCCATTAACGGATGGGCTGTATACAGTAAGGACAACAGTATAAGGATCGGTTC
CAAGGGGGATGTGTTTGTTATAAGAGAGCCGTTCATCTCATGCTCCCACTTGGAATG
CAGAACTTTCTTTTTGACTCAGGGAGCCTTGCTGAATGACAAGCACTCCAATGGGAC
TGTCAAAGACAGAAGCCCTCACAGAACATTAATGAGTTGTCCTGTGGGTGAGGCTCC
CTCCCCATATAACTCAAGGTTTGAGTCTGTTGCTTGGTCAGCAAGTGCTTGCCATGAT
GGCACCAGTTGGTTGACGATTGGAATTTCTGGCCCAGACAATGGGGCTGTGGCTGT
ATTGAAATACAATGGCATAATAACAGACACTATCAAGAGTTGGAGGAACAACATACTG
AGAACTCAAGAGTCTGAATGTGCATGTGTAAATGGCTCTTGCTTTACTGTAATGACTG
ACGGACCAAGTAATGGTCAGGCATCACATAAGATCTTCAAAATGGAAAAAGGGAAAG
TGGTTAAATCAGTCGAATTGGATGCTCCTAATTATCACTATGAGGAATGCTCCTGTTA
TCCTAATGCCGGAGAAATCACATGTGTGTGCAGGGATAATTGGCATGGCTCAAATCG
GCCATGGGTATCTTTCAATCAAAATTTGGAGTATCAAATAGGATATATATGCAGTGGA
GTTTTCGGAGACAATCCACGCCCCAATGATGGAACAGGTAGTTGTGGTCCGGTGTCC
TCTAACGGGGCATATGGGGTAAAAGGGTTTTCATTTAAATACGGCAATGGTGTCTGG
ATCGGGAGAACCAAAAGCACTAATTCCAGGAGCGGCTTTGAAATGATTTGGGATCCA

AATGGGTGGACTGAAACGGACAGTAGCTTTTCAGTGAAACAAGATATCGTAGCAATA
ACTGATTGGTCAGGATATAGCGGGAGTTTTGTCCAGCATCCAGAACTGACAGGACTA
GATTGCATAAGACCTTGTTTCTGGGTTGAGTTGATCAGAGGGCGGCCCAAAGAGAGC
ACAATTTGGACTAGTGGGAGCAGCATATCTTTTTGTGGTGTAAATAGTGACACTGTGG
GTTGGTCTTGGCCAGACGGTGCCGAGTTGCCATTCACCATTGACAAGTAGTTTGTTC
AAAAAACTCCTTGTTTCTACT (SEQ ID NO: 2)

M

AGCAAAAGCAGGTAGATGTTGAAAGATGAGTCTTCTAACCGAGGTCGAAACGTACGT
TCTCTCTATCATCCCGTCAGGCCCCCTCAAAGCCGAGATCGCACAGAAACTTGAAGA
TGTCTTTGCAGGAAAGAACACCGATCTCGAGGCTCTCATGGAGTGGCTAAAGACAAG
ACCAATCCTGTCACCTCTGACTAAAGGGATTTTGGGATTTGTATTCACGCTCACCGTG
CCCAGTGAGCGAGGACTGCAGCGTAGACGCTTTGTCCAGAATGCCCTAAATGGAAA
TGGAGATCCAAATAATATGGATAGGGCAGTTAAGCTATATAAGAAGCTGAAAAGAGA
AATAACATTCCATGGGGCTAAGGAGGTCGCACTCAGCTACTCAACCGGTGCACTTGC
CAGTTGCATGGGTCTCATATACAACAGGATGGGAACGGTGACTACGGAAGTGGCTTT
TGGCCTAGTGTGTGCCACTTGTGAGCAGATTGCAGATTCACAGCATCGGTCTCACAG
ACAGATGGCAACTATCACCAACCCACTAATCAGACATGAGAACAGAATGGTGCTGGC
CAGCACTACAGCTAAGGCTATGGAGCAGATGGCGGGATCAAGTGAGCAGGCAGCG
GAAGCCATGGAGATCGCTAATCAGGCTAGGCAGATGGTGCAGGCAATGAGGACAAT
TGGGACTCATCCTAACTCTAGTGCTGGTCTGAGAGATAATCTTCTTGAAAATTTGCAG
GCCTACCAGAAACGAATGGGAGTGCAGATGCAGCGATTCAAGTGATCCTATTGTTGT
TGCCGCAAATATCATTGGGATCTTGCACTTGATATTGTGGATTCTTGATCGTCTTTTCT
TCAAATGCATTTATCGTCGCCTTAAATACGGTTTGAAAAGAGGGCCTGCTACGGCAG
GGGTACCTGAGTCTATGAGGGAAGAGTACCGGCAGGAACAGCAGAGTGCTGTGGAT
GTTGACGATGGTCATTTTGTCAACATAGAATTGGAGTAAAAAACTACCTTGTTTCTACT
(SEQ ID NO: 3)

NS

AGCAAAAGCAGGGTGACAAAAACATAATGGATTCCAACACTGTGTCAAGCTTTCAGG
TAGACTGCTTTCTTTGGCATGTCCGCAAACGATTTGCAGACCAAGAACTGGGTGATG
CCCCATTCCTTGACCGGCTTCGCCGAGATCAGAAGTCCCTAAGAGGAAGAGGCAAC
ACTCTTGGTCTGGACATCGAAACAGCTACTCGCGCAGGAAAGCAGATAGTGGAGCG
GATTCTGGAGGGGGAGTCTGATAAGGCACTTAAAATGCCGGCTTCACGCTACCTAAC
TGACATGACTCTCGAAGAAATGTCAAGGGACTGGTTCATGCTCATGCCCAAGCAGAA
AGTGGCAGGTTCCCTTTGCATCAAAATGGACCAGGCAATAATGGATAAAACCATCAT
ATTGAAAGCAAACTTCAGTGTGATTTTTGACCGGTTGGAAACCCTAATACTACTTAGA
GCTTTCACAGAAGAAGGAGCAATCGTGGGAGAAATCTCACCATTACCTTCTCTTCCA
GGACATACTGGTGAGGATGTCAAAAATGCAATTGGCGTCCTCATCGGAGGACTTGAA
TGGAATGATAACACAGTTCGAGTCACTGAAACTATACAGAGATTCGCTTGGAGAAAC
AGTGATGAGGATGGGAGACTTCCACTCCCTCCAAATCAGAAACGGTAAATGGCGAGA
ACAATTGAGTCAGAAGTTTGAAGAAATAAGGTGGCTGATTGAAGAAGTAAGACATAG
ATTGAAAATTACAGAAAACAGCTTCGAACAGATAACGTTTATGCAAGCCTTACAACTA
CTGCTTGAAGTGGAGCAAGAGATAAGAGCCTTCTCGTTTCAGCTTATTTAATGATAAA
AAACACCCTTGTTTCTACT (SEQ ID NO: 4)

NP

AGCAAAAGCAGGGTAGATAATCACTCACCGAGTGACATCAGCATCATGGCGTCTCAA
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GAGATCAGGGCATCTGTTGGAAGAATGGTTAGTGGCATTGGGAGGTTCTACATACAG
ATGTGCACAGAACTCAAACTCAGTGACTATGAAGGGAGGCTGATCCAGAACAGCATA
ACAATAGAGAGAATGGTACTCTCTGCATTTGATGAAAGAAGGAACAGATACCTGGAA
GAACACCCCAGTGCGGGAAAGGACCCGAAGAAGACTGGAGGTCCAATTTATCGGAG
GAGAGACGGGAAATGGGTGAGAGAGCTAATTCTGTACGACAAAGAGGAGATCAGGA
GGATTTGGCGTCAAGCGAACAATGGAGAGGACGCAACTGCTGGTCTTACCCACCTG
ATGATATGGCATTCCAATCTAAATGATGCCACATATCAGAGAACGAGAGCTCTCGTG
CGTACTGGAATGGACCCAAGGATGTGCTCTCTGATGCAAGGGTCAACTCTCCCGAG

Figure 1 (cont'd)

GAGATCTGGAGCTGCCGGTGCAGCAGTAAAGGGGGTAGGGACAATGGTGATGGAG
CTGATTCGGATGATAAAACGAGGGATCAACGACCGGAATTTCTGGAGAGGCGAAAAT
GGAAGAAGAACAAGGATTGCATATGAGAGAATGTGCAACATCCTCAAAGGGAAATTC
CAAACAGCAGCACAAAGAGCAATGATGGATCAAGTGCGAGAGAGCAGAAATCCTGG
GAATGCTGAAATTGAAGATCTCATTTTTCTGGCACGGTCTGCACTCATCCTGAGAGG
ATCAGTGGCCCATAAGTCCTGCTTGCCTGCTTGTGTGTACGGACTTGCAGTGGCCAG
TGGATATGACTTTGAGAGAGAAGGGTACTCTCTGGTTGGAATAGATCCTTTCCGCCT
GCTTCAAAACAGCCAGGTCTTTAGTCTCATTAGACCAAATGAGAATCCAGCACATAAG
AGTCAATTAGTGTGGATGGCATGCCACTCTGCAGCATTTGAGGACCTTAGAGTCTCA
AGTTTCATCAGAGGGACAAGAGTGGTCCCAAGAGGACAGCTATCCACCAGAGGGGT
TCAAATTGCTTCAAATGAGAACATGGAGGCAATGGACTCCAACACTCTTGAACTGAG
AAGCAGATATTGGGCTATAAGAACCAGAAGCGGAGGAAACACCAACCAGCAGAGGG
CATCTGCAGGACAGATCAGCGTTCAGCCCACTTTCTCGGTCCAGAGAAACCTTCCCT
TCGAAAGAGCGACCATTATGGCAGCATTTACAGGAAATACTGAGGGCAGAACGTCTG
ACATGAGGACTGAAATCATAAGAATGATGGAAAGTGCCAGACCAGAAGATGTGTCAT
TCCAGGGGCGGGGAGTCTTCGAGCTCTCGGACGAAAAGGCAACGAACCCGATCGT
GCCTTCCTTTGACATGAATAATGAAGGATCTTATTTCTTCGGAGACAATGCAGAGGAG
TATGACAATTAAAGAAAAATACCCTTGTTTCTACT (SEQ ID NO: 5)

PA

AGCGAAAGCAGGTACTGATCCAAAATGGAAGACTTTGTGCGACAATGCTTCAATCCA
ATGATTGTCGAGCTTGCGGAAAAGGCAATGAAAGAATATGGGGAAGATCCGAAAATC
GAAACGAACAAGTTTGCTGCAATATGCACACACTTGGAGGTCTGTTTCATGTATTCGG
ATTTTCACTTTATTGATGAACGGAGTGAATCAATAATTGTAGAATCTGGAGATCCGAA
TGCATTATTGAAACACCGATTTGAAATAATTGAAGGAAGAGACCGAACGATGGCCTG
GACTGTGGTGAATAGTATCTGCAACACCACAGGAGTTGAGAAACCTAAATTTCTCCC
AGATTTGTATGACTACAAAGAGAACCGATTCATCGAAATTGGAGTGACACGGAGGGA
AGTTCATACATACTATCTGGAGAAAGCCAACAAGATAAAATCCGAGGAGACACATATT
CACATATTCTCATTCACAGGGGAGGAAATGGCCACCAAAGCGGACTACACCCTTGAT
GAAGAGAGCAGGGCAAGAATTAAAACCAGGCTGTTCACCATAAGGCAGGAAATGGC
CAGTAGGGGTCTATGGGATTCCTTTCGTCAATCCGAGAGAGGCGAAGAGACAATTGA
AGAAAAATTTGAAATCACTGGAACCATGCGCAGACTTGCAGACCAAAGTCTCCCACC
GAACTTCTCCAGCCTTGAAAACTTTAGAGCCTATGTGGATGGATTCGAACCGAACGG
CTGCATTGAGGGCAAGCTTTCTCAAATGTCAAAAGAAGTGAATGCTAGAATTGAGCC
ATTTTTGAAGACAACGCCACGCCCTCTCAGACTACCTGATGGGCCTCCTTGCTCTCA
GCGGTCGAAGTTCTTGCTGATGGATGCCCTTAAATTAAGCATCGAAGACCCGAGTCA
TGAGGGGGAGGGGATACCACTATACGATGCAATCAAATGCATGAAGACATTTTTCGG
CTGGAAAGAGCCCAACATCGTGAAACCACATGAAAAAGGTATAAACCCCAATTACCT
CCTGGCTTGGAAGCAAGTGCTGGCAGAACTCCAAGATATTGAAAATGAGGAGAAAAT
CCCAAAAACAAAGAACATGAAAAAAACAAGCCAGTTGAAGTGGGCACTCGGTGAGAA
CATGGCACCAGAGAAAGTAGACTTTGAGGACTGCAAAGATGTTAGCGATCTAAGACA
GTATGACAGTGATGAACCAGAGTCTAGATCACTAGCAAGCTGGATTCAGAGTGAATT
CAACAAGGCATGTGAATTGACAGATTCGATTTGGATTGAACTCGATGAAATAGGAGA
AGACGTAGCTCCAATTGAGCACATTGCAAGTATGAGAAGGAACTATTTTACAGCGGA
AGTATCCCATTGCAGGGCCACTGAATACATAATGAAGGGAGTGTACATAAACACAGC
CCTGTTGAATGCATCCTGTGCAGCCATGGATGACTTTCAACTGATTCCAATGATAAGC
AAATGCAGAACCAAAGAAGGAAGACGGAAAACTAATCTGTATGGATTCATTATAAAAG
GGAGATCCCACTTGAGGAATGATACCGATGTGGTAAATTTTGTGAGTATGGAATTCTC
TCTTACTGATCCGAGGCTGGAGCCACACAAGTGGGAAAAGTACTGTGTCCTCGAGAT
AGGAGACATGCTCCTCCGGACTGCAGTAGGCCAAGTTTCGAGGCCCATGTTCCTGT
ATGTAAGAACCAATGGAACCTCCAAGATCAAAATGAAATGGGGCATGGAAATGAGGC
GATGCCTTCTTCAATCCCTTCAACAAATTGAAAGCATGATTGAAGCCGAGTCTTCTGT
CAAAGAGAAGGACATGACCAAAGAATTCTTTGAAAACAAATCAGAAACATGGCCGATT
GGAGAGTCCCCCAAGGGAGTGGAGGAAGGCTCCATCGGAAAGGTGTGCAGAACCTT
GCTGGCGAAGTCTGTGTTCAACAGTTTATATGCATCTCCACAACTCGAGGGGTTTTC
AGCTGAATCAAGAAAATTGCTTCTCATTGCTCAGGCACTTAGGGACAACCTGGAACC

Figure 1 (cont'd)

TGGGACCTTCGATCTTGGAGGGCTATATGAAGCAATTGAGGAGTGCCTGATTAACGA
TCCCTGGGTTTTGCTTAATGCGTCTTGGTTCAACTCCTTCCTCGCACATGCACTGAAA
TAGTTGTGGCAATGCTACTATTTGCTATCCATACTGTCCAAAAAAGTACCTTGTTTCTA
CT (SEQ ID NO: 6)

PB1

AGCGAAAGCAGGCAAACCATTTGAATGGATGTCAATCCGACTTTACTTTTCTTGAAAG
TACCAGTGCAAAATGCTATAAGTACCACCTTCCCTTATACTGGAGACCCTCCATACAG
CCATGGAACAGGGACAGGATACACCATGGACACAGTCAACAGAACACACCAATATTC
AGAAAAGGGGAAGTGGACAACAAACACAGAGACTGGAGCACCCCAACTCAACCCGA
TTGATGGACCACTACCTGAGGATAATGAGCCCAGTGGGTACGCACAAACAGATTGTG
TATTGGAAGCAATGGCTTTCCTTGAAGAATCCCACCCAGGGATCTTTGAAAACTCGT
GTCTTGAAACGATGGAAATTGTTCAACAAACAAGAGTGGATAAACTGACCCAAGGTC
GCCAGACCTATGACTGGACATTGAATAGAAACCAACCGGCTGCAACTGCTTTGGCCA
ACACTATAGAAATCTTCAGATCGAACGGTCTAACAGCCAATGAATCGGGACGGCTAA
TAGATTTCCTCAAGGATGTGATGGAGTCAATGGATAAGGAAGAAATGGAGATAACAA
CACATTTCCAGAGAAAGAGAAGGGTGAGGGACAACATGACCAAGAAAATGGTCACAC
AAAGAACAATAGGGAAGAAAAAACAAAGGCTGAACAAAAAGAGCTACCTGATAAGAG
CACTGACACTGAACACAATGACAAAAGATGCAGAAAGAGGCAAATTGAAGAGGCGAG
CGATTGCAACACCCGGAATGCAAATCAGAGGATTCGTGTACTTTGTTGAAACACTAG
CGAGGAGTATCTGTGAGAAACTTGAGCAATCTGGACTCCCAGTCGGAGGGAATGAG
AAGAAGGCTAAATTGGCAAACGTCGTGAGGAAGATGATGACTAACTCACAAGATACT
GAACTCTCCTTTACAATTACTGGAGACAATACCAAATGGAATGAGAATCAGAATCCTA
GGATGTTTCTGGCAATGATAACGTACATCACAAGGAACCAGCCAGAATGGTTTCGGA
ATGTCTTAAGCATAGCTCCTATAATGTTCTCAAACAAAATGGCGAGACTAGGAAAAGG
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GCAAACATTGATCTTAAATACTTCAATGAATTAACGAAAAAGAAAATTGAGAAAATAAG
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CAACATGCTGAGTACAGTCCTAGGAGTTTCAATCCTGAATCTTGGACAGAAAAGGTA
CACCAAAACCACATATTGGTGGGACGGACTCCAATCCTCTGATGATTTCGCTCTCAT
CGTAAATGCACCGAATCATGAGGGAATACAAGCAGGAGTGGATAGGTTTTATAGGAC
TTGTAAACTAGTTGGAATCAATATGAGCAAGAAGAAGTCTTACATAAATCGGACAGGG
ACATTTGAATTCACGAGCTTTTTCTACCGCTATGGATTTGTAGCCAATTTCAGTATGG
AGCTGCCCAGTTTTGGAGTGTCTGGAATTAATGAATCGGCCGACATGAGCATTGGTG
TTACAGTGATAAAAAACAATATGATAAACAACGACCTTGGGCCAGCAACAGCTCAGAT
GGCTCTTCAGTTATTCATCAAGGACTACAGATACACATACCGATGCCACAGAGGGGA
TACGCAAATCCAAACAAGGAGATCATTCGAGCTGAAGAAGCTGTGGGAGCAAACCC
GTTCAAAGGCAGGACTGTTGGTTTCAGATGGAGGACCAAATCTATACAATATCCGAA
ACCTCCATATTCCTGAAGTCTGCTTAAAATGGGAATTGATGGATGAAGATTACCAGGG
CAGACTGTGTAATCCTCTGAATCCATTCGTCAGCCATAAGGAAATTGAATCTGTCAAC
AATGCTGTAGTAATGCCAGCTCATGGCCCGGCCAAGAGTATGGAATATGATGCCGTT
GCAACTACACATTCATGGATTCCTAAAAGGAACCGTTCCATTCTCAATACGAGTCAAA
GGGGAATTCTTGAGGATGAACAGATGTACCAGAAGTGCTGCAATCTATTCGAGAAAT
TCTTCCCCAGCAGTTCATATCGGAGGCCAGTTGGAATTTCCAGCATGGTGGAGGCCA
TGGTGTCTAGGGCCCGAATTGACGCACGAATCGATTTCGAGTCTGGAAGGATTAAGA
AAGAAGAGTTTGCCGAGATCATGAAGATCTGTTCCACCATTGAAGAACTCAGACGGC
AAAAATAGTGAATTTAGCTTGTCCTTCGTGAAAAAATGCCTTGTTTCTACT (SEQ ID NO: 7)

PB2

AGCGAAAGCAGGTCAAATATATTCAATATGGAGAGGATAAAAGAATTACGAGATCTAA
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TAATCAAGAAATACACATCAGGAAGACAAGAGAAGAACCCTGCTCTCAGAATGAAAT
GGATGATGGCAATGAAATATCCAATCACAGCGGACAAGAGAATAATAGAGATGATTC
CTGAAAGGAATGAACAAGGGCAGACGCTCTGGAGCAAGACAAATGATGCTGGATCG
GACAGGGTGATGGTGTCTCCCCTAGCTGTAACTTGGTGGAATAGGAATGGGCCGGC

Figure 1 (cont'd)

GACAAGTGCAGTTCATTATCCAAAGGTTTACAAAACATACTTTGAGAAGGTTGAAAGA
TTAAAACATGGAACCTTCGGTCCCGTTCATTTCCGAAACCAGGTTAAAATACGCCGC
CGAGTTGATATAAATCCTGGCCATGCAGATCTCAGTGCTAAAGAAGCACAAGATGTC
ATCATGGAGGTCGTTTTCCCAAATGAAGTGGGAGCTAGAATATTGACATCAGAGTCG
CAATTGACAATAACGAAAGAGAAGAAAGAAGAGCTCCAAGATTGTAAGATTGCTCCC
TTAATGGTTGCATACATGTTGGAAAGGGAACTGGTCCGCAAGACCAGATTCCTACCG
GTAGCAGGCGGAACAAGTAGTGTGTACATTGAGGTATTGCATTTGACTCAAGGGACC
TGCTGGGAACAGATGTACACTCCAGGCGGAGAAGTGAGAAATGACGATGTTGACCA
GAGTTTGATCATTGCTGCCAGAAACATTGTTAGGAGAGCAACAGTATCAGCGGATCC
ACTGGCATCACTGCTGGAGATGTGTCACAGCACACAAATTGGTGGGATAAGGATGGT
GGACATCCTTAGGCAAAATCCAACTGAGGAACAAGCTGTGGATATATGCAAAGCAGC
AATGGGTCTTAGGATCAGTTCTTCCTTTAGCTTTGGAGGCTTCACTTTCAAAAGAACA
AGTGGATCATCCGTCAAGAAGGAAGAGGAAGTGCTTACAGGCAACCTCCAAACATTG
AAAATAAGAGTACATGAGGGGTATGAGGAATTCACAATGGTTGGGCGGAGGGCAAC
AGCTATCCTGAGGAAAGCAACTAGAAGGCTGATTCAGTTGATAGTAAGTGGAAGAGA
CCAACAATCAATCGCTGAGGCAATCATTGTAGCAATGGTGTTCTCACAGGAGGATTG
CATGATAAAGGCAGTCCGAGGCGATCTGAATTTCGTAAACAGAGCAAACCAAAGATT
AAACCCCATGCATCAACTCCTGAGACATTTTCAAAAGGACGCAAAAGTGCTATTTCAG
AATTGGGGAATTGAACCCATTGATAATGTCATGGGGATGATCGGAATATTACCTGACA
TGACTCCCAGCACAGAAATGTCACTGAGAGGAGTAAGAGTTAGTAAAATGGGAGTGG
ATGAATATTCCAGCACTGAGAGAGTAGTTGTAAGTATTGACCGTTTCTTAAGGGTTCG
AGATCAGCGGGGGAACGTACTCTTATCTCCCGAAGAGGTCAGCGAAACCCAGGGAA
CAGAGAAATTGACAATAACATATTCATCATCAATGATGTGGGAAATCAACGGTCCTGA
GTCAGTGCTTGTTAACACCTATCAGTGGATCATCAGAAACTGGGAGACTGTGAAGAT
TCAATGGTCTCAAGACCCCACGATGCTGTACAATAAGATGGAGTTTGAACCGTTCCA
ATCCTTGGTACCCAAAGCTGCCAGAGGTCAATACAGTGGATTTGTGAGAACATTATTC
CAGCAAATGCGTGACGTACTGGGGACATTTGATACTGTCCAGATAATAAAGCTGCTA
CCATTTGCAGCAGCCCCACCGAAGCAGAGCAGAATGCAGTTTTCTTCTCTAACTGTG
AATGTGAGAGGCTCAGGAATGAGAATACTCGTAAGGGGCAATTCCCCTGTGTTCAAC
TACAATAAGGCAACCAAAAGGCTTACCGTCCTTGGAAAGGACGCAGGTGCATTAACA
GAGGATCCGGATGAAGGGACAGCCGGAGTGGAGTCTGCAGTACTGAGGGGATTCTT
AATTTTAGGCAAGGAGGACAAAAGGTATGGACCAGCATTGAGCATCAATGAACTGAG
CAATCTTGCGAAGGGGGAGAAAGCTAATGTGCTGATAGGGCAAGGTGACGTGGTGT
TGGTAATGAAACGAAAACGGGACTCTAGCATACTTACTGACAGCCAGACAGCGACCA
AAAGAATTCGGATGGCCATCAATTAGTGTCGAATTGTTTAAAAACGACCTTGTTTCTA
CT (SEQ ID NO: 8)

Figure 1 (cont'd)

FIGURE 2
Indonesia Strain Gene Sequences

HA

AGCAAAAGCAGGGGTTCAATCTGTCAAAATGGAGAAAATAGTGCTTCTTTTTGCAATA
GTCAGTCTTGTTAAAAGTGATCAGATTTGCATTGGTTACCATGCAAACAACTCGACAG
AGCAGGTTGACACAATAATGGAAAAGAACGTTACTGTTACACATGCCCAAGACATACT
GGAAAAGAAACACAACGGGAAGCTCTGCGATCTAGATGGAGTGAAGCCTCTAATTTT
GAGAGATTGTAGCGTAGCTGGATGGCTCCTCGGAAACCCAATGTGTGACGAATTCAT
CAATGTGCCGGAATGGTCTTACATAGTGGAGAAGGCCAATCCAGTCAATGACCTCTG
TTACCCAGGGGATTTCAATGACTATGAAGAATTGAAACACCTATTGAGCAGAATAAAC
CATTTTGAGAAAATTCAGATCATCCCCAAAAGTTCTTGGTCCAGTCATGAAGCCTCAT
TAGGGGTGAGCTCAGCATGTCCATACCAGGGAAAGTCCTCCTTTTTCAGAAATGTGG
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CAACCAAGAAGATCTTTTGGTACTGTGGGGGATTCACCATCCTAATGATGCGGCAGA
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AGGATGGAGTTCTTCTGGACAATTTTAAAGCCGAATGATGCAATCAACTTCGAGAGTA
ATGGAAATTTCATTGCTCCAGAATATGCATACAAAATTGTCAAGAAAGGGGACTCAAC
AATTATGAAAAGTGAATTGGAATATGGTAACTGCAACACCAAGTGTCAAACTCCAATG
GGGGCGATAAACTCTAGCATGCCATTCCACAATATACACCCTCTCACCATTGGGGAA
TGCCCCAAATATGTGAAATCAAACAGATTAGTCCTTGCGACTGGGCTCAGAAATAGC
CCTCAAACCGAGACCCGAGGATTATTTGGAGCTATAGCAGGTTTTATAGAGGGAGGA
TGGCAGGGAATGGTAGATGGTTGGTATGGGTACCACCATAGCAATGAGCAGGGGAG
TGGGTACGCTGCAGACAAAGAATCCACTCAAAAGGCAATAGATGGAGTCACCAATAA
GGTCAACTCGATCATTGACAAAATGAACACTCAGTTTGAGGCCGTTGGAAGGGAATT
TAACAACTTAGAAAGGAGAATAGAGAATTTAAACAAGAAGATGGAAGACGGGTTCCT
AGATGTCTGGACTTATAATGCTGAACTTCTGGTTCTCATGGAAAATGAGAGAACTCTA
GACTTTCATGACTCAAATGTCAAGAACCTTTACGACAAGGTCCGACTACAGCTTAGG
GATAATGCAAAGGAGCTGGGTAACGGTTGTTTCGAGTTCTATCATAAATGTGATAATG
AATGTATGGAAAGTGTAAGAAATGGAACGTATGACTACCCGCAGTATTCAGAAGAAG
CGAGACTAAAAAGAGAGGAAATAAGTGGAGTAAAATTGGAATCAATAGGAATTTACCA
AATACTGTCAATTTATTCTACAGTGGCGAGTTCCCTAGCACTGGCAATCATGGTAGCT
GGTCTATCCTTATGGATGTGCTCCAATGGATCGTTACAATGCAGAATTTGCATTTAAA
TTTGTGAGTTCAGATTGTAGTTAAAAACACCCTTGTTTCTACT (SEQ ID NO: 1)

NA

AGCAAAAGCAGGAGTTCAAAATGAATCCAAATCAGAAGATAATAACCATCGGATCAAT
CTGTATGGTAACTGGAATAGTTAGCTTAATGTTACAAATTGGGAACATGATCTCAATA
TGGGTCAGTCATTCAATTCACACAGGGAATCAACACCAATCTGAACCAATCAGCAATA
CTAATTTTCTTACTGAGAAAGCTGTGGCTTCAGTAAAATTAGCGGGCAATTCATCTCT
TTGCCCCATTAACGGATGGGCTGTATACAGTAAGGACAACAGTATAAGGATCGGTTC
CAAGGGGGATGTGTTTGTTATAAGAGAGCCGTTCATCTCATGCTCCCACTTGGAATG
CAGAACTTTCTTTTTGACTCAGGGAGCCTTGCTGAATGACAAGCACTCCAATGGGAC
TGTCAAAGACAGAAGCCCTCACAGAACATTAATGAGTTGTCCTGTGGGTGAGGCTCC
CTCCCCATATAACTCAAGGTTTGAGTCTGTTGCTTGGTCAGCAAGTGCTTGCCATGAT
GGCACCAGTTGGTTGACGATTGGAATTTCTGGCCCAGACAATGGGGCTGTGGCTGT
ATTGAAATACAATGGCATAATAACAGACACTATCAAGAGTTGGAGGAACAACATACTG
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ACGGACCAAGTAATGGTCAGGCATCACATAAGATCTTCAAAATGGAAAAAGGGAAAG
TGGTTAAATCAGTCGAATTGGATGCTCCTAATTATCACTATGAGGAATGCTCCTGTTA
TCCTAATGCCGGAGAAATCACATGTGTGTGCAGGGATAATTGGCATGGCTCAAATCG
GCCATGGGTATCTTTCAATCAAAATTTGGAGTATCAAATAGGATATATATGCAGTGGA
GTTTTCGGAGACAATCCACGCCCCAATGATGGAACAGGTAGTTGTGGTCCGGTGTCC
TCTAACGGGGCATATGGGGTAAAAGGGTTTTCATTTAAATACGGCAATGGTGTCTGG
ATCGGGAGAACCAAAAGCACTAATTCCAGGAGCGGCTTTGAAATGATTTGGGATCCA
AATGGGTGGACTGAAACGGACAGTAGCTTTTCAGTGAAACAAGATATCGTAGCAATA
ACTGATTGGTCAGGATATAGCGGGAGTTTTGTCCAGCATCCAGAACTGACAGGACTA
GATTGCATAAGACCTTGTTTCTGGGTTGAGTTGATCAGAGGGCGGCCCAAAGAGAGC
ACAATTTGGACTAGTGGGAGCAGCATATCTTTTTGTGGTGTAAATAGTGACACTGTGG

GTTGGTCTTGGCCAGACGGTGCCGAGTTGCCATTCACCATTGACAAGTAGTTTGTTC
AAAAAACTCCTTGTTTCTACT (SEQ ID NO: 2)

M

AGCAAAAGCAGGTAGATGTTGAAAGATGAGTCTTCTAACCGAGGTCGAAACGTACGT
TCTCTCTATCATCCCGTCAGGCCCCCTCAAAGCCGAGATCGCACAGAAACTTGAAGA
TGTCTTTGCAGGAAAGAACACCGATCTCGAGGCTCTCATGGAGTGGCTAAAGACAAG
ACCAATCCTGTCACCTCTGACTAAAGGGATTTTGGGATTTGTATTCACGCTCACCGTG
CCCAGTGAGCGAGGACTGCAGCGTAGACGCTTTGTCCAGAATGCCCTAAATGGAAA
TGGAGATCCAAATAATATGGATAGGGCAGTTAAGCTATATAAGAAGCTGAAAAGAGA
AATAACATTCCATGGGGCTAAGGAGGTCGCACTCAGCTACTCAACCGGTGCACTTGC
CAGTTGCATGGGTCTCATATACAACAGGATGGGAACGGTGACTACGGAAGTGGCTTT
TGGCCTAGTGTGTGCCACTTGTGAGCAGATTGCAGATTCACAGCATCGGTCTCACAG
ACAGATGGCAACTATCACCAACCCACTAATCAGACATGAGAACAGAATGGTGCTGGC
CAGCACTACAGCTAAGGCTATGGAGCAGATGGCGGGATCAAGTGAGCAGGCAGCG
GAAGCCATGGAGATCGCTAATCAGGCTAGGCAGATGGTGCAGGCAATGAGGACAAT
TGGGACTCATCCTAACTCTAGTGCTGGTCTGAGAGATAATCTTCTTGAAAATTTGCAG
GCCTACCAGAAACGAATGGGAGTGCAGATGCAGCGATTCAAGTGATCCTATTGTTGT
TGCCGCAAATATCATTGGGATCTTGCACTTGATATTGTGGATTCTTGATCGTCTTTTCT
TCAAATGCATTTATCGTCGCCTTAAATACGGTTTGAAAAGAGGGCCTGCTACGGCAG
GGGTACCTGAGTCTATGAGGGAAGAGTACCGGCAGGAACAGCAGAGTGCTGTGGAT
GTTGACGATGGTCATTTTGTCAACATAGAATTGGAGTAAAAAACTACCTTGTTTCTACT
(SEQ ID NO: 3)

NS

AGCAAAAGCAGGGTGACAAAAACATAATGGATTCCAACACTGTGTCAAGCTTTCAGG
TAGACTGCTTTCTTTGGCATGTCCGCAAACGATTTGCAGACCAAGAACTGGGTGATG
CCCCATTCCTTGACCGGCTTCGCCGAGATCAGAAGTCCCTAAGAGGAAGAGGCAAC
ACTCTTGGTCTGGACATCGAAACAGCTACTCGCGCAGGAAAGCAGATAGTGGAGCG
GATTCTGGAGGGGGAGTCTGATAAGGCACTTAAAATGCCGGCTTCACGCTACCTAAC
TGACATGACTCTCGAAGAAATGTCAAGGGACTGGTTCATGCTCATGCCCAAGCAGAA
AGTGGCAGGTTCCCTTTGCATCAAAATGGACCAGGCAATAATGGATAAAACCATCAT
ATTGAAAGCAAACTTCAGTGTGATTTTTGACCGGTTGGAAACCCTAATACTACTTAGA
GCTTTCACAGAAGAAGGAGCAATCGTGGGAGAAATCTCACCATTACCTTCTCTTCCA
GGACATACTGGTGAGGATGTCAAAAATGCAATTGGCGTCCTCATCGGAGGACTTGAA
TGGAATGATAACACAGTTCGAGTCACTGAAACTATACAGAGATTCGCTTGGAGAAAC
AGTGATGAGGATGGGAGACTTCCACTCCCTCCAAATCAGAAACGGTAAATGGCGAGA
ACAATTGAGTCAGAAGTTTGAAGAAATAAGGTGGCTGATTGAAGAAGTAAGACATAG
ATTGAAAATTACAGAAAACAGCTTCGAACAGATAACGTTTATGCAAGCCTTACAACTA
CTGCTTGAAGTGGAGCAAGAGATAAGAGCCTTCTCGTTTCAGCTTATTTAATGATAAA
AAACACCCTTGTTTCTACT (SEQ ID NO: 4)

NP

AGCAAAAGCAGGGTAGATAATCACTCACCGAGTGACATCAGCATCATGGCGTCTCAA
GGCACCAAACGATCTTATGAACAGATGGAAACTGGTGGGGAACGCCAGAATGCTACT
GAGATCAGGGCATCTGTTGGAAGAATGGTTAGTGGCATTGGGAGGTTCTACATACAG
ATGTGCACAGAACTCAAACTCAGTGACTATGAAGGGAGGCTGATCCAGAACAGCATA
ACAATAGAGAGAATGGTACTCTCTGCATTTGATGAAAGAAGGAACAGATACCTGGAA
GAACACCCCAGTGCGGGAAAGGACCCGAAGAAGACTGGAGGTCCAATTTATCGGAG
GAGAGACGGGAAATGGGTGAGAGAGCTAATTCTGTACGACAAAGAGGAGATCAGGA
GGATTTGGCGTCAAGCGAACAATGGAGAGGACGCAACTGCTGGTCTTACCCACCTG
ATGATATGGCATTCCAATCTAAATGATGCCACATATCAGAGAACGAGAGCTCTCGTG
CGTACTGGAATGGACCCAAGGATGTGCTCTCTGATGCAAGGGTCAACTCTCCCGAG
GAGATCTGGAGCTGCCGGTGCAGCAGTAAAGGGGGTAGGGACAATGGTGATGGAG
CTGATTCGGATGATAAAACGAGGGATCAACGACCGGAATTTCTGGAGAGGCGAAAAT
GGAAGAAGAACAAGGATTGCATATGAGAGAATGTGCAACATCCTCAAAGGGAAATTC

Figure 2 (cont'd)

CAAACAGCAGCACAAAGAGCAATGATGGATCAAGTGCGAGAGAGCAGAAATCCTGG
GAATGCTGAAATTGAAGATCTCATTTTTCTGGCACGGTCTGCACTCATCCTGAGAGG
ATCAGTGGCCCATAAGTCCTGCTTGCCTGCTTGTGTGTACGGACTTGCAGTGGCCAG
TGGATATGACTTTGAGAGAGAAGGGTACTCTCTGGTTGGAATAGATCCTTTCCGCCT
GCTTCAAAACAGCCAGGTCTTTAGTCTCATTAGACCAAATGAGAATCCAGCACATAAG
AGTCAATTAGTGTGGATGGCATGCCACTCTGCAGCATTTGAGGACCTTAGAGTCTCA
AGTTTCATCAGAGGGACAAGAGTGGTCCCAAGAGGACAGCTATCCACCAGAGGGGT
TCAAATTGCTTCAAATGAGAACATGGAGGCAATGGACTCCAACACTCTTGAACTGAG
AAGCAGATATTGGGCTATAAGAACCAGAAGCGGAGGAAACACCAACCAGCAGAGGG
CATCTGCAGGACAGATCAGCGTTCAGCCCACTTTCTCGGTCCAGAGAAACCTTCCCT
TCGAAAGAGCGACCATTATGGCAGCATTTACAGGAAATACTGAGGGCAGAACGTCTG
ACATGAGGACTGAAATCATAAGAATGATGGAAAGTGCCAGACCAGAAGATGTGTCAT
TCCAGGGGCGGGGAGTCTTCGAGCTCTCGGACGAAAAGGCAACGAACCCGATCGT
GCCTTCCTTTGACATGAATAATGAAGGATCTTATTTCTTCGGAGACAATGCAGAGGAG
TATGACAATTAAAGAAAAATACCCTTGTTTCTACT (SEQ ID NO: 5)

PA

AGCGAAAGCAGGTACTGATCCAAAATGGAAGACTTTGTGCGACAATGCTTCAATCCA
ATGATTGTCGAGCTTGCGGAAAAGGCAATGAAAGAATATGGGGAAGATCCGAAAATC
GAAACGAACAAGTTTGCTGCAATATGCACACACTTGGAGGTCTGTTTCATGTATTCGG
ATTTTCACTTTATTGATGAACGGAGTGAATCAATAATTGTAGAATCTGGAGATCCGAA
TGCATTATTGAAACACCGATTTGAAATAATTGAAGGAAGAGACCGAACGATGGCCTG
GACTGTGGTGAATAGTATCTGCAACACCACAGGAGTTGAGAAACCTAAATTTCTCCC
AGATTTGTATGACTACAAAGAGAACCGATTCATCGAAATTGGAGTGACACGGAGGGA
AGTTCATACATACTATCTGGAGAAAGCCAACAAGATAAAATCCGAGGAGACACATATT
CACATATTCTCATTCACAGGGGAGGAAATGGCCACCAAAGCGGACTACACCCTTGAT
GAAGAGAGCAGGGCAAGAATTAAAACCAGGCTGTTCACCATAAGGCAGGAAATGGC
CAGTAGGGGTCTATGGGATTCCTTTCGTCAATCCGAGAGAGGCGAAGAGACAATTGA
AGAAAAATTTGAAATCACTGGAACCATGCGCAGACTTGCAGACCAAAGTCTCCCACC
GAACTTCTCCAGCCTTGAAAACTTTAGAGCCTATGTGGATGGATTCGAACCGAACGG
CTGCATTGAGGGCAAGCTTTCTCAAATGTCAAAAGAAGTGAATGCTAGAATTGAGCC
ATTTTTGAAGACAACGCCACGCCCTCTCAGACTACCTGATGGGCCTCCTTGCTCTCA
GCGGTCGAAGTTCTTGCTGATGGATGCCCTTAAATTAAGCATCGAAGACCCGAGTCA
TGAGGGGGAGGGGATACCACTATACGATGCAATCAAATGCATGAAGACATTTTTCGG
CTGGAAAGAGCCCAACATCGTGAAACCACATGAAAAAGGTATAAACCCCAATTACCT
CCTGGCTTGGAAGCAAGTGCTGGCAGAACTCCAAGATATTGAAAATGAGGAGAAAAT
CCCAAAAACAAAGAACATGAAAAAAACAAGCCAGTTGAAGTGGGCACTCGGTGAGAA
CATGGCACCAGAGAAAGTAGACTTTGAGGACTGCAAAGATGTTAGCGATCTAAGACA
GTATGACAGTGATGAACCAGAGTCTAGATCACTAGCAAGCTGGATTCAGAGTGAATT
CAACAAGGCATGTGAATTGACAGATTCGATTTGGATTGAACTCGATGAAATAGGAGA
AGACGTAGCTCCAATTGAGCACATTGCAAGTATGAGAAGGAACTATTTTACAGCGGA
AGTATCCCATTGCAGGGCCACTGAATACATAATGAAGGGAGTGTACATAAACACAGC
CCTGTTGAATGCATCCTGTGCAGCCATGGATGACTTTCAACTGATTCCAATGATAAGC
AAATGCAGAACCAAAGAAGGAAGACGGAAAACTAATCTGTATGGATTCATTATAAAAG
GGAGATCCCACTTGAGGAATGATACCGATGTGGTAAATTTTGTGAGTATGGAATTCTC
TCTTACTGATCCGAGGCTGGAGCCACACAAGTGGGAAAAGTACTGTGTCCTCGAGAT
AGGAGACATGCTCCTCCGGACTGCAGTAGGCCAAGTTTCGAGGCCCATGTTCCTGT
ATGTAAGAACCAATGGAACCTCCAAGATCAAAATGAAATGGGGCATGGAAATGAGGC
GATGCCTTCTTCAATCCCTTCAACAAATTGAAAGCATGATTGAAGCCGAGTCTTCTGT
CAAAGAGAAGGACATGACCAAAGAATTCTTTGAAAACAAATCAGAAACATGGCCGATT
GGAGAGTCCCCCAAGGGAGTGGAGGAAGGCTCCATCGGAAAGGTGTGCAGAACCTT
GCTGGCGAAGTCTGTGTTCAACAGTTTATATGCATCTCCACAACTCGAGGGGTTTTC
AGCTGAATCAAGAAAATTGCTTCTCATTGCTCAGGCACTTAGGGACAACCTGGAACC
TGGGACCTTCGATCTTGGAGGGCTATATGAAGCAATTGAGGAGTGCCTGATTAACGA
TCCCTGGGTTTTGCTTAATGCGTCTTGGTTCAACTCCTTCCTCGCACATGCACTGAAA
TAGTTGTGGCAATGCTACTATTTGCTATCCATACTGTCCAAAAAAGTACCTTGTTTCTA
CT (SEQ ID NO: 6)

Figure 2 (cont'd)

PB1

AGCGAAAGCAGGCAAACCATTTGAATGGATGTCAATCCGACTTTACTTTTCTTGAAAG
TACCAGTGCAAAATGCTATAAGTACCACCTTCCCTTATACTGGAGACCCTCCATACAG
CCATGGAACAGGGACAGGATACACCATGGACACAGTCAACAGAACACACCAATATTC
AGAAAAGGGGAAGTGGACAACAAACACAGAGACTGGAGCACCCCAACTCAACCCGA
TTGATGGACCACTACCTGAGGATAATGAGCCCAGTGGGTACGCACAAACAGATTGTG
TATTGGAAGCAATGGCTTTCCTTGAAGAATCCCACCCAGGGATCTTTGAAAACTCGT
GTCTTGAAACGATGGAAATTGTTCAACAAACAAGAGTGGATAAACTGACCCAAGGTC
GCCAGACCTATGACTGGACATTGAATAGAAACCAACCGGCTGCAACTGCTTTGGCCA
ACACTATAGAAATCTTCAGATCGAACGGTCTAACAGCCAATGAATCGGGACGGCTAA
TAGATTTCCTCAAGGATGTGATGGAGTCAATGGATAAGGAAGAAATGGAGATAACAA
CACATTTCCAGAGAAAGAGAAGGGTGAGGGACAACATGACCAAGAAAATGGTCACAC
AAAGAACAATAGGGAAGAAAAAACAAAGGCTGAACAAAAAGAGCTACCTGATAAGAG
CACTGACACTGAACACAATGACAAAAGATGCAGAAAGAGGCAAATTGAAGAGGCGAG
CGATTGCAACACCCGGAATGCAAATCAGAGGATTCGTGTACTTTGTTGAAACACTAG
CGAGGAGTATCTGTGAGAAACTTGAGCAATCTGGACTCCCAGTCGGAGGGAATGAG
AAGAAGGCTAAATTGGCAAACGTCGTGAGGAAGATGATGACTAACTCACAAGATACT
GAACTCTCCTTTACAATTACTGGAGACAATACCAAATGGAATGAGAATCAGAATCCTA
GGATGTTTCTGGCAATGATAACGTACATCACAAGGAACCAGCCAGAATGGTTTCGGA
ATGTCTTAAGCATAGCTCCTATAATGTTCTCAAACAAAATGGCGAGACTAGGAAAAGG
ATACATGTTCGAAAGTAAGAGCATGAAGTTACGAACACAAATACCAGCAGAAATGCTT
GCAAACATTGATCTTAAATACTTCAATGAATTAACGAAAAAGAAAATTGAGAAAATAAG
GCCTCTATTAATAGATGGTACAGCCTCATTGAGCCCTGGAATGATGATGGGCATGTT
CAACATGCTGAGTACAGTCCTAGGAGTTTCAATCCTGAATCTTGGACAGAAAAGGTA
CACCAAAACCACATATTGGTGGGACGGACTCCAATCCTCTGATGATTTCGCTCTCAT
CGTAAATGCACCGAATCATGAGGGAATACAAGCAGGAGTGGATAGGTTTTATAGGAC
TTGTAAACTAGTTGGAATCAATATGAGCAAGAAGAAGTCTTACATAAATCGGACAGGG
ACATTTGAATTCACGAGCTTTTTCTACCGCTATGGATTTGTAGCCAATTTCAGTATGG
AGCTGCCCAGTTTTGGAGTGTCTGGAATTAATGAATCGGCCGACATGAGCATTGGTG
TTACAGTGATAAAAAACAATATGATAAACAACGACCTTGGGCCAGCAACAGCTCAGAT
GGCTCTTCAGTTATTCATCAAGGACTACAGATACACATACCGATGCCACAGAGGGGA
TACGCAAATCCAAACAAGGAGATCATTCGAGCTGAAGAAGCTGTGGGAGCAAACCC
GTTCAAAGGCAGGACTGTTGGTTTCAGATGGAGGACCAAATCTATACAATATCCGAA
ACCTCCATATTCCTGAAGTCTGCTTAAAATGGGAATTGATGGATGAAGATTACCAGGG
CAGACTGTGTAATCCTCTGAATCCATTCGTCAGCCATAAGGAAATTGAATCTGTCAAC
AATGCTGTAGTAATGCCAGCTCATGGCCCGGCCAAGAGTATGGAATATGATGCCGTT
GCAACTACACATTCATGGATTCCTAAAAGGAACCGTTCCATTCTCAATACGAGTCAAA
GGGGAATTCTTGAGGATGAACAGATGTACCAGAAGTGCTGCAATCTATTCGAGAAAT
TCTTCCCCAGCAGTTCATATCGGAGGCCAGTTGGAATTTCCAGCATGGTGGAGGCCA
TGGTGTCTAGGGCCCGAATTGACGCACGAATCGATTTCGAGTCTGGAAGGATTAAGA
AAGAAGAGTTTGCCGAGATCATGAAGATCTGTTCCACCATTGAAGAACTCAGACGGC
AAAAATAGTGAATTTAGCTTGTCCTTCGTGAAAAAATGCCTTGTTTCTACT (SEQ ID NO: 7)

PB2

AGCGAAAGCAGGTCAAATATATTCAATATGGAGAGGATAAAAGAATTACGAGATCTAA
TGTCACAGTCCCGCACTCGCGAGATACTAACAAAAACCACTGTGGACCATATGGCCA
TAATCAAGAAATACACATCAGGAAGACAAGAGAAGAACCCTGCTCTCAGAATGAAAT
GGATGATGGCAATGAAATATCCAATCACAGCGGACAAGAGAATAATAGAGATGATTC
CTGAAAGGAATGAACAAGGGCAGACGCTCTGGAGCAAGACAAATGATGCTGGATCG
GACAGGGTGATGGTGTCTCCCCTAGCTGTAACTTGGTGGAATAGGAATGGGCCGGC
GACAAGTGCAGTTCATTATCCAAAGGTTTACAAAACATACTTTGAGAAGGTTGAAAGA
TTAAAACATGGAACCTTCGGTCCCGTTCATTTCCGAAACCAGGTTAAAATACGCCGC
CGAGTTGATATAAATCCTGGCCATGCAGATCTCAGTGCTAAAGAAGCACAAGATGTC
ATCATGGAGGTCGTTTTCCCAAATGAAGTGGGAGCTAGAATATTGACATCAGAGTCG
CAATTGACAATAACGAAAGAGAAGAAAGAAGAGCTCCAAGATTGTAAGATTGCTCCC
TTAATGGTTGCATACATGTTGGAAAGGGAACTGGTCCGCAAGACCAGATTCCTACCG
GTAGCAGGCGGAACAAGTAGTGTGTACATTGAGGTATTGCATTTGACTCAAGGGACC
TGCTGGGAACAGATGTACACTCCAGGCGGAGAAGTGAGAAATGACGATGTTGACCA

Figure 2 (cont'd)

GAGTTTGATCATTGCTGCCAGAAACATTGTTAGGAGAGCAACAGTATCAGCGGATCC
ACTGGCATCACTGCTGGAGATGTGTCACAGCACACAAATTGGTGGGATAAGGATGGT
GGACATCCTTAGGCAAAATCCAACTGAGGAACAAGCTGTGGATATATGCAAAGCAGC
AATGGGTCTTAGGATCAGTTCTTCCTTTAGCTTTGGAGGCTTCACTTTCAAAAGAACA
AGTGGATCATCCGTCAAGAAGGAAGAGGAAGTGCTTACAGGCAACCTCCAAACATTG
AAAATAAGAGTACATGAGGGGTATGAGGAATTCACAATGGTTGGGCGGAGGGCAAC
AGCTATCCTGAGGAAAGCAACTAGAAGGCTGATTCAGTTGATAGTAAGTGGAAGAGA
CCAACAATCAATCGCTGAGGCAATCATTGTAGCAATGGTGTTCTCACAGGAGGATTG
CATGATAAAGGCAGTCCGAGGCGATCTGAATTTCGTAAACAGAGCAAACCAAAGATT
AAACCCCATGCATCAACTCCTGAGACATTTTCAAAAGGACGCAAAAGTGCTATTTCAG
AATTGGGGAATTGAACCCATTGATAATGTCATGGGGATGATCGGAATATTACCTGACA
TGACTCCCAGCACAGAAATGTCACTGAGAGGAGTAAGAGTTAGTAAAATGGGAGTGG
ATGAATATTCCAGCACTGAGAGAGTAGTTGTAAGTATTGACCGTTTCTTAAGGGTTCG
AGATCAGCGGGGGAACGTACTCTTATCTCCCGAAGAGGTCAGCGAAACCCAGGGAA
CAGAGAAATTGACAATAACATATTCATCATCAATGATGTGGGAAATCAACGGTCCTGA
GTCAGTGCTTGTTAACACCTATCAGTGGATCATCAGAAACTGGGAGACTGTGAAGAT
TCAATGGTCTCAAGACCCCACGATGCTGTACAATAAGATGGAGTTTGAACCGTTCCA
ATCCTTGGTACCCAAAGCTGCCAGAGGTCAATACAGTGGATTTGTGAGAACATTATTC
CAGCAAATGCGTGACGTACTGGGGACATTTGATACTGTCCAGATAATAAAGCTGCTA
CCATTTGCAGCAGCCCCACCGAAGCAGAGCAGAATGCAGTTTTCTTCTCTAACTGTG
AATGTGAGAGGCTCAGGAATGAGAATACTCGTAAGGGGCAATTCCCCTGTGTTCAAC
TACAATAAGGCAACCAAAAGGCTTACCGTCCTTGGAAAGGACGCAGGTGCATTAACA
GAGGATCCGGATGAAGGGACAGCCGGAGTGGAGTCTGCAGTACTGAGGGGATTCTT
AATTTTAGGCAAGGAGGACAAAAGGTATGGACCAGCATTGAGCATCAATGAACTGAG
CAATCTTGCGAAGGGGGAGAAAGCTAATGTGCTGATAGGGCAAGGTGACGTGGTGT
TGGTAATGAAACGAAAACGGGACTCTAGCATACTTACTGACAGCCAGACAGCGACCA
AAAGAATTCGGATGGCCATCAATTAGTGTCGAATTGTTTAAAAACGACCTTGTTTCTA
CT (SEQ ID NO: 8)

Figure 2 (cont'd)

FIGURE 3
A/Turkey/Turkey/1/05 Attenuated Strain Gene Sequences

HA

AGCAAAAGCAGGGGTTCAATCTGTCAAAATGGAGAAAATAGTGCTTCTTCTTGCAATA
GTCAGCCTTGTTAAAAGTGATCAGATTTGCATTGGTTACCATGCAAACAACTCGACAG
AGCAGGTTGACACAATAATGGAAAAGAACGTCACTGTTACACATGCCCAAGACATACT
GGAAAAGACACACAACGGGAAACTCTGCGATCTAGATGGAGTGAAGCCTCTAATTTT
AGAGAGATTGTAGTGTAGCTGGATGGCTCCTCGGGAACCCAATGTGTGACGAATTCCT
CAATGTGCCGGAATGGTCTTACATAGTGGAGAAGATCAATCCAGCCAATGACCTCTG
TTACCCAGGGTATTTCAACGACTATGAAGAACTGAAACACCTATTGAGCAGAATAAAC
CATTTTGAGAAAATTCAGATCATCCCCAAAAGTTCTTGGTCAGACATGAAGCCTCAG
CAGGGGTGAGCTCAGCATGTCCATACCAGGGAAGGTCCTCCTTTTTTAGAAATGTGG
TATGGCTTATCAAAAAGGACAATGCATACCCAACAATAAAGAGAAGTTACAATAATAC
CAACCAAGAAGATCTTTTGGTATTGTGGGGGATTCACCATCCAAATGATGCGGCAGA
GCAGACAAGGCTCTATCAAAACCCAACTACCTATATTTCCGTTGGGACATCAACACTA
AACCAGAGATTGGTACCAAAAATAGCCACTAGATCTAAGGTAAACGGGCAAAGTGGA
AGGATGGAGTTCTTTTGGACAATTTTAAAACCGAATGATGCAATAAACTTTGAGAGTA
ATGGAAATTTCATTGCTCCAGAAAATGCATACAAAATTGTCAAGAAAGGGGACTCAAC
AATTATGAAAAGTGAGTTGGAATATGGTAACTGCAACACCAAGTGTCAAACTCCAATA
GGGGCGATAAACTCTAGTATGCCATTCCACAACATCCACCCTCTCACCATCGGGGAA
TGCCCCAAATATGTGAAATCAAGCAGATTAGTCCTTGCTACTGGGCTCAGAAATAGC
CCTCAAACCGAGACCCGAGGACTATTTGGAGCTATAGCAGGTTTTATAGAGGGAGGA
TGGCAGGGAATGGTAGATGGTTGGTATGGGTACCACCATAGCAACGAGCAGGGGAG
TGGGTACGCTGCAGACAAAGAATCCACTCAAAAGGCAATAGATGGAGTCACCAATAA
GGTCAACTCGATCATTGACAAAATGAACACTCAGTTTGAGGCTGTTGGAAGGGAATT
TAATAACTTAGAAAGGAGAATAGAAAATTTAAACAAGAAGATGGAAGACGGATTCCT
AGATGTCTGGACTTATAATGCTGAACTTCTGGTTCTCATGGAAAATGAGAGAACTCTA
GACTTTCATGACTCAAATGTCAAGAACCTTTACGACAAGGTCCGACTACAGCTTAGG
GATAATGCAAAGGAGCTTGGTAACGGTTGTTTCGAGTTCTATCACAGATGTGATAATG
AATGTATGGAAAGTGTAAGAAACGGAACGTATGACTACCCGCAGTATTCAGAAGAAG
CAAGATTAAAAAGAGAGGAAATAAGTGGAGTAAAATTGGAATCAATAGGAACTTACCA
AATACTGTCAATTTATTCAACAGTGGCGAGCTCCCTAGCACTGGCAATCATGGTGGCT
GGTCTATCTTTATGGATGTGCTCCAATGGATCGTTACAATGCAGAATTTGCATTTAAA
TTTGTGAGTTCAGATTGTAGTTAAAAACACCCTTGTTTCTACT (SEQ ID NO: 9)

NA

AGCAAAAGCAGGAGTTCAAAATGAATCCAAATCAGAAGATAATAACCATCGGATCAAT
CTGTATGGTAATTGGAATAGTTAGCTTAATGTTACAAATTGGGAACATGATCTCAATA
TGGGTCAGTCATTCAATTCAGACAGGGAATCAATGCCAAGCTGAACCAATCAGCAATA
CTAAATTTCTTACTGAGAAAGCTGTGGCTTCAGTAACATTAGCGGGCAATTCATCTCT
TTGCCCCATTAGCGGATGGGCTGTATACAGTAAGGACAACAGTATAAGGATCGGTTC
CAGGGGGGATGTGTTTGTTATAAGAGAGCCGTTCATCTCATGCTCCCACTTGGAATG
CAGAACTTTCTTTTTGACTCAGGGAGCCTTGCTGAATGACAAGCACTCCAATGGGAC
TGTCAAAGACAGAAGCCCTCACAGAACATTAATGAGTTGTCCTGTGGGTGAGGCTCC
CTCCCCATATAACTCAAGGTTTGAGTCTGTTGCTTGGTCAGCAAGTGCTTGCCATGAT
GGCACCAGTTGGTTGACAATTGGAATTTCTGGTCCAGACAATGGGGCTGTGGCTGT
ATTGAAATACAATGGCATAATAACAGACACCATCAAGAGTTGGAGGAACAACATACTG
AGAACTCAAGAGTCTGAATGTGCATGTGTAAATGGCTCTTGCTTTACTGTAATGACTG
ATGGACCAAGTAGTGGGCAGGCATCATATAAGATCTTCAAAATGGAAAAAGGGAAAG
TGGTTAAATCAGTCGAATTGGATGCTCCTAATTATCACTATGAGGAGTGCTCCTGTTA
TCCTGATGCCGGCGAAATCACATGTGTGTGCAGGGATAATTGGCATGGCTCAAATAG
GCCATGGGTATCTTTCAATCAAAATTTGGAGTATCAAATAGGATATATATGCAGTGGA
GTTTTCGGAGACAATCCACGCCCCAATGATGGAACAGGTAGTTGTGGTCCGGTGTTC
TCTAACGGGGCATATGGGGTAAAAGGGTTTTCATTCAAATACGGCAATGGTGTTTGG
ATCGGGAGAACCAAAAGCACTAATTCCAGGAGCGGCTTTGAAATGATTTGGGACCCA
AATGGGTGGACTGGAACGGACAGTAGCTTTTCGGTGAAGCAAGATATCGTAGCAATA
ACTGATTGGTCAGGATATAGCGGGAGTTTTGTCCAGCATCCAGAACTGACAGGATTA
GATTGCATAAGACCTTGTTTCTGGGTTGAGTTAATCAGAGGGCGGCCTAAAGAGAGC
ACAATTTGGACCAGTGGGAGCAGCATATCTTTTTGTGGTGTAAATAGTGACACTGTTA
GTTGGTCTTGGCCAGACGGTGCTGAGTTGCCATTCACCATTGACAAGTAGTTTGTTC
AAAAAACTCCTTGTTTCTACT (SEQ ID NO: 10)

M

AGCAAAAGCAGGTAGATGTTGAAAGATGAGTCTTCTAACCGAGGTCGAAACGTACGT
TCTCTCTATCATCCCGTCAGGCCCCCTCAAAGCCGAGATCGCACAGAAACTTGAAGA
TGTCTTTGCAGGAAAGAACACCGATCTCGAGGCTCTCATGGAGTGGCTAAAGACAAG
ACCAATCCTGTCACCTCTGACTAAAGGGATTTTGGGATTTGTATTCACGCTCACCGTG
CCCAGTGAGCGAGGACTGCAGCGTAGACGCTTTGTCCAGAATGCCCTAAATGGAAA
TGGAGATCCAAATAATATGGATAGGGCAGTTAAGCTATATAAGAAGCTGAAAAGAGA
AATAACATTCCATGGGGCTAAGGAGGTCGCACTCAGCTACTCAACCGGTGCACTTGC
CAGTTGCATGGGTCTCATATACAACAGGATGGGAACGGTGACTACGGAAGTGGCTTT
TGGCCTAGTGTGTGCCACTTGTGAGCAGATTGCAGATTCACAGCATCGGTCTCACAG
ACAGATGGCAACTATCACCAACCCACTAATCAGACATGAGAACAGAATGGTGCTGGC
CAGCACTACAGCTAAGGCTATGGAGCAGATGGCGGGATCAAGTGAGCAGGCAGCG
GAAGCCATGGAGATCGCTAATCAGGCTAGGCAGATGGTGCAGGCAATGAGGACAAT
TGGGACTCATCCTAACTCTAGTGCTGGTCTGAGAGATAATCTTCTTGAAAATTTGCAG
GCCTACCAGAAACGAATGGGAGTGCAGATGCAGCGATTCAAGTGATCCTATTGTTGT
TGCCGCAAATATCATTGGGATCTTGCACTTGATATTGTGGATTCTTGATCGTCTTTTCT
TCAAATGCATTTATCGTCGCCTTAAATACGGTTTGAAAAGAGGGCCTGCTACGGCAG
GGGTACCTGAGTCTATGAGGGAAGAGTACCGGCAGGAACAGCAGAGTGCTGTGGAT
GTTGACGATGGTCATTTTGTCAACATAGAATTGGAGTAAAAAACTACCTTGTTTCTACT
(SEQ ID NO: 3)

Figure 3 (cont'd)

NS

AGCAAAAGCAGGGTGACAAAAACATAATGGATTCCAACACTGTGTCAAGCTTTCAGG
TAGACTGCTTTCTTTGGCATGTCCGCAAACGATTTGCAGACCAAGAACTGGGTGATG
CCCCATTCCTTGACCGGCTTCGCCGAGATCAGAAGTCCCTAAGAGGAAGAGGCAAC
ACTCTTGGTCTGGACATCGAAACAGCTACTCGCGCAGGAAAGCAGATAGTGGAGCG
GATTCTGGAGGGGGAGTCTGATAAGGCACTTAAAATGCCGGCTTCACGCTACCTAAC
TGACATGACTCTCGAAGAAATGTCAAGGGACTGGTTCATGCTCATGCCCAAGCAGAA
AGTGGCAGGTTCCCTTTGCATCAAAATGGACCAGGCAATAATGGATAAAACCATCAT
ATTGAAAGCAAACTTCAGTGTGATTTTTGACCGGTTGGAAACCCTAATACTACTTAGA
GCTTTCACAGAAGAAGGAGCAATCGTGGGAGAAATCTCACCATTACCTTCTCTTCCA
GGACATACTGGTGAGGATGTCAAAAATGCAATTGGCGTCCTCATCGGAGGACTTGAA
TGGAATGATAACACAGTTCGAGTCACTGAAACTATACAGAGATTCGCTTGGAGAAAC
AGTGATGAGGATGGGAGACTTCCACTCCCTCCAAATCAGAAACGGTAAATGGCGAGA
ACAATTGAGTCAGAAGTTTGAAGAAATAAGGTGGCTGATTGAAGAAGTAAGACATAG
ATTGAAAATTACAGAAAACAGCTTCGAACAGATAACGTTTATGCAAGCCTTACAACTA
CTGCTTGAAGTGGAGCAAGAGATAAGAGCCTTCTCGTTTCAGCTTATTTAATGATAAA
AAACACCCTTGTTTCTACT (SEQ ID NO: 4)

NP

AGCAAAAGCAGGGTAGATAATCACTCACCGAGTGACATCAGCATCATGGCGTCTCAA
GGCACCAAACGATCTTATGAACAGATGGAAACTGGTGGGGAACGCCAGAATGCTACT
GAGATCAGGGCATCTGTTGGAAGAATGGTTAGTGGCATTGGGAGGTTCTACATACAG
ATGTGCACAGAACTCAAACTCAGTGACTATGAAGGGAGGCTGATCCAGAACAGCATA
ACAATAGAGAGAATGGTACTCTCTGCATTTGATGAAAGAAGGAACAGATACCTGGAA
GAACACCCCAGTGCGGGAAAGGACCCGAAGAAGACTGGAGGTCCAATTTATCGGAG
GAGAGACGGGAAATGGGTGAGAGAGCTAATTCTGTACGACAAAGAGGAGATCAGGA
GGATTTGGCGTCAAGCGAACAATGGAGAGGACGCAACTGCTGGTCTTACCCACCTG
ATGATATGGCATTCCAATCTAAATGATGCCACATATCAGAGAACGAGAGCTCTCGTG
CGTACTGGAATGGACCCAAGGATGTGCTCTCTGATGCAAGGGTCAACTCTCCCGAG
GAGATCTGGAGCTGCCGGTGCAGCAGTAAAGGGGGTAGGGACAATGGTGATGGAG
CTGATTCGGATGATAAAACGAGGGATCAACGACCGGAATTTCTGGAGAGGCGAAAAT
GGAAGAAGAACAAGGATTGCATATGAGAGAATGTGCAACATCCTCAAAGGGAAATTC
CAAACAGCAGCACAAAGAGCAATGATGGATCAAGTGCGAGAGAGCAGAAATCCTGG
GAATGCTGAAATTGAAGATCTCATTTTTCTGGCACGGTCTGCACTCATCCTGAGAGG
ATCAGTGGCCCATAAGTCCTGCTTGCCTGCTTGTGTGTACGGACTTGCAGTGGCCAG
TGGATATGACTTTGAGAGAGAAGGGTACTCTCTGGTTGGAATAGATCCTTTCCGCCT
GCTTCAAAACAGCCAGGTCTTTAGTCTCATTAGACCAAATGAGAATCCAGCACATAAG
AGTCAATTAGTGTGGATGGCATGCCACTCTGCAGCATTTGAGGACCTTAGAGTCTCA
AGTTTCATCAGAGGGACAAGAGTGGTCCCAAGAGGACAGCTATCCACCAGAGGGGT
TCAAATTGCTTCAAATGAGAACATGGAGGCAATGGACTCCAACACTCTTGAACTGAG
AAGCAGATATTGGGCTATAAGAACCAGAAGCGGAGGAAACACCAACCAGCAGAGGG
CATCTGCAGGACAGATCAGCGTTCAGCCCACTTTCTCGGTCCAGAGAAACCTTCCCT
TCGAAAGAGCGACCATTATGGCAGCATTTACAGGAAATACTGAGGGCAGAACGTCTG
ACATGAGGACTGAAATCATAAGAATGATGGAAAGTGCCAGACCAGAAGATGTGTCAT
TCCAGGGGCGGGGAGTCTTCGAGCTCTCGGACGAAAAGGCAACGAACCCGATCGT
GCCTTCCTTTGACATGAATAATGAAGGATCTTATTTCTTCGGAGACAATGCAGAGGAG
TATGACAATTAAAGAAAAATACCCTTGTTTCTACT (SEQ ID NO: 5)

Figure 3 (cont'd)

PA
AGCGAAAGCAGGTACTGATCCAAAATGGAAGACTTTGTGCGACAATGCTTCAATCCA
ATGATTGTCGAGCTTGCGGAAAAGGCAATGAAAGAATATGGGGAAGATCCGAAAATC
GAAACGAACAAGTTTGCTGCAATATGCACACACTTGGAGGTCTGTTTCATGTATTCGG
ATTTTCACTTTATTGATGAACGGAGTGAATCAATAATTGTAGAATCTGGAGATCCGAA
TGCATTATTGAAACACCGATTTGAAATAATTGAAGGAAGAGACCGAACGATGGCCTG
GACTGTGGTGAATAGTATCTGCAACACCACAGGAGTTGAGAAACCTAAATTTCTCCC
AGATTTGTATGACTACAAAGAGAACCGATTCATCGAAATTGGAGTGACACGGAGGGA
AGTTCATACATACTATCTGGAGAAAGCCAACAAGATAAAATCCGAGGAGACACATATT
CACATATTCTCATTCACAGGGGAGGAAATGGCCACCAAAGCGGACTACACCCTTGAT
GAAGAGAGCAGGGCAAGAATTAAAACCAGGCTGTTCACCATAAGGCAGGAAATGGC
CAGTAGGGGTCTATGGGATTCCTTTCGTCAATCCGAGAGAGGCGAAGAGACAATTGA
AGAAAAATTTGAAATCACTGGAACCATGCGCAGACTTGCAGACCAAAGTCTCCCACC
GAACTTCTCCAGCCTTGAAAACTTTAGAGCCTATGTGGATGGATTCGAACCGAACGG
CTGCATTGAGGGCAAGCTTTCTCAAATGTCAAAAGAAGTGAATGCTAGAATTGAGCC
ATTTTTGAAGACAACGCCACGCCCTCTCAGACTACCTGATGGGCCTCCTTGCTCTCA
GCGGTCGAAGTTCTTGCTGATGGATGCCCTTAAATTAAGCATCGAAGACCCGAGTCA
TGAGGGGGAGGGGATACCACTATACGATGCAATCAAATGCATGAAGACATTTTTCGG
CTGGAAAGAGCCCAACATCGTGAAACCACATGAAAAAGGTATAAACCCCAATTACCT
CCTGGCTTGGAAGCAAGTGCTGGCAGAACTCCAAGATATTGAAAATGAGGAGAAAAT
CCCAAAAACAAAGAACATGAAAAAAACAAGCCAGTTGAAGTGGGCACTCGGTGAGAA
CATGGCACCAGAGAAAGTAGACTTTGAGGACTGCAAAGATGTTAGCGATCTAAGACA
GTATGACAGTGATGAACCAGAGTCTAGATCACTAGCAAGCTGGATTCAGAGTGAATT
CAACAAGGCATGTGAATTGACAGATTCGATTTGGATTGAACTCGATGAAATAGGAGA
AGACGTAGCTCCAATTGAGCACATTGCAAGTATGAGAAGGAACTATTTTACAGCGGA
AGTATCCCATTGCAGGGCCACTGAATACATAATGAAGGGAGTGTACATAAACACAGC
CCTGTTGAATGCATCCTGTGCAGCCATGGATGACTTTCAACTGATTCCAATGATAAGC
AAATGCAGAACCAAAGAAGGAAGACGGAAAACTAATCTGTATGGATTCATTATAAAAG
GGAGATCCCACTTGAGGAATGATACCGATGTGGTAAATTTTGTGAGTATGGAATTCTC
TCTTACTGATCCGAGGCTGGAGCCACACAAGTGGGAAAAGTACTGTGTCCTCGAGAT
AGGAGACATGCTCCTCCGGACTGCAGTAGGCCAAGTTTCGAGGCCCATGTTCCTGT
ATGTAAGAACCAATGGAACCTCCAAGATCAAAATGAAATGGGGCATGGAAATGAGGC
GATGCCTTCTTCAATCCCTTCAACAAATTGAAAGCATGATTGAAGCCGAGTCTTCTGT
CAAAGAGAAGGACATGACCAAAGAATTCTTTGAAAACAAATCAGAAACATGGCCGATT
GGAGAGTCCCCCAAGGGAGTGGAGGAAGGCTCCATCGGAAAGGTGTGCAGAACCTT
GCTGGCGAAGTCTGTGTTCAACAGTTTATATGCATCTCCACAACTCGAGGGGTTTTC
AGCTGAATCAAGAAAATTGCTTCTCATTGCTCAGGCACTTAGGGACAACCTGGAACC
TGGGACCTTCGATCTTGGAGGGCTATATGAAGCAATTGAGGAGTGCCTGATTAACGA
TCCCTGGGTTTTGCTTAATGCGTCTTGGTTCAACTCCTTCCTCGCACATGCACTGAAA
TAGTTGTGGCAATGCTACTATTTGCTATCCATACTGTCCAAAAAAGTACCTTGTTTCTA
CT (SEQ ID NO: 6)

Figure 3 (cont'd)

PB1

AGCGAAAGCAGGCAAACCATTTGAATGGATGTCAATCCGACTTTACTTTTCTTGAAAG
TACCAGTGCAAAATGCTATAAGTACCACCTTCCCTTATACTGGAGACCCTCCATACAG
CCATGGAACAGGGACAGGATACACCATGGACACAGTCAACAGAACACACCAATATTC
AGAAAAGGGGAAGTGGACAACAAACACAGAGACTGGAGCACCCCAACTCAACCCGA
TTGATGGACCACTACCTGAGGATAATGAGCCCAGTGGGTACGCACAAACAGATTGTG
TATTGGAAGCAATGGCTTTCCTTGAAGAATCCCACCCAGGGATCTTTGAAAACTCGT
GTCTTGAAACGATGGAAATTGTTCAACAAACAAGAGTGGATAAACTGACCCAAGGTC
GCCAGACCTATGACTGGACATTGAATAGAAACCAACCGGCTGCAACTGCTTTGGCCA
ACACTATAGAAATCTTCAGATCGAACGGTCTAACAGCCAATGAATCGGGACGGCTAA
TAGATTTCCTCAAGGATGTGATGGAGTCAATGGATAAGGAAGAAATGGAGATAACAA
CACATTTCCAGAGAAAGAGAAGGGTGAGGGACAACATGACCAAGAAAATGGTCACAC
AAAGAACAATAGGGAAGAAAAAACAAAGGCTGAACAAAAAGAGCTACCTGATAAGAG
CACTGACACTGAACACAATGACAAAAGATGCAGAAAGAGGCAAATTGAAGAGGCGAG
CGATTGCAACACCCGGAATGCAAATCAGAGGATTCGTGTACTTTGTTGAAACACTAG
CGAGGAGTATCTGTGAGAAACTTGAGCAATCTGGACTCCCAGTCGGAGGGAATGAG
AAGAAGGCTAAATTGGCAAACGTCGTGAGGAAGATGATGACTAACTCACAAGATACT
GAACTCTCCTTTACAATTACTGGAGACAATACCAAATGGAATGAGAATCAGAATCCTA
GGATGTTTCTGGCAATGATAACGTACATCACAAGGAACCAGCCAGAATGGTTTCGGA
ATGTCTTAAGCATAGCTCCTATAATGTTCTCAAACAAAATGGCGAGACTAGGAAAAGG
ATACATGTTCGAAAGTAAGAGCATGAAGTTACGAACACAAATACCAGCAGAAATGCTT
GCAAACATTGATCTTAAATACTTCAATGAATTAACGAAAAAGAAAATTGAGAAAATAAG
GCCTCTATTAATAGATGGTACAGCCTCATTGAGCCCTGGAATGATGATGGGCATGTT
CAACATGCTGAGTACAGTCCTAGGAGTTTCAATCCTGAATCTTGGACAGAAAAGGTA
CACCAAAACCACATATTGGTGGGACGGACTCCAATCCTCTGATGATTTCGCTCTCAT
CGTAAATGCACCGAATCATGAGGGAATACAAGCAGGAGTGGATAGGTTTTATAGGAC
TTGTAAACTAGTTGGAATCAATATGAGCAAGAAGAAGTCTTACATAAATCGGACAGGG
ACATTTGAATTCACGAGCTTTTTCTACCGCTATGGATTTGTAGCCAATTTCAGTATGG
AGCTGCCCAGTTTTGGAGTGTCTGGAATTAATGAATCGGCCGACATGAGCATTGGTG
TTACAGTGATAAAAAACAATATGATAAACAACGACCTTGGGCCAGCAACAGCTCAGAT
GGCTCTTCAGTTATTCATCAAGGACTACAGATACACATACCGATGCCACAGAGGGGA
TACGCAAATCCAAACAAGGAGATCATTCGAGCTGAAGAAGCTGTGGGAGCAAACCC
GTTCAAAGGCAGGACTGTTGGTTTCAGATGGAGGACCAAATCTATACAATATCCGAA
ACCTCCATATTCCTGAAGTCTGCTTAAAATGGGAATTGATGGATGAAGATTACCAGGG
CAGACTGTGTAATCCTCTGAATCCATTCGTCAGCCATAAGGAAATTGAATCTGTCAAC
AATGCTGTAGTAATGCCAGCTCATGGCCCGGCCAAGAGTATGGAATATGATGCCGTT
GCAACTACACATTCATGGATTCCTAAAAGGAACCGTTCCATTCTCAATACGAGTCAAA
GGGGAATTCTTGAGGATGAACAGATGTACCAGAAGTGCTGCAATCTATTCGAGAAAT
TCTTCCCCAGCAGTTCATATCGGAGGCCAGTTGGAATTTCCAGCATGGTGGAGGCCA
TGGTGTCTAGGGCCCGAATTGACGCACGAATCGATTTCGAGTCTGGAAGGATTAAGA
AAGAAGAGTTTGCCGAGATCATGAAGATCTGTTCCACCATTGAAGAACTCAGACGGC
AAAAATAGTGAATTTAGCTTGTCCTTCGTGAAAAAATGCCTTGTTTCTACT (SEQ ID NO: 7)

Figure 3 (cont'd)

PB2

AGCGAAAGCAGGTCAAATATATTCAATATGGAGAGGATAAAAGAATTACGAGATCTAA
TGTCACAGTCCCGCACTCGCGAGATACTAACAAAAACCACTGTGGACCATATGGCCA
TAATCAAGAAATACACATCAGGAAGACAAGAGAAGAACCCTGCTCTCAGAATGAAAT
GGATGATGGCAATGAAATATCCAATCACAGCGGACAAGAGAATAATAGAGATGATTC
CTGAAAGGAATGAACAAGGGCAGACGCTCTGGAGCAAGACAAATGATGCTGGATCG
GACAGGGTGATGGTGTCTCCCCTAGCTGTAACTTGGTGGAATAGGAATGGGCCGGC
GACAAGTGCAGTTCATTATCCAAAGGTTTACAAAACATACTTTGAGAAGGTTGAAAGA
TTAAAACATGGAACCTTCGGTCCCGTTCATTTCCGAAACCAGGTTAAAATACGCCGC
CGAGTTGATATAAATCCTGGCCATGCAGATCTCAGTGCTAAAGAAGCACAAGATGTC
ATCATGGAGGTCGTTTTCCCAAATGAAGTGGGAGCTAGAATATTGACATCAGAGTCG
CAATTGACAATAACGAAAGAGAAGAAAGAAGAGCTCCAAGATTGTAAGATTGCTCCC
TTAATGGTTGCATACATGTTGGAAAGGGAACTGGTCCGCAAGACCAGATTCCTACCG
GTAGCAGGCGGAACAAGTAGTGTGTACATTGAGGTATTGCATTTGACTCAAGGGACC
TGCTGGGAACAGATGTACACTCCAGGCGGAGAAGTGAGAAATGACGATGTTGACCA
GAGTTTGATCATTGCTGCCAGAAACATTGTTAGGAGAGCAACAGTATCAGCGGATCC
ACTGGCATCACTGCTGGAGATGTGTCACAGCACACAAATTGGTGGGATAAGGATGGT
GGACATCCTTAGGCAAAATCCAACTGAGGAACAAGCTGTGGATATATGCAAAGCAGC
AATGGGTCTTAGGATCAGTTCTTCCTTTAGCTTTGGAGGCTTCACTTTCAAAAGAACA
AGTGGATCATCCGTCAAGAAGGAAGAGGAAGTGCTTACAGGCAACCTCCAAACATTG
AAAATAAGAGTACATGAGGGGTATGAGGAATTCACAATGGTTGGGCGGAGGGCAAC
AGCTATCCTGAGGAAAGCAACTAGAAGGCTGATTCAGTTGATAGTAAGTGGAAGAGA
CCAACAATCAATCGCTGAGGCAATCATTGTAGCAATGGTGTTCTCACAGGAGGATTG
CATGATAAAGGCAGTCCGAGGCGATCTGAATTTCGTAAACAGAGCAAACCAAAGATT
AAACCCCATGCATCAACTCCTGAGACATTTTCAAAAGGACGCAAAAGTGCTATTTCAG
AATTGGGGAATTGAACCCATTGATAATGTCATGGGGATGATCGGAATATTACCTGACA
TGACTCCCAGCACAGAAATGTCACTGAGAGGAGTAAGAGTTAGTAAAATGGGAGTGG
ATGAATATTCCAGCACTGAGAGAGTAGTTGTAAGTATTGACCGTTTCTTAAGGGTTCG
AGATCAGCGGGGGAACGTACTCTTATCTCCCGAAGAGGTCAGCGAAACCCAGGGAA
CAGAGAAATTGACAATAACATATTCATCATCAATGATGTGGGAAATCAACGGTCCTGA
GTCAGTGCTTGTTAACACCTATCAGTGGATCATCAGAAACTGGGAGACTGTGAAGAT
TCAATGGTCTCAAGACCCCACGATGCTGTACAATAAGATGGAGTTTGAACCGTTCCA
ATCCTTGGTACCCAAAGCTGCCAGAGGTCAATACAGTGGATTTGTGAGAACATTATTC
CAGCAAATGCGTGACGTACTGGGGACATTTGATACTGTCCAGATAATAAAGCTGCTA
CCATTTGCAGCAGCCCCACCGAAGCAGAGCAGAATGCAGTTTTCTTCTCTAACTGTG
AATGTGAGAGGCTCAGGAATGAGAATACTCGTAAGGGGCAATTCCCCTGTGTTCAAC
TACAATAAGGCAACCAAAAGGCTTACCGTCCTTGGAAAGGACGCAGGTGCATTAACA
GAGGATCCGGATGAAGGGACAGCCGGAGTGGAGTCTGCAGTACTGAGGGGATTCTT
AATTTTAGGCAAGGAGGACAAAAGGTATGGACCAGCATTGAGCATCAATGAACTGAG
CAATCTTGCGAAGGGGGAGAAAGCTAATGTGCTGATAGGGCAAGGTGACGTGGTGT
TGGTAATGAAACGAAAACGGGACTCTAGCATACTTACTGACAGCCAGACAGCGACCA
AAAGAATTCGGATGGCCATCAATTAGTGTCGAATTGTTTAAAAACGACCTTGTTTCTA
CT (SEQ ID NO: 8)

Figure 3 (cont'd)

FIGURE 4
A/AnHui/1/05 Attenuated Strain Gene Sequences

HA

AGCAAAAGCAGGGGTTCAATCTGTCAAAATGGAGAAAATAGTGCTTCTTCTTGCAATA
GTCAGCCTTGTTAAAAGTGATCAGATTTGCATTGGTTACCATGCAAACAACTCGACAG
AGCAGGTTGACACAATAATGGAAAAGAACGTTACTGTTACACATGCCCAAGACATACT
GGAAAAGACACACAACGGGAAGCTCTGCGATCTAGATGGAGTGAAGCCTCTGATTTT
AAGAGATTGTAGTGTAGCTGGATGGCTCCTCGGAAACCCAATGTGTGACGAATTCAT
CAATGTGCCGGAATGGTCTTACATAGTGGAGAAGGCCAACCCAGCCAATGACCTCTG
TTACCCAGGGAATTTCAACGACTATGAAGAACTGAAACACCTATTGAGCAGAATAAAC
CATTTTGAGAAAATTCAGATCATCCCCAAAAGTTCTTGGTCCGATCATGAAGCCTCAT
CAGGGGTGAGCTCAGCATGTCCATACCAGGGAACGCCCTCCTTTTTCAGAAATGTGG
TATGGCTTATCAAAAAGAACAATACATACCCAACAATAAAGAGAAGCTACAATAATAC
CAACCAGGAAGATCTTTTGATACTGTGGGGGATTCATCATTCTAATGATGCGGCAGA
GCAGACAAAGCTCTATCAAAACCCAACCACCTATATTTCCGTTGGGACATCAACACTA
AACCAGAGATTGGTACCAAAAATAGCTACTAGATCCAAAGTAAACGGGCAAAGTGGA
AGGATGGATTTCTTCTGGACAATTTTAAAACCGAATGATGCAATCAACTTCGAGAGTA
ATGGAAATTTCATTGCTCCAGAATATGCATACAAAATTGTCAAGAAAGGGGACTCAGC
AATTGTTAAAAGTGAAGTGGAATATGGTAACTGCAACACAAAGTGTCAAACTCCAATA
GGGGCGATAAACTCTAGTATGCCATTCCACAACATACACCCTCTCACCATCGGGGAA
TGCCCCAAATATGTGAAATCAAACAAATTAGTCCTTGCGACTGGGCTCAGAAATAGTC
CTCAAACCGAGACCCGAGGACTATTTGGAGCTATAGCAGGGTTTATAGAGGGAGGAT
GGCAGGGAATGGTAGATGGTTGGTATGGGTACCACCATAGCAATGAGCAGGGGAGT
GGGTACGCTGCAGACAAAGAATCCACTCAAAAGGCAATAGATGGAGTCACCAATAAG
GTCAACTCGATCATTGACAAAATGAACACTCAGTTTGAGGCCGTTGGAAGGGAATTT
AATAACTTAGAAAGGAGAATAGAGAATTTAAACAAGAAAATGGAAGACGGATTCCTAG
ATGTCTGGACTTATAATGCTGAACTTCTGGTTCTCATGGAAAATGAGAGAACTCTAGA
CTTCCATGATTCAAATGTCAAGAACCTTTACGACAAGGTCCGACTACAGCTTAGGGAT
AATGCAAAGGAGCTGGGTAACGGTTGTTTCGAGTTCTATCACAAATGTGATAATGAAT
GTATGGAAAGTGTAAGAAACGGAACGTATGACTACCCGCAGTATTCAGAAGAAGCAA
GATTAAAAAGAGAGGAAATAAGTGGAGTAAAATTGGAATCAATAGGAACTTACCAAAT
ACTGTCAATTTATTCAACAGTTGCGAGTTCTCTAGCACTGGCAATCATGGTGGCTGGT
CTATCTTTGTGGATGTGCTCCAATGGGTCGTTACAATGCAGAATTTGCATTTAAATTT
GTGAGTTCAGATTGTAGTTAAAAACACCCTTGTTTCTACT (SEQ ID NO: 11)

NA
AGCAAAAGCAGGAGTTCAAAATGAATCCAAATCAGAAGATAATAACCATTGGGTCAAT
CTGTATGGTAATTGGAATAGTTAGCTTAATGTTACAAATTGGGAACATGATCTCAATAT
GGGTCAGTCATTCAATTCAAACAGGGAATCAACACCAAGCTGAACCAATCAGAAATG
CTAATTTTCTTACTGAGAACGCTGTGGCTTCAGTAACATTAGCGGGCAATTCATCTCT
TTGCCCCGTTAGAGGATGGGCTGTACACAGTAAAGACAACAGTATAAGGATTGGTTC
CAAGGGGGATGTTTTGTTATTAGAGAGCCGTTCATCTCATGCTCCCACTTGGAATG
CAGAACTTTCTTTTTGACTCAGGGAGCCTTACTGAATGACAAGCACTCCAATGGGACT
GTCAAAGACAGAAGCCCTCACAGAACATTAATGAGTTGTCCTGTGGGTGAGGCTCCC
TCCCCATATAACTCAAGGTTTGAGTCTGTTGCTTGGTCAGCAAGTGCTTGCCATGATG
GCACCAGTTGGTTGACAATTGGAATTTCTGGCCCAGACAATGGGGCTGTGGCTGTAT
TGAAATACAATGGCATAATAACAGACACTATCAAGAGTTGGAGGAACAACATACTGAG
AACTCAAGAGTCTGAATGTGCATGTGTAAATGGCTCTTGCTTTACTGTAATGACTGAT
GGACCAAGTAATGGGCAGGCATCATATAAGATCTTCAAAATGGAAAAAGGGAAAGTG
GTTAAATCAGTCGAATTGAATGCTCCTAATTATCACTATGAGGAATGCTCCTGTTATC
CTGATGCTGGCGAAATCACATGTGTGTGCAGGGATAATTGGCATGGCTCGAATAGGC
CATGGGTATCTTTCAATCAGAATTTGGAGTATCAAATAGGATATATATGCAGTGGAGT
TTTCGGAGACAATCCACGCCCCAATGATGGAACAGGTAGTTGTGGTCCAGTGTCCCC
TAACGGGGCATATGGGATAAAAGGGTTTTCATTTAAATACGGCAATGGTGTTTGGATC
GGAAGAACCAAAAGCACTAATTCCAGGAGCGGCTTTGAAATGATTTGGGATCCAAAT
GGGTGGACTGAAACGGACAGTAACTTTTCGGTGAAACAAGATATAGTAGCAATAACT
GATTGGTCAGGATATAGCGGGAGTTTTGTCCAGCATCCAGAACTGACAGGATTAGAT
TGCATAAGACCTTGCTTCTGGGTTGAGTTAATCAGAGGGCGGCCCAAAGAGAGCACA
ATTTGGACTAGTGGGAGCAGCATATCTTTTTGTGGTGTAAATAGTGACACTGTGAGTT
GGTCTTGGCCAGACGGTGCTGAGTTGCCATTCACCATTGACAAGTAGTTTGTTCAAA
AAACTCCTTGTTTCTACT (SEQ ID NO: 12)

M
AGCAAAAGCAGGTAGATGTTGAAAGATGAGTCTTCTAACCGAGGTCGAAACGTACGT
TCTCTCTATCATCCCGTCAGGCCCCCTCAAAGCCGAGATCGCACAGAAACTTGAAGA
TGTCTTTGCAGGAAAGAACACCGATCTCGAGGCTCTCATGGAGTGGCTAAAGACAAG
ACCAATCCTGTCACCTCTGACTAAAGGGATTTTGGGATTTGTATTCACGCTCACCGTG
CCCAGTGAGCGAGGACTGCAGCGTAGACGCTTTGTCCAGAATGCCCTAAATGGAAA
TGGAGATCCAAATAATATGGATAGGGCAGTTAAGCTATATAAGAAGCTGAAAAGAGA
AATAACATTCCATGGGGCTAAGGAGGTCGCACTCAGCTACTCAACCGGTGCACTTGC
CAGTTGCATGGGTCTCATATACAACAGGATGGGAACGGTGACTACGGAAGTGGCTTT
TGGCCTAGTGTGTGCCACTTGTGAGCAGATTGCAGATTCACAGCATCGGTCTCACAG
ACAGATGGCAACTATCACCAACCCACTAATCAGACATGAGAACAGAATGGTGCTGGC
CAGCACTACAGCTAAGGCTATGGAGCAGATGGCGGGATCAAGTGAGCAGGCAGCG
GAAGCCATGGAGATCGCTAATCAGGCTAGGCAGATGGTGCAGGCAATGAGGACAAT
TGGGACTCATCCTAACTCTAGTGCTGGTCTGAGAGATAATCTTCTTGAAAATTTGCAG
GCCTACCAGAAACGAATGGGAGTGCAGATGCAGCGATTCAAGTGATCCTATTGTTGT
TGCCGCAAATATCATTGGGATCTTGCACTTGATATTGTGGATTCTTGATCGTCTTTTCT
TCAAATGCATTTATCGTCGCCTTAAATACGGTTTGAAAAGAGGGCCTGCTACGGCAG
GGGTACCTGAGTCTATGAGGGAAGAGTACCGGCAGGAACAGCAGAGTGCTGTGGAT
GTTGACGATGGTCATTTTGTCAACATAGAATTGGAGTAAAAAACTACCTTGTTTCTACT
(SEQ ID NO: 3)

Figure 4 (cont'd)

NS

AGCAAAAGCAGGGTGACAAAAACATAATGGATTCCAACACTGTGTCAAGCTTTCAGG
TAGACTGCTTTCTTTGGCATGTCCGCAAACGATTTGCAGACCAAGAACTGGGTGATG
CCCCATTCCTTGACCGGCTTCGCCGAGATCAGAAGTCCCTAAGAGGAAGAGGCAAC
ACTCTTGGTCTGGACATCGAAACAGCTACTCGCGCAGGAAAGCAGATAGTGGAGCG
GATTCTGGAGGGGGAGTCTGATAAGGCACTTAAAATGCCGGCTTCACGCTACCTAAC
TGACATGACTCTCGAAGAAATGTCAAGGGACTGGTTCATGCTCATGCCCAAGCAGAA
AGTGGCAGGTTCCCTTTGCATCAAAATGGACCAGGCAATAATGGATAAAACCATCAT
ATTGAAAGCAAACTTCAGTGTGATTTTTGACCGGTTGGAAACCCTAATACTACTTAGA
GCTTTCACAGAAGAAGGAGCAATCGTGGGAGAAATCTCACCATTACCTTCTCTTCCA
GGACATACTGGTGAGGATGTCAAAAATGCAATTGGCGTCCTCATCGGAGGACTTGAA
TGGAATGATAACACAGTTCGAGTCACTGAAACTATACAGAGATTCGCTTGGAGAAAC
AGTGATGAGGATGGGAGACTTCCACTCCCTCCAAATCAGAAACGGTAAATGGCGAGA
ACAATTGAGTCAGAAGTTTGAAGAAATAAGGTGGCTGATTGAAGAAGTAAGACATAG
ATTGAAAATTACAGAAAACAGCTTCGAACAGATAACGTTTATGCAAGCCTTACAACTA
CTGCTTGAAGTGGAGCAAGAGATAAGAGCCTTCTCGTTTCAGCTTATTTAATGATAAA
AAACACCCTTGTTTCTACT (SEQ ID NO: 4)

NP

AGCAAAAGCAGGGTAGATAATCACTCACCGAGTGACATCAGCATCATGGCGTCTCAA
GGCACCAAACGATCTTATGAACAGATGGAAACTGGTGGGGAACGCCAGAATGCTACT
GAGATCAGGGCATCTGTTGGAAGAATGGTTAGTGGCATTGGGAGGTTCTACATACAG
ATGTGCACAGAACTCAAACTCAGTGACTATGAAGGGAGGCTGATCCAGAACAGCATA
ACAATAGAGAGAATGGTACTCTCTGCATTTGATGAAAGAAGGAACAGATACCTGGAA
GAACACCCCAGTGCGGGAAAGGACCCGAAGAAGACTGGAGGTCCAATTTATCGGAG
GAGAGACGGGAAATGGGTGAGAGAGCTAATTCTGTACGACAAAGAGGAGATCAGGA
GGATTTGGCGTCAAGCGAACAATGGAGAGGACGCAACTGCTGGTCTTACCCACCTG
ATGATATGGCATTCCAATCTAAATGATGCCACATATCAGAGAACGAGAGCTCTCGTG
CGTACTGGAATGGACCCAAGGATGTGCTCTCTGATGCAAGGGTCAACTCTCCCGAG
GAGATCTGGAGCTGCCGGTGCAGCAGTAAAGGGGGTAGGGACAATGGTGATGGAG
CTGATTCGGATGATAAAACGAGGGATCAACGACCGGAATTTCTGGAGAGGCGAAAAT
GGAAGAAGAACAAGGATTGCATATGAGAGAATGTGCAACATCCTCAAAGGGAAATTC
CAAACAGCAGCACAAAGAGCAATGATGGATCAAGTGCGAGAGAGCAGAAATCCTGG
GAATGCTGAAATTGAAGATCTCATTTTTCTGGCACGGTCTGCACTCATCCTGAGAGG
ATCAGTGGCCCATAAGTCCTGCTTGCCTGCTTGTGTGTACGGACTTGCAGTGGCCAG
TGGATATGACTTTGAGAGAGAAGGGTACTCTCTGGTTGGAATAGATCCTTTCCGCCT
GCTTCAAAACAGCCAGGTCTTTAGTCTCATTAGACCAAATGAGAATCCAGCACATAAG
AGTCAATTAGTGTGGATGGCATGCCACTCTGCAGCATTTGAGGACCTTAGAGTCTCA
AGTTTCATCAGAGGGACAAGAGTGGTCCCAAGAGGACAGCTATCCACCAGAGGGGT
TCAAATTGCTTCAAATGAGAACATGGAGGCAATGGACTCCAACACTCTTGAACTGAG
AAGCAGATATTGGGCTATAAGAACCAGAAGCGGAGGAAACACCAACCAGCAGAGGG
CATCTGCAGGACAGATCAGCGTTCAGCCCACTTTCTCGGTCCAGAGAAACCTTCCCT
TCGAAAGAGCGACCATTATGGCAGCATTTACAGGAAATACTGAGGGCAGAACGTCTG
ACATGAGGACTGAAATCATAAGAATGATGGAAAGTGCCAGACCAGAAGATGTGTCAT
TCCAGGGGCGGGGAGTCTTCGAGCTCTCGGACGAAAAGGCAACGAACCCGATCGT
GCCTTCCTTTGACATGAATAATGAAGGATCTTATTTCTTCGGAGACAATGCAGAGGAG
TATGACAATTAAAGAAAAATACCCTTGTTTCTACT (SEQ ID NO: 5)

Figure 4 (cont'd)

PA
AGCGAAAGCAGGTACTGATCCAAAATGGAAGACTTTGTGCGACAATGCTTCAATCCA
ATGATTGTCGAGCTTGCGGAAAAGGCAATGAAAGAATATGGGGAAGATCCGAAAATC
GAAACGAACAAGTTTGCTGCAATATGCACACACTTGGAGGTCTGTTTCATGTATTCGG
ATTTTCACTTTATTGATGAACGGAGTGAATCAATAATTGTAGAATCTGGAGATCCGAA
TGCATTATTGAAACACCGATTTGAAATAATTGAAGGAAGAGACCGAACGATGGCCTG
GACTGTGGTGAATAGTATCTGCAACACCACAGGAGTTGAGAAACCTAAATTTCTCCC
AGATTTGTATGACTACAAAGAGAACCGATTCATCGAAATTGGAGTGACACGGAGGGA
AGTTCATACATACTATCTGGAGAAAGCCAACAAGATAAAATCCGAGGAGACACATATT
CACATATTCTCATTCACAGGGGAGGAAATGGCCACCAAAGCGGACTACACCCTTGAT
GAAGAGAGCAGGGCAAGAATTAAAACCAGGCTGTTCACCATAAGGCAGGAAATGGC
CAGTAGGGGTCTATGGGATTCCTTTCGTCAATCCGAGAGAGGCGAAGAGACAATTGA
AGAAAAATTTGAAATCACTGGAACCATGCGCAGACTTGCAGACCAAAGTCTCCCACC
GAACTTCTCCAGCCTTGAAAACTTTAGAGCCTATGTGGATGGATTCGAACCGAACGG
CTGCATTGAGGGCAAGCTTTCTCAAATGTCAAAAGAAGTGAATGCTAGAATTGAGCC
ATTTTTGAAGACAACGCCACGCCCTCTCAGACTACCTGATGGGCCTCCTTGCTCTCA
GCGGTCGAAGTTCTTGCTGATGGATGCCCTTAAATTAAGCATCGAAGACCCGAGTCA
TGAGGGGGAGGGGATACCACTATACGATGCAATCAAATGCATGAAGACATTTTTCGG
CTGGAAAGAGCCCAACATCGTGAAACCACATGAAAAAGGTATAAACCCCAATTACCT
CCTGGCTTGGAAGCAAGTGCTGGCAGAACTCCAAGATATTGAAAATGAGGAGAAAAT
CCCAAAAACAAAGAACATGAAAAAAACAAGCCAGTTGAAGTGGGCACTCGGTGAGAA
CATGGCACCAGAGAAAGTAGACTTTGAGGACTGCAAAGATGTTAGCGATCTAAGACA
GTATGACAGTGATGAACCAGAGTCTAGATCACTAGCAAGCTGGATTCAGAGTGAATT
CAACAAGGCATGTGAATTGACAGATTCGATTTGGATTGAACTCGATGAAATAGGAGA
AGACGTAGCTCCAATTGAGCACATTGCAAGTATGAGAAGGAACTATTTTACAGCGGA
AGTATCCCATTGCAGGGCCACTGAATACATAATGAAGGGAGTGTACATAAACACAGC
CCTGTTGAATGCATCCTGTGCAGCCATGGATGACTTTCAACTGATTCCAATGATAAGC
AAATGCAGAACCAAAGAAGGAAGACGGAAAACTAATCTGTATGGATTCATTATAAAAG
GGAGATCCCACTTGAGGAATGATACCGATGTGGTAAATTTTGTGAGTATGGAATTCTC
TCTTACTGATCCGAGGCTGGAGCCACACAAGTGGGAAAAGTACTGTGTCCTCGAGAT
AGGAGACATGCTCCTCCGGACTGCAGTAGGCCAAGTTTCGAGGCCCATGTTCCTGT
ATGTAAGAACCAATGGAACCTCCAAGATCAAAATGAAATGGGGCATGGAAATGAGGC
GATGCCTTCTTCAATCCCTTCAACAAATTGAAAGCATGATTGAAGCCGAGTCTTCTGT
CAAAGAGAAGGACATGACCAAAGAATTCTTTGAAAACAAATCAGAAACATGGCCGATT
GGAGAGTCCCCCAAGGGAGTGGAGGAAGGCTCCATCGGAAAGGTGTGCAGAACCTT
GCTGGCGAAGTCTGTGTTCAACAGTTTATATGCATCTCCACAACTCGAGGGGTTTTC
AGCTGAATCAAGAAAATTGCTTCTCATTGCTCAGGCACTTAGGGACAACCTGGAACC
TGGGACCTTCGATCTTGGAGGGCTATATGAAGCAATTGAGGAGTGCCTGATTAACGA
TCCCTGGGTTTTGCTTAATGCGTCTTGGTTCAACTCCTTCCTCGCACATGCACTGAAA
TAGTTGTGGCAATGCTACTATTTGCTATCCATACTGTCCAAAAAAGTACCTTGTTTCTA
CT (SEQ ID NO: 6)

Figure 4 (cont'd)

PB1

AGCGAAAGCAGGCAAACCATTTGAATGGATGTCAATCCGACTTTACTTTTCTTGAAAG
TACCAGTGCAAAATGCTATAAGTACCACCTTCCCTTATACTGGAGACCCTCCATACAG
CCATGGAACAGGGACAGGATACACCATGGACACAGTCAACAGAACACACCAATATTC
AGAAAAGGGGAAGTGGACAACAAACACAGAGACTGGAGCACCCCAACTCAACCCGA
TTGATGGACCACTACCTGAGGATAATGAGCCCAGTGGGTACGCACAAACAGATTGTG
TATTGGAAGCAATGGCTTTCCTTGAAGAATCCCACCCAGGGATCTTTGAAAACTCGT
GTCTTGAAACGATGGAAATTGTTCAACAAACAAGAGTGGATAAACTGACCCAAGGTC
GCCAGACCTATGACTGGACATTGAATAGAAACCAACCGGCTGCAACTGCTTTGGCCA
ACACTATAGAAATCTTCAGATCGAACGGTCTAACAGCCAATGAATCGGGACGGCTAA
TAGATTTCCTCAAGGATGTGATGGAGTCAATGGATAAGGAAGAAATGGAGATAACAA
CACATTTCCAGAGAAAGAGAAGGGTGAGGGACAACATGACCAAGAAAATGGTCACAC
AAAGAACAATAGGGAAGAAAAAACAAAGGCTGAACAAAAAGAGCTACCTGATAAGAG
CACTGACACTGAACACAATGACAAAAGATGCAGAAAGAGGCAAATTGAAGAGGCGAG
CGATTGCAACACCCGGAATGCAAATCAGAGGATTCGTGTACTTTGTTGAAACACTAG
CGAGGAGTATCTGTGAGAAACTTGAGCAATCTGGACTCCCAGTCGGAGGGAATGAG
AAGAAGGCTAAATTGGCAAACGTCGTGAGGAAGATGATGACTAACTCACAAGATACT
GAACTCTCCTTTACAATTACTGGAGACAATACCAAATGGAATGAGAATCAGAATCCTA
GGATGTTTCTGGCAATGATAACGTACATCACAAGGAACCAGCCAGAATGGTTTCGGA
ATGTCTTAAGCATAGCTCCTATAATGTTCTCAAACAAAATGGCGAGACTAGGAAAAGG
ATACATGTTCGAAAGTAAGAGCATGAAGTTACGAACACAAATACCAGCAGAAATGCTT
GCAAACATTGATCTTAAATACTTCAATGAATTAACGAAAAAGAAAATTGAGAAAATAAG
GCCTCTATTAATAGATGGTACAGCCTCATTGAGCCCTGGAATGATGATGGGCATGTT
CAACATGCTGAGTACAGTCCTAGGAGTTTCAATCCTGAATCTTGGACAGAAAAGGTA
CACCAAAACCACATATTGGTGGGACGGACTCCAATCCTCTGATGATTTCGCTCTCAT
CGTAAATGCACCGAATCATGAGGGAATACAAGCAGGAGTGGATAGGTTTTATAGGAC
TTGTAAACTAGTTGGAATCAATATGAGCAAGAAGAAGTCTTACATAAATCGGACAGGG
ACATTTGAATTCACGAGCTTTTTCTACCGCTATGGATTTGTAGCCAATTTCAGTATGG
AGCTGCCCAGTTTTGGAGTGTCTGGAATTAATGAATCGGCCGACATGAGCATTGGTG
TTACAGTGATAAAAAACAATATGATAAACAACGACCTTGGGCCAGCAACAGCTCAGAT
GGCTCTTCAGTTATTCATCAAGGACTACAGATACACATACCGATGCCACAGAGGGGA
TACGCAAATCCAAACAAGGAGATCATTCGAGCTGAAGAAGCTGTGGGAGCAAACCC
GTTCAAAGGCAGGACTGTTGGTTTCAGATGGAGGACCAAATCTATACAATATCCGAA
ACCTCCATATTCCTGAAGTCTGCTTAAAATGGGAATTGATGGATGAAGATTACCAGGG
CAGACTGTGTAATCCTCTGAATCCATTCGTCAGCCATAAGGAAATTGAATCTGTCAAC
AATGCTGTAGTAATGCCAGCTCATGGCCCGGCCAAGAGTATGGAATATGATGCCGTT
GCAACTACACATTCATGGATTCCTAAAAGGAACCGTTCCATTCTCAATACGAGTCAAA
GGGGAATTCTTGAGGATGAACAGATGTACCAGAAGTGCTGCAATCTATTCGAGAAAT
TCTTCCCCAGCAGTTCATATCGGAGGCCAGTTGGAATTTCCAGCATGGTGGAGGCCA
TGGTGTCTAGGGCCCGAATTGACGCACGAATCGATTTCGAGTCTGGAAGGATTAAGA
AAGAAGAGTTTGCCGAGATCATGAAGATCTGTTCCACCATTGAAGAACTCAGACGGC
AAAAATAGTGAATTTAGCTTGTCCTTCGTGAAAAAATGCCTTGTTTCTACT (SEQ ID NO: 7)

Figure 4 (cont'd)

PB2

AGCGAAAGCAGGTCAAATATATTCAATATGGAGAGGATAAAAGAATTACGAGATCTAA
TGTCACAGTCCCGCACTCGCGAGATACTAACAAAAACCACTGTGGACCATATGGCCA
TAATCAAGAAATACACATCAGGAAGACAAGAGAAGAACCCTGCTCTCAGAATGAAAT
GGATGATGGCAATGAAATATCCAATCACAGCGGACAAGAGAATAATAGAGATGATTC
CTGAAAGGAATGAACAAGGGCAGACGCTCTGGAGCAAGACAAATGATGCTGGATCG
GACAGGGTGATGGTGTCTCCCCTAGCTGTAACTTGGTGGAATAGGAATGGGCCGGC
GACAAGTGCAGTTCATTATCCAAAGGTTTACAAAACATACTTTGAGAAGGTTGAAAGA
TTAAAACATGGAACCTTCGGTCCCGTTCATTTCCGAAACCAGGTTAAAATACGCCGC
CGAGTTGATATAAATCCTGGCCATGCAGATCTCAGTGCTAAAGAAGCACAAGATGTC
ATCATGGAGGTCGTTTTCCCAAATGAAGTGGGAGCTAGAATATTGACATCAGAGTCG
CAATTGACAATAACGAAAGAGAAGAAAGAAGAGCTCCAAGATTGTAAGATTGCTCCC
TTAATGGTTGCATACATGTTGGAAAGGGAACTGGTCCGCAAGACCAGATTCCTACCG
GTAGCAGGCGGAACAAGTAGTGTGTACATTGAGGTATTGCATTTGACTCAAGGGACC
TGCTGGGAACAGATGTACACTCCAGGCGGAGAAGTGAGAAATGACGATGTTGACCA
GAGTTTGATCATTGCTGCCAGAAACATTGTTAGGAGAGCAACAGTATCAGCGGATCC
ACTGGCATCACTGCTGGAGATGTGTCACAGCACACAAATTGGTGGGATAAGGATGGT
GGACATCCTTAGGCAAAATCCAACTGAGGAACAAGCTGTGGATATATGCAAAGCAGC
AATGGGTCTTAGGATCAGTTCTTCCTTTAGCTTTGGAGGCTTCACTTTCAAAAGAACA
AGTGGATCATCCGTCAAGAAGGAAGAGGAAGTGCTTACAGGCAACCTCCAAACATTG
AAAATAAGAGTACATGAGGGGTATGAGGAATTCACAATGGTTGGGCGGAGGGCAAC
AGCTATCCTGAGGAAAGCAACTAGAAGGCTGATTCAGTTGATAGTAAGTGGAAGAGA
CCAACAATCAATCGCTGAGGCAATCATTGTAGCAATGGTGTTCTCACAGGAGGATTG
CATGATAAAGGCAGTCCGAGGCGATCTGAATTTCGTAAACAGAGCAAACCAAAGATT
AAACCCCATGCATCAACTCCTGAGACATTTTCAAAAGGACGCAAAAGTGCTATTTCAG
AATTGGGGAATTGAACCCATTGATAATGTCATGGGGATGATCGGAATATTACCTGACA
TGACTCCCAGCACAGAAATGTCACTGAGAGGAGTAAGAGTTAGTAAAATGGGAGTGG
ATGAATATTCCAGCACTGAGAGAGTAGTTGTAAGTATTGACCGTTTCTTAAGGGTTCG
AGATCAGCGGGGGAACGTACTCTTATCTCCCGAAGAGGTCAGCGAAACCCAGGGAA
CAGAGAAATTGACAATAACATATTCATCATCAATGATGTGGGAAATCAACGGTCCTGA
GTCAGTGCTTGTTAACACCTATCAGTGGATCATCAGAAACTGGGAGACTGTGAAGAT
TCAATGGTCTCAAGACCCCACGATGCTGTACAATAAGATGGAGTTTGAACCGTTCCA
ATCCTTGGTACCCAAAGCTGCCAGAGGTCAATACAGTGGATTTGTGAGAACATTATTC
CAGCAAATGCGTGACGTACTGGGGACATTTGATACTGTCCAGATAATAAAGCTGCTA
CCATTTGCAGCAGCCCCACCGAAGCAGAGCAGAATGCAGTTTTCTTCTCTAACTGTG
AATGTGAGAGGCTCAGGAATGAGAATACTCGTAAGGGGCAATTCCCCTGTGTTCAAC
TACAATAAGGCAACCAAAAGGCTTACCGTCCTTGGAAAGGACGCAGGTGCATTAACA
GAGGATCCGGATGAAGGGACAGCCGGAGTGGAGTCTGCAGTACTGAGGGGATTCTT
AATTTTAGGCAAGGAGGACAAAAGGTATGGACCAGCATTGAGCATCAATGAACTGAG
CAATCTTGCGAAGGGGGAGAAAGCTAATGTGCTGATAGGGCAAGGTGACGTGGTGT
TGGTAATGAAACGAAAACGGGACTCTAGCATACTTACTGACAGCCAGACAGCGACCA
AAAGAATTCGGATGGCCATCAATTAGTGTCGAATTGTTTAAAAACGACCTTGTTTCTA
CT (SEQ ID NO: 8)

Figure 4 (cont'd)