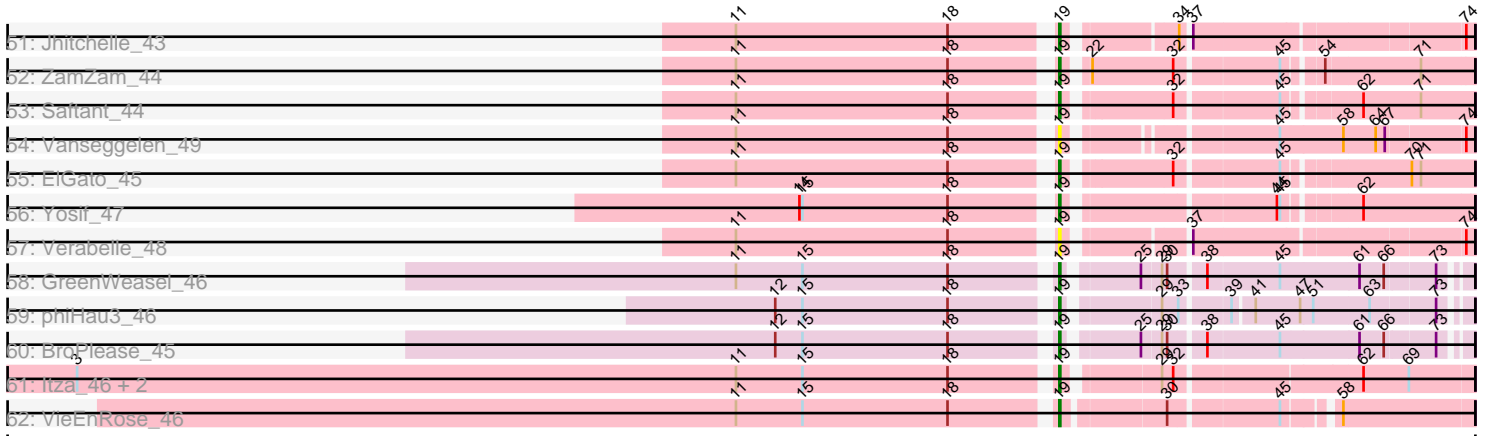


Pham 311397



Note: Tracks are now grouped by subcluster and scaled. Switching in subcluster is indicated by changes in track color. Track scale is now set by default to display the region 30 bp upstream of start 1 to 30 bp downstream of the last possible start. If this default region is judged to be packed too tightly with annotated starts, the track will be further scaled to only show that region of the ORF with annotated starts. This action will be indicated by adding "Zoomed" to the title. For starts, yellow indicates the location of called starts comprised solely of Glimmer/GeneMark auto-annotations, green indicates the location of called starts with at least 1 manual gene annotation.

## Pham 311397 Report

This analysis was run 06/27/26 on database version 652.

WARNING: Pham size does not match number of genes in report. Either unphamerated genes have been added (by you) or starterator has removed genes due to invalid start codon.

Pham number 311397 has 111 members, 7 are drafts.

Phages represented in each track:

- Track 1 : Katalie\_44, RedBear\_45, South40\_44
- Track 2 : Jash\_45, Eddasa\_45, Oliynyk\_45, Izzy\_45, BryanRecycles\_45, Rusticus\_45
- Track 3 : Aaronocolus\_44, Unstoppable\_44, Esperer\_44, Nerdos\_43, Phettuccine\_44, Bovely\_44, Leviticus\_44
- Track 4 : Ejemplo\_43, Maneekul\_44, Yasdnil\_44, TuanPN\_43
- Track 5 : Dwayne\_44, Emaanora\_47, OzzyJ\_45, Hippo\_44, TagePhighter\_46
- Track 6 : Asten\_44
- Track 7 : Lika\_44, Godpower\_45
- Track 8 : Sujidade\_45
- Track 9 : Lannister\_46
- Track 10 : Brataylor\_47, Celeste\_45
- Track 11 : Toma\_44, Dattran\_46, Goby\_44
- Track 12 : Whatever\_44, Triste\_44, Werner\_44, BarryBee\_47
- Track 13 : Danzina\_46, Zemlya\_46
- Track 14 : Indigo\_43
- Track 15 : EnochSoames\_47
- Track 16 : Nanodon\_46
- Track 17 : Chucky\_44, Snorlax\_44
- Track 18 : Nabi\_45, Rana\_45, Lorelei\_45
- Track 19 : SarahRose\_44
- Track 20 : Haizum\_46, Tefunt\_46
- Track 21 : Jevington\_47
- Track 22 : Paedore\_45, Loofah\_46
- Track 23 : Caelum\_46
- Track 24 : ELB20\_44
- Track 25 : Zainub\_47
- Track 26 : Daudau\_45
- Track 27 : Amethyst\_44
- Track 28 : SqueakyClean\_44, GirlDinner\_44, Animus\_44, Janus\_45
- Track 29 : Nishikigoi\_46
- Track 30 : Issmi\_46
- Track 31 : TinaBelcher\_44, Bowden\_44

- Track 32 : Thestral\_46
- Track 33 : BartholomewSD\_47
- Track 34 : Pablito\_45
- Track 35 : Superstar\_49
- Track 36 : Andris\_45
- Track 37 : Diane\_44
- Track 38 : Hank144\_47
- Track 39 : Triumph\_47, Axiom\_46
- Track 40 : Marav\_48
- Track 41 : Puginator\_47
- Track 42 : Omar\_47
- Track 43 : R4\_46
- Track 44 : TrvxScott\_43
- Track 45 : Alvy\_47
- Track 46 : Paolo\_47
- Track 47 : Provolone\_45, Pavo\_45, Conan\_45
- Track 48 : Alsaber\_45, phiCAM\_42, Sudan\_44, Kaine\_44, Dexers\_43, Celery\_47
- Track 49 : Speedwell\_49
- Track 50 : Amela\_44, SunkenRoot\_45, Verse\_44
- Track 51 : Jhitchelle\_43
- Track 52 : ZamZam\_44
- Track 53 : Saftant\_44
- Track 54 : Vanseggelen\_49
- Track 55 : ElGato\_45
- Track 56 : Yosif\_47
- Track 57 : Verabelle\_48
- Track 58 : GreenWeasel\_46
- Track 59 : phiHau3\_46
- Track 60 : BroPlease\_45
- Track 61 : Itza\_46, Celia\_46, Urza\_46
- Track 62 : VieEnRose\_46

***Summary of Final Annotations (See graph section above for start numbers):***

The start number called the most often in the published annotations is 19, it was called in 54 of the 104 non-draft genes in the pham.

Genes that call this "Most Annotated" start:

• Alsaber\_45, Alvy\_47, Amela\_44, Amethyst\_44, Andris\_45, Animus\_44, Axiom\_46, BartholomewSD\_47, Bowden\_44, BroPlease\_45, Caelum\_46, Celery\_47, Celia\_46, Conan\_45, Daudau\_45, Dexers\_43, Diane\_44, ELB20\_44, ElGato\_45, GirlDinner\_44, GreenWeasel\_46, Haizum\_46, Hank144\_47, Issmi\_46, Itza\_46, Janus\_45, Jevington\_47, Jhitchelle\_43, Kaine\_44, Loofah\_46, Marav\_48, Nishikigoi\_46, Pablito\_45, Paedore\_45, Paolo\_47, Pavo\_45, Provolone\_45, Puginator\_47, R4\_46, Saftant\_44, Speedwell\_49, SqueakyClean\_44, Sudan\_44, SunkenRoot\_45, Superstar\_49, Tefunt\_46, Thestral\_46, TinaBelcher\_44, Triumph\_47, TrvxScott\_43, Urza\_46, Vanseggelen\_49, Verabelle\_48, Verse\_44, VieEnRose\_46, Yosif\_47, Zainub\_47, ZamZam\_44, phiCAM\_42, phiHau3\_46,

Genes that have the "Most Annotated" start but do not call it:

•

Genes that do not have the "Most Annotated" start:

• Aaronocolus\_44, Asten\_44, BarryBee\_47, Bovely\_44, Brataylor\_47, BryanRecycles\_45, Celeste\_45, Chucky\_44, Danzina\_46, Dattran\_46, Dwayne\_44, Eddasa\_45, Ejemplo\_43, Emaanora\_47, EnochSoames\_47, Esperer\_44, Goby\_44, Godpower\_45, Hippo\_44, Indigo\_43, Izzy\_45, Jash\_45, Katalie\_44, Lannister\_46, Leviticus\_44, Lika\_44, Lorelei\_45, Maneekul\_44, Nabi\_45, Nanodon\_46, Nerdos\_43, Oliynyk\_45, Omar\_47, OzzyJ\_45, Phettuccine\_44, Rana\_45, RedBear\_45, Rusticus\_45, SarahRose\_44, Snorlax\_44, South40\_44, Sujidade\_45, TagePhighter\_46, Toma\_44, Triste\_44, TuanPN\_43, Unstoppable\_44, Werner\_44, Whatever\_44, Yasdnil\_44, Zemlya\_46,

### Summary by start number:

Start 19:

• Found in 60 of 111 ( 54.1% ) of genes in pham  
• Manual Annotations of this start: 54 of 104  
• Called 100.0% of time when present  
• Phage (with cluster) where this start called: Alsaber\_45 (BD3), Alvy\_47 (BD2), Amela\_44 (BD3), Amethyst\_44 (BD2), Andris\_45 (BD2), Animus\_44 (BD2), Axiom\_46 (BD2), BartholomewSD\_47 (BD2), Bowden\_44 (BD2), BroPlease\_45 (BD4), Caelum\_46 (BD2), Celery\_47 (BD3), Celia\_46 (BD6), Conan\_45 (BD3), Daudau\_45 (BD2), Dexers\_43 (BD3), Diane\_44 (BD2), ELB20\_44 (BD2), ElGato\_45 (BD3), GirlDinner\_44 (BD2), GreenWeasel\_46 (BD4), Haizum\_46 (BD2), Hank144\_47 (BD2), Issmi\_46 (BD2), Itza\_46 (BD6), Janus\_45 (BD2), Jevington\_47 (BD2), Jhitchelle\_43 (BD3), Kaine\_44 (BD3), Loofah\_46 (BD2), Marav\_48 (BD2), Nishikigoi\_46 (BD2), Pablito\_45 (BD2), Paedore\_45 (BD2), Paolo\_47 (BD2), Pavo\_45 (BD3), Provolone\_45 (BD3), Puginator\_47 (BD2), R4\_46 (BD2), Saftant\_44 (BD3), Speedwell\_49 (BD3), SqueakyClean\_44 (BD2), Sudan\_44 (BD3), SunkenRoot\_45 (BD3), Superstar\_49 (BD2), Tefunt\_46 (BD2), Thestral\_46 (BD2), TinaBelcher\_44 (BD2), Triumph\_47 (BD2), TrvxScott\_43 (BD2), Urza\_46 (BD6), Vanseggelen\_49 (BD3), Verabelle\_48 (BD3), Verse\_44 (BD3), VieEnRose\_46 (BD6), Yosif\_47 (BD3), Zainub\_47 (BD2), ZamZam\_44 (BD3), phiCAM\_42 (BD3), phiHau3\_46 (BD4),

Start 20:

• Found in 50 of 111 ( 45.0% ) of genes in pham  
• Manual Annotations of this start: 49 of 104  
• Called 100.0% of time when present  
• Phage (with cluster) where this start called: Aaronocolus\_44 (BD1), Asten\_44 (BD1), BarryBee\_47 (BD1), Bovely\_44 (BD1), Brataylor\_47 (BD1), BryanRecycles\_45 (BD1), Celeste\_45 (BD1), Chucky\_44 (BD1), Danzina\_46 (BD1), Dattran\_46 (BD1), Dwayne\_44 (BD1), Eddasa\_45 (BD1), Ejemplo\_43 (BD1), Emaanora\_47 (BD1), EnochSoames\_47 (BD1), Esperer\_44 (BD1), Goby\_44 (BD1), Godpower\_45 (BD1), Hippo\_44 (BD1), Indigo\_43 (BD1), Izzy\_45 (BD1), Jash\_45 (BD1), Katalie\_44 (BD1), Lannister\_46 (BD1), Leviticus\_44 (BD1), Lika\_44 (BD1), Lorelei\_45 (BD1), Maneekul\_44 (BD1), Nabi\_45 (BD1), Nanodon\_46 (BD1), Nerdos\_43 (BD1), Oliynyk\_45 (BD1), OzzyJ\_45 (BD1), Phettuccine\_44 (BD1), Rana\_45 (BD1), RedBear\_45 (BD1), Rusticus\_45 (BD1), SarahRose\_44 (BD1), Snorlax\_44 (BD1), South40\_44 (BD1), Sujidade\_45 (BD1), TagePhighter\_46 (BD1), Toma\_44 (BD1), Triste\_44 (BD1), TuanPN\_43 (BD1), Unstoppable\_44 (BD1), Werner\_44 (BD1), Whatever\_44 (BD1), Yasdnil\_44 (BD1), Zemlya\_46 (BD1),

Start 30:

- Found in 5 of 111 ( 4.5% ) of genes in pham
- Manual Annotations of this start: 1 of 104
- Called 20.0% of time when present
- Phage (with cluster) where this start called: Omar\_47 (BD2),

### **Summary by clusters:**

There are 5 clusters represented in this pham: BD4, BD6, BD1, BD3, BD2,

Info for manual annotations of cluster BD1:

- Start number 20 was manually annotated 49 times for cluster BD1.

Info for manual annotations of cluster BD2:

- Start number 19 was manually annotated 32 times for cluster BD2.
- Start number 30 was manually annotated 1 time for cluster BD2.

Info for manual annotations of cluster BD3:

- Start number 19 was manually annotated 15 times for cluster BD3.

Info for manual annotations of cluster BD4:

- Start number 19 was manually annotated 3 times for cluster BD4.

Info for manual annotations of cluster BD6:

- Start number 19 was manually annotated 4 times for cluster BD6.

### **Gene Information:**

Gene: Aaronocolus\_44 Start: 30436, Stop: 30792, Start Num: 20

Candidate Starts for Aaronocolus\_44:

(18, 30310), (Start: 20 @30436 has 49 MA's), (25, 30499), (31, 30529), (38, 30565), (46, 30637), (50, 30652), (67, 30724), (68, 30736),

Gene: Alsaber\_45 Start: 32093, Stop: 32449, Start Num: 19

Candidate Starts for Alsaber\_45:

(11, 31793), (18, 32003), (Start: 19 @32093 has 54 MA's), (32, 32183), (45, 32276), (71, 32396),

Gene: Alvy\_47 Start: 31974, Stop: 32327, Start Num: 19

Candidate Starts for Alvy\_47:

(1, 30978), (2, 31008), (10, 31467), (11, 31671), (14, 31734), (15, 31737), (17, 31878), (Start: 19 @31974 has 54 MA's), (25, 32037), (39, 32109), (41, 32127), (47, 32169), (58, 32211), (73, 32295),

Gene: Amela\_44 Start: 32894, Stop: 33247, Start Num: 19

Candidate Starts for Amela\_44:

(11, 32594), (18, 32804), (Start: 19 @32894 has 54 MA's), (45, 33077), (71, 33197),

Gene: Amethyst\_44 Start: 31337, Stop: 31699, Start Num: 19

Candidate Starts for Amethyst\_44:

(11, 31034), (14, 31097), (15, 31100), (17, 31241), (Start: 19 @31337 has 54 MA's), (23, 31364), (38, 31460), (39, 31481), (41, 31499), (47, 31541),

Gene: Andris\_45 Start: 31599, Stop: 31958, Start Num: 19

Candidate Starts for Andris\_45:

(1, 30606), (2, 30636), (5, 30693), (8, 30957), (10, 31092), (11, 31296), (12, 31335), (14, 31359), (15, 31362), (16, 31458), (17, 31503), (18, 31506), (Start: 19 @31599 has 54 MA's), (Start: 30 @31683 has 1 MA's), (47, 31800), (50, 31803), (58, 31842), (67, 31881),

Gene: Animus\_44 Start: 31844, Stop: 32206, Start Num: 19

Candidate Starts for Animus\_44:

(10, 31337), (11, 31541), (14, 31604), (15, 31607), (17, 31748), (Start: 19 @31844 has 54 MA's), (23, 31871), (29, 31934), (41, 32006), (47, 32048), (65, 32126),

Gene: Asten\_44 Start: 30765, Stop: 31124, Start Num: 20

Candidate Starts for Asten\_44:

(Start: 20 @30765 has 49 MA's), (29, 30846), (39, 30900), (41, 30918), (50, 30966), (74, 31116),

Gene: Axiom\_46 Start: 31799, Stop: 32143, Start Num: 19

Candidate Starts for Axiom\_46:

(10, 31292), (11, 31496), (14, 31559), (15, 31562), (17, 31703), (Start: 19 @31799 has 54 MA's), (26, 31865), (55, 32012),

Gene: BarryBee\_47 Start: 30775, Stop: 31134, Start Num: 20

Candidate Starts for BarryBee\_47:

(11, 30445), (12, 30484), (15, 30511), (18, 30655), (Start: 20 @30775 has 49 MA's), (29, 30856), (39, 30910), (41, 30928), (50, 30976), (59, 31018), (74, 31126),

Gene: BartholomewSD\_47 Start: 31973, Stop: 32326, Start Num: 19

Candidate Starts for BartholomewSD\_47:

(1, 30977), (2, 31007), (10, 31466), (11, 31670), (14, 31733), (15, 31736), (17, 31877), (Start: 19 @31973 has 54 MA's), (25, 32036), (39, 32108), (41, 32126), (47, 32168), (58, 32210), (73, 32294),

Gene: Bovely\_44 Start: 30442, Stop: 30798, Start Num: 20

Candidate Starts for Bovely\_44:

(18, 30316), (Start: 20 @30442 has 49 MA's), (25, 30505), (31, 30535), (38, 30571), (46, 30643), (50, 30658), (67, 30730), (68, 30742),

Gene: Bowden\_44 Start: 31888, Stop: 32241, Start Num: 19

Candidate Starts for Bowden\_44:

(10, 31381), (11, 31585), (12, 31624), (14, 31648), (15, 31651), (16, 31747), (17, 31792), (18, 31795), (Start: 19 @31888 has 54 MA's), (21, 31894), (27, 31960), (39, 32023), (41, 32041), (47, 32083), (73, 32209),

Gene: Brataylor\_47 Start: 31748, Stop: 32104, Start Num: 20

Candidate Starts for Brataylor\_47:

(Start: 20 @31748 has 49 MA's), (25, 31814), (39, 31886), (41, 31904), (46, 31934), (48, 31946), (53, 31967), (57, 31985), (63, 32009), (74, 32096),

Gene: BroPlease\_45 Start: 30896, Stop: 31243, Start Num: 19

Candidate Starts for BroPlease\_45:

(12, 30632), (15, 30659), (18, 30803), (Start: 19 @30896 has 54 MA's), (25, 30959), (29, 30977), (Start: 30 @30980 has 1 MA's), (38, 31010), (45, 31079), (61, 31154), (66, 31175), (73, 31220),

Gene: BryanRecycles\_45 Start: 30752, Stop: 31108, Start Num: 20

Candidate Starts for BryanRecycles\_45:

(11, 30422), (12, 30461), (14, 30485), (15, 30488), (18, 30632), (Start: 20 @30752 has 49 MA's), (31, 30845), (38, 30881), (42, 30926), (46, 30953), (50, 30968), (67, 31040), (68, 31052),

Gene: Caelum\_46 Start: 31569, Stop: 31931, Start Num: 19

Candidate Starts for Caelum\_46:

(11, 31266), (13, 31323), (15, 31332), (17, 31473), (Start: 19 @31569 has 54 MA's), (23, 31596), (29, 31659), (41, 31731), (47, 31773), (50, 31776), (51, 31785), (52, 31788), (72, 31887),

Gene: Celery\_47 Start: 32026, Stop: 32379, Start Num: 19

Candidate Starts for Celery\_47:

(11, 31726), (18, 31936), (Start: 19 @32026 has 54 MA's), (32, 32116), (45, 32209), (71, 32329),

Gene: Celeste\_45 Start: 31214, Stop: 31570, Start Num: 20

Candidate Starts for Celeste\_45:

(Start: 20 @31214 has 49 MA's), (25, 31280), (39, 31352), (41, 31370), (46, 31400), (48, 31412), (53, 31433), (57, 31451), (63, 31475), (74, 31562),

Gene: Celia\_46 Start: 31375, Stop: 31740, Start Num: 19

Candidate Starts for Celia\_46:

(3, 30418), (11, 31072), (15, 31138), (18, 31282), (Start: 19 @31375 has 54 MA's), (29, 31456), (32, 31465), (62, 31633), (69, 31678),

Gene: Chucky\_44 Start: 30779, Stop: 31138, Start Num: 20

Candidate Starts for Chucky\_44:

(11, 30449), (12, 30488), (15, 30515), (18, 30659), (Start: 20 @30779 has 49 MA's), (29, 30860), (39, 30914), (41, 30932), (50, 30980), (51, 30989), (59, 31022), (74, 31130),

Gene: Conan\_45 Start: 31987, Stop: 32343, Start Num: 19

Candidate Starts for Conan\_45:

(11, 31687), (18, 31897), (Start: 19 @31987 has 54 MA's), (29, 32068), (32, 32077), (45, 32170), (70, 32281), (71, 32290),

Gene: Danzina\_46 Start: 31515, Stop: 31871, Start Num: 20

Candidate Starts for Danzina\_46:

(Start: 20 @31515 has 49 MA's), (22, 31530), (38, 31644), (42, 31689), (44, 31707), (46, 31716), (50, 31731), (58, 31764), (60, 31770), (67, 31803), (68, 31815),

Gene: Dattran\_46 Start: 31357, Stop: 31716, Start Num: 20

Candidate Starts for Dattran\_46:

(11, 31027), (12, 31066), (14, 31090), (15, 31093), (18, 31237), (Start: 20 @31357 has 49 MA's), (29, 31438), (39, 31492), (41, 31510), (58, 31597), (74, 31708),

Gene: Daudau\_45 Start: 31710, Stop: 32051, Start Num: 19

Candidate Starts for Daudau\_45:

(11, 31407), (14, 31470), (15, 31473), (17, 31614), (Start: 19 @31710 has 54 MA's), (26, 31776), (43, 31875), (45, 31884),

Gene: Dexers\_43 Start: 32011, Stop: 32367, Start Num: 19

Candidate Starts for Dexers\_43:

(11, 31711), (18, 31921), (Start: 19 @32011 has 54 MA's), (32, 32101), (45, 32194), (71, 32314),

Gene: Diane\_44 Start: 31566, Stop: 31922, Start Num: 19

Candidate Starts for Diane\_44:

(9, 30975), (10, 31059), (11, 31263), (14, 31326), (15, 31329), (17, 31470), (Start: 19 @31566 has 54 MA's), (23, 31593), (29, 31656), (39, 31710), (41, 31728), (47, 31770),

Gene: Dwayne\_44 Start: 30766, Stop: 31125, Start Num: 20

Candidate Starts for Dwayne\_44:

(11, 30436), (12, 30475), (15, 30502), (18, 30646), (Start: 20 @30766 has 49 MA's), (29, 30847), (39, 30901), (41, 30919), (50, 30967), (59, 31009), (74, 31117),

Gene: ELB20\_44 Start: 32192, Stop: 32545, Start Num: 19

Candidate Starts for ELB20\_44:

(1, 31205), (2, 31235), (6, 31295), (11, 31889), (15, 31955), (17, 32096), (Start: 19 @32192 has 54 MA's), (25, 32255), (41, 32345), (47, 32387),

Gene: Eddasa\_45 Start: 30752, Stop: 31108, Start Num: 20

Candidate Starts for Eddasa\_45:

(11, 30422), (12, 30461), (14, 30485), (15, 30488), (18, 30632), (Start: 20 @30752 has 49 MA's), (31, 30845), (38, 30881), (42, 30926), (46, 30953), (50, 30968), (67, 31040), (68, 31052),

Gene: Ejemplo\_43 Start: 30707, Stop: 31063, Start Num: 20

Candidate Starts for Ejemplo\_43:

(11, 30377), (12, 30416), (14, 30440), (15, 30443), (18, 30587), (Start: 20 @30707 has 49 MA's), (39, 30842), (41, 30860), (58, 30944), (59, 30947), (74, 31055),

Gene: ElGato\_45 Start: 31651, Stop: 32007, Start Num: 19

Candidate Starts for ElGato\_45:

(11, 31351), (18, 31561), (Start: 19 @31651 has 54 MA's), (32, 31741), (45, 31834), (70, 31945), (71, 31954),

Gene: Emaanora\_47 Start: 30724, Stop: 31083, Start Num: 20

Candidate Starts for Emaanora\_47:

(11, 30394), (12, 30433), (15, 30460), (18, 30604), (Start: 20 @30724 has 49 MA's), (29, 30805), (39, 30859), (41, 30877), (50, 30925), (59, 30967), (74, 31075),

Gene: EnochSoames\_47 Start: 30747, Stop: 31103, Start Num: 20

Candidate Starts for EnochSoames\_47:

(11, 30417), (12, 30456), (14, 30480), (15, 30483), (18, 30627), (Start: 20 @30747 has 49 MA's), (31, 30840), (38, 30876), (42, 30921), (46, 30948), (50, 30963), (68, 31047),

Gene: Esperer\_44 Start: 30255, Stop: 30611, Start Num: 20

Candidate Starts for Esperer\_44:

(18, 30129), (Start: 20 @30255 has 49 MA's), (25, 30318), (31, 30348), (38, 30384), (46, 30456), (50, 30471), (67, 30543), (68, 30555),

Gene: GirlDinner\_44 Start: 31345, Stop: 31707, Start Num: 19

Candidate Starts for GirlDinner\_44:

(10, 30838), (11, 31042), (14, 31105), (15, 31108), (17, 31249), (Start: 19 @31345 has 54 MA's), (23, 31372), (29, 31435), (41, 31507), (47, 31549), (65, 31627),

Gene: Goby\_44 Start: 31256, Stop: 31615, Start Num: 20

Candidate Starts for Goby\_44:

(11, 30926), (12, 30965), (14, 30989), (15, 30992), (18, 31136), (Start: 20 @31256 has 49 MA's), (29, 31337), (39, 31391), (41, 31409), (58, 31496), (74, 31607),

Gene: Godpower\_45 Start: 31239, Stop: 31592, Start Num: 20

Candidate Starts for Godpower\_45:

(11, 30909), (12, 30948), (15, 30975), (18, 31119), (Start: 20 @31239 has 49 MA's), (25, 31302), (35, 31335), (39, 31374), (41, 31392), (46, 31422), (48, 31434), (53, 31455), (74, 31584),

Gene: GreenWeasel\_46 Start: 30903, Stop: 31250, Start Num: 19

Candidate Starts for GreenWeasel\_46:

(11, 30600), (15, 30666), (18, 30810), (Start: 19 @30903 has 54 MA's), (25, 30966), (29, 30984), (Start: 30 @30987 has 1 MA's), (38, 31017), (45, 31086), (61, 31161), (66, 31182), (73, 31227),

Gene: Haizum\_46 Start: 31681, Stop: 32037, Start Num: 19

Candidate Starts for Haizum\_46:

(11, 31378), (14, 31441), (15, 31444), (17, 31585), (Start: 19 @31681 has 54 MA's), (23, 31708), (29, 31771), (39, 31825), (41, 31843), (47, 31885),

Gene: Hank144\_47 Start: 31894, Stop: 32256, Start Num: 19

Candidate Starts for Hank144\_47:

(14, 31654), (15, 31657), (17, 31798), (Start: 19 @31894 has 54 MA's), (23, 31921), (29, 31984), (41, 32056), (47, 32098), (53, 32119),

Gene: Hippo\_44 Start: 30778, Stop: 31137, Start Num: 20

Candidate Starts for Hippo\_44:

(11, 30448), (12, 30487), (15, 30514), (18, 30658), (Start: 20 @30778 has 49 MA's), (29, 30859), (39, 30913), (41, 30931), (50, 30979), (59, 31021), (74, 31129),

Gene: Indigo\_43 Start: 30435, Stop: 30791, Start Num: 20

Candidate Starts for Indigo\_43:

(11, 30099), (14, 30162), (15, 30165), (18, 30309), (Start: 20 @30435 has 49 MA's), (25, 30498), (31, 30528), (36, 30543), (38, 30564), (46, 30636), (50, 30651), (67, 30723), (68, 30735),

Gene: Issmi\_46 Start: 32268, Stop: 32627, Start Num: 19

Candidate Starts for Issmi\_46:

(11, 31965), (14, 32028), (15, 32031), (17, 32172), (Start: 19 @32268 has 54 MA's), (24, 32325), (25, 32337), (41, 32427), (47, 32469), (50, 32472),

Gene: Itza\_46 Start: 31289, Stop: 31654, Start Num: 19

Candidate Starts for Itza\_46:

(3, 30332), (11, 30986), (15, 31052), (18, 31196), (Start: 19 @31289 has 54 MA's), (29, 31370), (32, 31379), (62, 31547), (69, 31592),

Gene: Izzy\_45 Start: 30799, Stop: 31155, Start Num: 20

Candidate Starts for Izzy\_45:

(11, 30469), (12, 30508), (14, 30532), (15, 30535), (18, 30679), (Start: 20 @30799 has 49 MA's), (31, 30892), (38, 30928), (42, 30973), (46, 31000), (50, 31015), (67, 31087), (68, 31099),

Gene: Janus\_45 Start: 31685, Stop: 32047, Start Num: 19

Candidate Starts for Janus\_45:

(10, 31178), (11, 31382), (14, 31445), (15, 31448), (17, 31589), (Start: 19 @31685 has 54 MA's), (23, 31712), (29, 31775), (41, 31847), (47, 31889), (65, 31967),

Gene: Jash\_45 Start: 30752, Stop: 31108, Start Num: 20

Candidate Starts for Jash\_45:

(11, 30422), (12, 30461), (14, 30485), (15, 30488), (18, 30632), (Start: 20 @30752 has 49 MA's), (31, 30845), (38, 30881), (42, 30926), (46, 30953), (50, 30968), (67, 31040), (68, 31052),

Gene: Jevington\_47 Start: 32067, Stop: 32426, Start Num: 19

Candidate Starts for Jevington\_47:

(14, 31827), (15, 31830), (17, 31971), (Start: 19 @32067 has 54 MA's), (29, 32148), (38, 32181), (43, 32241), (62, 32325), (67, 32346),

Gene: Jhitchelle\_43 Start: 31530, Stop: 31883, Start Num: 19

Candidate Starts for Jhitchelle\_43:

(11, 31230), (18, 31440), (Start: 19 @31530 has 54 MA's), (34, 31623), (37, 31629), (74, 31875),

Gene: Kaine\_44 Start: 31802, Stop: 32158, Start Num: 19

Candidate Starts for Kaine\_44:

(11, 31502), (18, 31712), (Start: 19 @31802 has 54 MA's), (32, 31892), (45, 31985), (71, 32105),

Gene: Katalie\_44 Start: 30972, Stop: 31334, Start Num: 20

Candidate Starts for Katalie\_44:

(Start: 20 @30972 has 49 MA's), (29, 31056), (41, 31128), (74, 31326),

Gene: Lannister\_46 Start: 31432, Stop: 31791, Start Num: 20

Candidate Starts for Lannister\_46:

(11, 31102), (14, 31165), (15, 31168), (18, 31312), (Start: 20 @31432 has 49 MA's), (29, 31513), (39, 31567), (41, 31585), (74, 31783),

Gene: Leviticus\_44 Start: 30439, Stop: 30795, Start Num: 20

Candidate Starts for Leviticus\_44:

(18, 30313), (Start: 20 @30439 has 49 MA's), (25, 30502), (31, 30532), (38, 30568), (46, 30640), (50, 30655), (67, 30727), (68, 30739),

Gene: Lika\_44 Start: 31242, Stop: 31595, Start Num: 20

Candidate Starts for Lika\_44:

(11, 30912), (12, 30951), (15, 30978), (18, 31122), (Start: 20 @31242 has 49 MA's), (25, 31305), (35, 31338), (39, 31377), (41, 31395), (46, 31425), (48, 31437), (53, 31458), (74, 31587),

Gene: Loofah\_46 Start: 32074, Stop: 32430, Start Num: 19

Candidate Starts for Loofah\_46:

(11, 31771), (12, 31810), (14, 31834), (15, 31837), (16, 31933), (17, 31978), (18, 31981), (Start: 19 @32074 has 54 MA's), (41, 32227), (49, 32272),

Gene: Lorelei\_45 Start: 31293, Stop: 31649, Start Num: 20

Candidate Starts for Lorelei\_45:

(Start: 20 @31293 has 49 MA's), (25, 31359), (26, 31362), (29, 31377), (41, 31449), (48, 31491), (50, 31494), (53, 31512), (74, 31641),

Gene: Maneekul\_44 Start: 30797, Stop: 31153, Start Num: 20

Candidate Starts for Maneekul\_44:

(11, 30467), (12, 30506), (14, 30530), (15, 30533), (18, 30677), (Start: 20 @30797 has 49 MA's), (39, 30932), (41, 30950), (58, 31034), (59, 31037), (74, 31145),

Gene: Marav\_48 Start: 32389, Stop: 32736, Start Num: 19

Candidate Starts for Marav\_48:

(14, 32149), (15, 32152), (17, 32293), (Start: 19 @32389 has 54 MA's), (29, 32470), (43, 32557), (55, 32605), (58, 32617), (74, 32728),

Gene: Nabi\_45 Start: 31293, Stop: 31649, Start Num: 20

Candidate Starts for Nabi\_45:

(Start: 20 @31293 has 49 MA's), (25, 31359), (26, 31362), (29, 31377), (41, 31449), (48, 31491), (50, 31494), (53, 31512), (74, 31641),

Gene: Nanodon\_46 Start: 31082, Stop: 31435, Start Num: 20

Candidate Starts for Nanodon\_46:

(11, 30746), (14, 30809), (15, 30812), (18, 30956), (Start: 20 @31082 has 49 MA's), (38, 31211), (50, 31298), (67, 31367), (73, 31412),

Gene: Nerdos\_43 Start: 30434, Stop: 30790, Start Num: 20

Candidate Starts for Nerdos\_43:

(18, 30308), (Start: 20 @30434 has 49 MA's), (25, 30497), (31, 30527), (38, 30563), (46, 30635), (50, 30650), (67, 30722), (68, 30734),

Gene: Nishikigoi\_46 Start: 31681, Stop: 32037, Start Num: 19

Candidate Starts for Nishikigoi\_46:

(9, 31090), (10, 31174), (11, 31378), (14, 31441), (15, 31444), (17, 31585), (Start: 19 @31681 has 54 MA's), (23, 31708), (29, 31771), (39, 31825), (41, 31843), (47, 31885),

Gene: Oliynyk\_45 Start: 30752, Stop: 31108, Start Num: 20

Candidate Starts for Oliynyk\_45:

(11, 30422), (12, 30461), (14, 30485), (15, 30488), (18, 30632), (Start: 20 @30752 has 49 MA's), (31, 30845), (38, 30881), (42, 30926), (46, 30953), (50, 30968), (67, 31040), (68, 31052),

Gene: Omar\_47 Start: 31950, Stop: 32219, Start Num: 30

Candidate Starts for Omar\_47:

(14, 31629), (15, 31632), (Start: 30 @31950 has 1 MA's), (47, 32067), (50, 32070), (58, 32109), (64, 32139),

Gene: OzzyJ\_45 Start: 30766, Stop: 31125, Start Num: 20

Candidate Starts for OzzyJ\_45:

(11, 30436), (12, 30475), (15, 30502), (18, 30646), (Start: 20 @30766 has 49 MA's), (29, 30847), (39, 30901), (41, 30919), (50, 30967), (59, 31009), (74, 31117),

Gene: Pablito\_45 Start: 31466, Stop: 31822, Start Num: 19

Candidate Starts for Pablito\_45:

(Start: 19 @31466 has 54 MA's), (29, 31556), (38, 31589), (72, 31775),

Gene: Paedore\_45 Start: 32059, Stop: 32415, Start Num: 19

Candidate Starts for Paedore\_45:

(11, 31756), (12, 31795), (14, 31819), (15, 31822), (16, 31918), (17, 31963), (18, 31966), (Start: 19 @32059 has 54 MA's), (41, 32212), (49, 32257),

Gene: Paolo\_47 Start: 32252, Stop: 32605, Start Num: 19

Candidate Starts for Paolo\_47:

(14, 32012), (15, 32015), (17, 32156), (Start: 19 @32252 has 54 MA's), (41, 32405), (47, 32447),

Gene: Pavo\_45 Start: 32251, Stop: 32607, Start Num: 19

Candidate Starts for Pavo\_45:

(11, 31951), (18, 32161), (Start: 19 @32251 has 54 MA's), (29, 32332), (32, 32341), (45, 32434), (70, 32545), (71, 32554),

Gene: Phettuccine\_44 Start: 30435, Stop: 30791, Start Num: 20

Candidate Starts for Phettuccine\_44:

(18, 30309), (Start: 20 @30435 has 49 MA's), (25, 30498), (31, 30528), (38, 30564), (46, 30636), (50, 30651), (67, 30723), (68, 30735),

Gene: Provolone\_45 Start: 31633, Stop: 31989, Start Num: 19

Candidate Starts for Provolone\_45:

(11, 31333), (18, 31543), (Start: 19 @31633 has 54 MA's), (29, 31714), (32, 31723), (45, 31816), (70, 31927), (71, 31936),

Gene: Puginator\_47 Start: 32282, Stop: 32623, Start Num: 19

Candidate Starts for Puginator\_47:

(1, 31286), (2, 31316), (4, 31370), (10, 31775), (11, 31979), (15, 32045), (17, 32186), (Start: 19 @32282 has 54 MA's), (45, 32456), (75, 32618),

Gene: R4\_46 Start: 32220, Stop: 32561, Start Num: 19

Candidate Starts for R4\_46:

(11, 31917), (15, 31983), (17, 32124), (Start: 19 @32220 has 54 MA's), (28, 32298), (40, 32352), (43, 32385),

Gene: Rana\_45 Start: 31293, Stop: 31649, Start Num: 20

Candidate Starts for Rana\_45:

(Start: 20 @31293 has 49 MA's), (25, 31359), (26, 31362), (29, 31377), (41, 31449), (48, 31491), (50, 31494), (53, 31512), (74, 31641),

Gene: RedBear\_45 Start: 30972, Stop: 31334, Start Num: 20

Candidate Starts for RedBear\_45:

(Start: 20 @30972 has 49 MA's), (29, 31056), (41, 31128), (74, 31326),

Gene: Rusticus\_45 Start: 30752, Stop: 31108, Start Num: 20

Candidate Starts for Rusticus\_45:

(11, 30422), (12, 30461), (14, 30485), (15, 30488), (18, 30632), (Start: 20 @30752 has 49 MA's), (31, 30845), (38, 30881), (42, 30926), (46, 30953), (50, 30968), (67, 31040), (68, 31052),

Gene: Saftant\_44 Start: 32211, Stop: 32564, Start Num: 19

Candidate Starts for Saftant\_44:

(11, 31911), (18, 32121), (Start: 19 @32211 has 54 MA's), (32, 32301), (45, 32394), (62, 32457), (71, 32514),

Gene: SarahRose\_44 Start: 30774, Stop: 31133, Start Num: 20

Candidate Starts for SarahRose\_44:

(11, 30444), (12, 30483), (15, 30510), (18, 30654), (Start: 20 @30774 has 49 MA's), (29, 30855), (39, 30909), (41, 30927), (50, 30975), (56, 31008), (59, 31017), (74, 31125),

Gene: Snorlax\_44 Start: 30778, Stop: 31137, Start Num: 20

Candidate Starts for Snorlax\_44:

(11, 30448), (12, 30487), (15, 30514), (18, 30658), (Start: 20 @30778 has 49 MA's), (29, 30859), (39, 30913), (41, 30931), (50, 30979), (51, 30988), (59, 31021), (74, 31129),

Gene: South40\_44 Start: 30972, Stop: 31334, Start Num: 20

Candidate Starts for South40\_44:

(Start: 20 @30972 has 49 MA's), (29, 31056), (41, 31128), (74, 31326),

Gene: Speedwell\_49 Start: 33501, Stop: 33854, Start Num: 19

Candidate Starts for Speedwell\_49:

(11, 33201), (18, 33411), (Start: 19 @33501 has 54 MA's), (32, 33591), (45, 33684), (54, 33714), (71, 33804),

Gene: SqueakyClean\_44 Start: 31776, Stop: 32138, Start Num: 19

Candidate Starts for SqueakyClean\_44:

(10, 31269), (11, 31473), (14, 31536), (15, 31539), (17, 31680), (Start: 19 @31776 has 54 MA's), (23, 31803), (29, 31866), (41, 31938), (47, 31980), (65, 32058),

Gene: Sudan\_44 Start: 32089, Stop: 32445, Start Num: 19

Candidate Starts for Sudan\_44:

(11, 31789), (18, 31999), (Start: 19 @32089 has 54 MA's), (32, 32179), (45, 32272), (71, 32392),

Gene: Sujidade\_45 Start: 31524, Stop: 31883, Start Num: 20

Candidate Starts for Sujidade\_45:

(7, 30783), (11, 31194), (12, 31233), (15, 31260), (18, 31404), (Start: 20 @31524 has 49 MA's), (29, 31605), (33, 31617), (39, 31659), (41, 31677), (56, 31758), (58, 31764), (63, 31788), (74, 31875),

Gene: SunkenRoot\_45 Start: 32694, Stop: 33047, Start Num: 19

Candidate Starts for SunkenRoot\_45:

(11, 32394), (18, 32604), (Start: 19 @32694 has 54 MA's), (45, 32877), (71, 32997),

Gene: Superstar\_49 Start: 32964, Stop: 33305, Start Num: 19

Candidate Starts for Superstar\_49:

(11, 32661), (14, 32724), (15, 32727), (17, 32868), (Start: 19 @32964 has 54 MA's), (40, 33096), (45, 33138),

Gene: TagePighther\_46 Start: 30778, Stop: 31137, Start Num: 20

Candidate Starts for TagePighther\_46:

(11, 30448), (12, 30487), (15, 30514), (18, 30658), (Start: 20 @30778 has 49 MA's), (29, 30859), (39, 30913), (41, 30931), (50, 30979), (59, 31021), (74, 31129),

Gene: Tefunt\_46 Start: 31683, Stop: 32039, Start Num: 19

Candidate Starts for Tefunt\_46:

(11, 31380), (14, 31443), (15, 31446), (17, 31587), (Start: 19 @31683 has 54 MA's), (23, 31710), (29, 31773), (39, 31827), (41, 31845), (47, 31887),

Gene: Thestral\_46 Start: 31880, Stop: 32233, Start Num: 19

Candidate Starts for Thestral\_46:

(10, 31373), (11, 31577), (12, 31616), (14, 31640), (15, 31643), (16, 31739), (17, 31784), (18, 31787), (Start: 19 @31880 has 54 MA's), (21, 31886), (39, 32015), (41, 32033), (47, 32075), (73, 32201),

Gene: TinaBelcher\_44 Start: 31827, Stop: 32180, Start Num: 19

Candidate Starts for TinaBelcher\_44:

(10, 31320), (11, 31524), (12, 31563), (14, 31587), (15, 31590), (16, 31686), (17, 31731), (18, 31734), (Start: 19 @31827 has 54 MA's), (21, 31833), (27, 31899), (39, 31962), (41, 31980), (47, 32022), (73, 32148),

Gene: Toma\_44 Start: 31256, Stop: 31615, Start Num: 20

Candidate Starts for Toma\_44:

(11, 30926), (12, 30965), (14, 30989), (15, 30992), (18, 31136), (Start: 20 @31256 has 49 MA's), (29, 31337), (39, 31391), (41, 31409), (58, 31496), (74, 31607),

Gene: Triste\_44 Start: 30766, Stop: 31125, Start Num: 20

Candidate Starts for Triste\_44:

(11, 30436), (12, 30475), (15, 30502), (18, 30646), (Start: 20 @30766 has 49 MA's), (29, 30847), (39, 30901), (41, 30919), (50, 30967), (59, 31009), (74, 31117),

Gene: Triumph\_47 Start: 31816, Stop: 32160, Start Num: 19

Candidate Starts for Triumph\_47:

(10, 31309), (11, 31513), (14, 31576), (15, 31579), (17, 31720), (Start: 19 @31816 has 54 MA's), (26, 31882), (55, 32029),

Gene: TrvxScott\_43 Start: 31873, Stop: 32226, Start Num: 19

Candidate Starts for TrvxScott\_43:

(1, 30877), (2, 30907), (4, 30961), (10, 31366), (11, 31570), (12, 31609), (14, 31633), (15, 31636), (16, 31732), (17, 31777), (18, 31780), (Start: 19 @31873 has 54 MA's), (21, 31879), (39, 32008), (41, 32026), (47, 32068), (73, 32194),

Gene: TuanPN\_43 Start: 30707, Stop: 31063, Start Num: 20

Candidate Starts for TuanPN\_43:

(11, 30377), (12, 30416), (14, 30440), (15, 30443), (18, 30587), (Start: 20 @30707 has 49 MA's), (39, 30842), (41, 30860), (58, 30944), (59, 30947), (74, 31055),

Gene: Unstoppable\_44 Start: 30430, Stop: 30786, Start Num: 20

Candidate Starts for Unstoppable\_44:

(18, 30304), (Start: 20 @30430 has 49 MA's), (25, 30493), (31, 30523), (38, 30559), (46, 30631), (50, 30646), (67, 30718), (68, 30730),

Gene: Urza\_46 Start: 31310, Stop: 31675, Start Num: 19

Candidate Starts for Urza\_46:

(3, 30353), (11, 31007), (15, 31073), (18, 31217), (Start: 19 @31310 has 54 MA's), (29, 31391), (32, 31400), (62, 31568), (69, 31613),

Gene: Vanseggelen\_49 Start: 31734, Stop: 32087, Start Num: 19

Candidate Starts for Vanseggelen\_49:

(11, 31434), (18, 31644), (Start: 19 @31734 has 54 MA's), (45, 31908), (58, 31968), (64, 31998), (67, 32007), (74, 32079),

Gene: Verabelle\_48 Start: 32295, Stop: 32648, Start Num: 19

Candidate Starts for Verabelle\_48:

(11, 31995), (18, 32205), (Start: 19 @32295 has 54 MA's), (37, 32394), (74, 32640),

Gene: Verse\_44 Start: 32888, Stop: 33241, Start Num: 19

Candidate Starts for Verse\_44:

(11, 32588), (18, 32798), (Start: 19 @32888 has 54 MA's), (45, 33071), (71, 33191),

Gene: VieEnRose\_46 Start: 31380, Stop: 31736, Start Num: 19

Candidate Starts for VieEnRose\_46:

(11, 31077), (15, 31143), (18, 31287), (Start: 19 @31380 has 54 MA's), (Start: 30 @31470 has 1 MA's), (45, 31569), (58, 31611),

Gene: Werner\_44 Start: 30776, Stop: 31135, Start Num: 20

Candidate Starts for Werner\_44:

(11, 30446), (12, 30485), (15, 30512), (18, 30656), (Start: 20 @30776 has 49 MA's), (29, 30857), (39, 30911), (41, 30929), (50, 30977), (59, 31019), (74, 31127),

Gene: Whatever\_44 Start: 30776, Stop: 31135, Start Num: 20

Candidate Starts for Whatever\_44:

(11, 30446), (12, 30485), (15, 30512), (18, 30656), (Start: 20 @30776 has 49 MA's), (29, 30857), (39, 30911), (41, 30929), (50, 30977), (59, 31019), (74, 31127),

Gene: Yasdni\_44 Start: 30825, Stop: 31181, Start Num: 20

Candidate Starts for Yasdni\_44:

(11, 30495), (12, 30534), (14, 30558), (15, 30561), (18, 30705), (Start: 20 @30825 has 49 MA's), (39, 30960), (41, 30978), (58, 31062), (59, 31065), (74, 31173),

Gene: Yosif\_47 Start: 32857, Stop: 33213, Start Num: 19

Candidate Starts for Yosif\_47:

(14, 32620), (15, 32623), (18, 32767), (Start: 19 @32857 has 54 MA's), (44, 33040), (45, 33043), (62, 33106),

Gene: Zainub\_47 Start: 32228, Stop: 32575, Start Num: 19

Candidate Starts for Zainub\_47:

(14, 31988), (15, 31991), (17, 32132), (Start: 19 @32228 has 54 MA's), (29, 32309), (71, 32525),

Gene: ZamZam\_44 Start: 32184, Stop: 32540, Start Num: 19

Candidate Starts for ZamZam\_44:

(11, 31884), (18, 32094), (Start: 19 @32184 has 54 MA's), (22, 32199), (32, 32277), (45, 32370), (54, 32400), (71, 32490),

Gene: Zemlya\_46 Start: 31315, Stop: 31671, Start Num: 20

Candidate Starts for Zemlya\_46:

(Start: 20 @31315 has 49 MA's), (22, 31330), (38, 31444), (42, 31489), (44, 31507), (46, 31516), (50, 31531), (58, 31564), (60, 31570), (67, 31603), (68, 31615),

Gene: phiCAM\_42 Start: 34039, Stop: 34392, Start Num: 19

Candidate Starts for phiCAM\_42:

(11, 33739), (18, 33949), (Start: 19 @34039 has 54 MA's), (32, 34129), (45, 34222), (71, 34342),

Gene: phiHau3\_46 Start: 30871, Stop: 31215, Start Num: 19

Candidate Starts for phiHau3\_46:

(12, 30607), (15, 30634), (18, 30778), (Start: 19 @30871 has 54 MA's), (29, 30952), (33, 30964), (39, 31006), (41, 31024), (47, 31066), (51, 31078), (63, 31132), (73, 31192),