1. Project Information

Program	Microbial/CSP 2012
PMO Project	0
Seq Proj ID	1027136
Sequencing Project Name	Thioalkalivibrio sp. HL7711_P3F6 JGI 000151CP–G10
JGI Project ID	0

2. Read Statistics

Illumina Std PE Statistics

File name	7667.6.80858.CATTTT.fastq
Library	TNGG
Number of reads	23,581,872
Sequencing depth [†]	707X
Read type	2x150 bp

[†] A genome size of 5.0 Mbp was assumed in this calculation.

3. Read QC Results

The following are the results of reads screened against contaminants. Pairs of matching reads were removed from the dataset.

Illumina Std PE Read Filter Statistics

Description	Num Reads	Pct Reads
Input	23,581,872	100
Contam removed	3276	0.0
Artifact removed	964,322	4.1
Total removed	3,581,872	15.2
Total remaining	20,000,000	84.8

List of Contaminants Removed

Description	Num Reads	Pct Reads
human_chr11	2,348	0.01
human_chr6	606	0.00
human_chr2	258	0.00
gi|357579577|Canis_lupus_familiaris_chr3	256	0.00
gi|357579535|Canis_lupus_familiaris_chr20	20	0.00
gi|357579571|Canis_lupus_familiaris_chr5	16	0.00
human_chr5	12	0.00

human_chr16	6	0.00
human_chr14	4	0.00
human_chr8	4	0.00
human_chr10	4	0.00
human_chr1	2	0.00
human_chr7	2	0.00
gi|357579523|Canis_lupus_familiaris_chr27	2	0.00
human_chr17	2	0.00
human_chr20	2	0.00
human_chr12	2	0.00
human_chr4	2	0.00

The following are the results of reads screened against potential reagent and process contaminants but were not removed from the dataset.
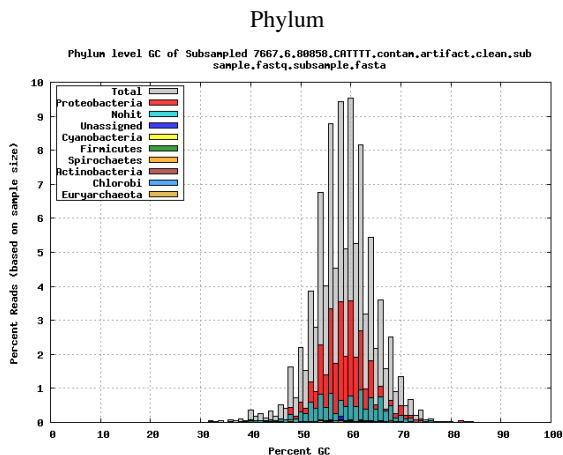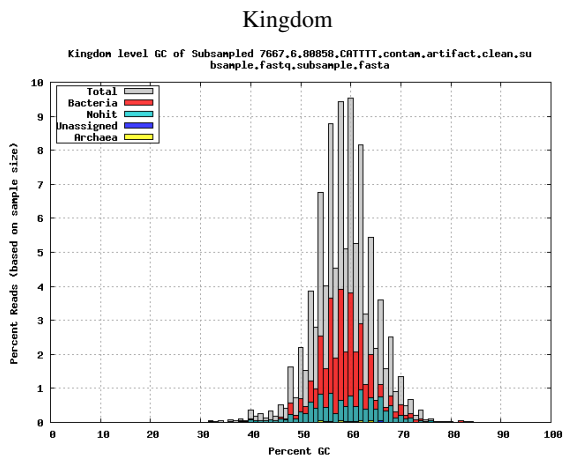
Illumina Std PE Contamination Identification Statistics

Description	Num Reads	Pct Reads
Input	23,581,872	100
Contam identified	24	0.0

List of Contaminants Identified

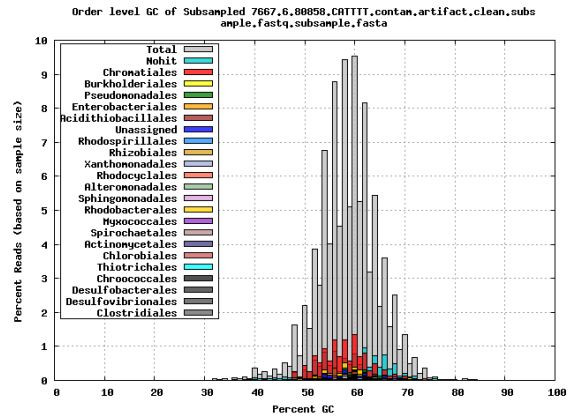| Description	Num Reads	Pct Reads
Ralstonia	22	0.00
Delftia	2	0.00

GC histogram of the reads subsampled to 10k, overlaid with GC of hits based on BLASTX, shown for different taxonomic levels.
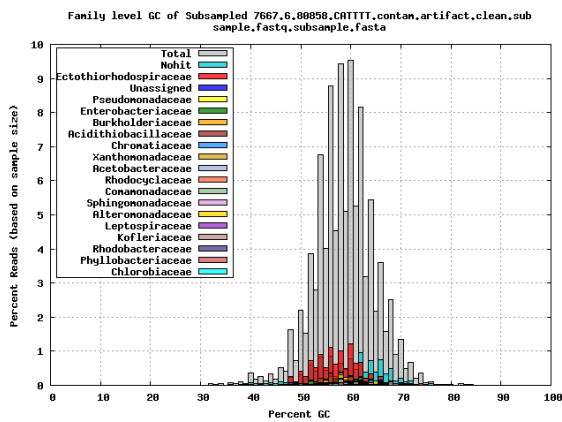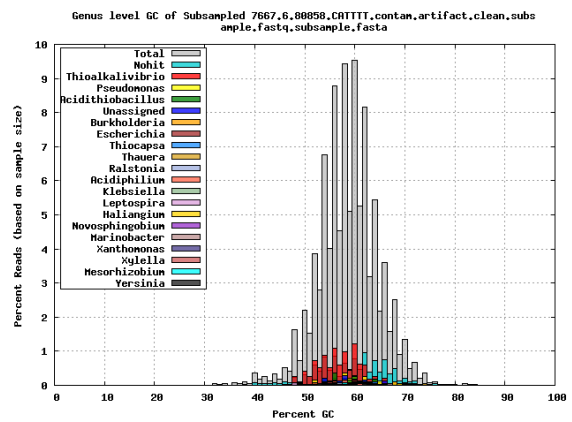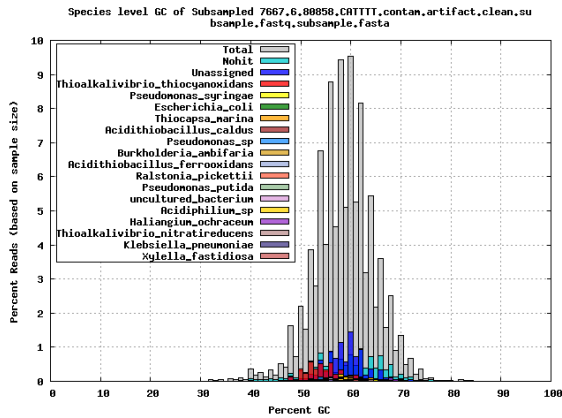
Kingdom

Phylum

Class

Class level GC of Subsampled 7667.6.80858.CATTTT.contam.artifact.clean.subsample.fastq.subsample.fasta

Legend:
Total, Gammaproteobacteria, Nohit, Betaproteobacteria, Alphaproteobacteria, Unassigned, Deltaproteobacteria, Spirochaetia, Actinobacteria, Epsilonproteobacteria, Chlorobia, Bacilli, Clostridia

X-axis: Percent GC
Y-axis: Percent Reads (based on sample size)

Order

Order level GC of Subsampled 7667.6.80858.CATTTT.contam.artifact.clean.subsample.fastq.subsample.fasta

Legend:
Total, Nohit, Chromatiales, Burkholderiales, Pseudomonadales, Enterobacteriales, Acidithiobacillales, Unassigned, Rhodospirillales, Rhizobiales, Xanthomonadales, Rhodocyclales, Alteromonadales, Sphingomonadales, Rhodobacterales, Myxococcales, Spirochaetales, Actinomycetales, Chlorobiales, Thiotrichales, Chroococcales, Desulfobacterales, Desulfovibrionales, Clostridiales

X-axis: Percent GC
Y-axis: Percent Reads (based on sample size)

Family

Family level GC of Subsampled 7667.6.80858.CATTTT.contam.artifact.clean.subsample.fastq.subsample.fasta

Legend:
Total, Nohit, Ectothiorhodospiraceae, Unassigned, Pseudomonadaceae, Enterobacteriaceae, Burkholderiaceae, Acidithiobacillaceae, Chromatiaceae, Xanthomonadaceae, Acetobacteraceae, Rhodocyclaceae, Comamonadaceae, Sphingomonadaceae, Alteromonadaceae, Leptospiraceae, Kofleriaceae, Rhodobacteraceae, Phyllobacteriaceae, Chlorobiaceae

X-axis: Percent GC
Y-axis: Percent Reads (based on sample size)

Genus

Genus level GC of Subsampled 7667.6.80858.CATTTT.contam.artifact.clean.subsample.fastq.subsample.fasta

Legend:
Total, Nohit, Thioalkalivibrio, Pseudomonas, Acidithiobacillus, Unassigned, Burkholderia, Escherichia, Thiocapsa, Thauera, Ralstonia, Acidiphilium, Klebsiella, Leptospira, Haliangium, Novosphingobium, Marinobacter, Xanthomonas, Xylella, Mesorhizobium, Yersinia

X-axis: Percent GC
Y-axis: Percent Reads (based on sample size)

Species

Species level GC of Subsampled 7667.6.80858.CATTTT.contam.artifact.clean.subsample.fastq.subsample.fasta

Legend:
Total, Nohit, Unassigned, Thioalkalivibrio_thiocyanoxidans, Pseudomonas_syringae, Escherichia_coli, Thiocapsa_marina, Acidithiobacillus_caldus, Pseudomonas_sp, Burkholderia_ambifaria, Acidithiobacillus_ferrooxidans, Ralstonia_pickettii, Pseudomonas_putida, uncultured_bacterium, Acidiphilium_sp, Haliangium_ochraceum, Thioalkalivibrio_nitratireducens, Klebsiella_pneumoniae, Xylella_fastidiosa

X-axis: Percent GC
Y-axis: Percent Reads (based on sample size)

4. Assembly Statistics

Assembly method	SPAdes with auto decontamination
Scaffold total	49
Contig total	49
Scaffold sequence length	359.4 kb
Contig sequence length	359.4 kb (0.0% gap)
Scaffold N/L50	12/10.1 kb
Contig N/L50	12/10.1 kb
Largest Contig	33.2 kb
Number of scaffolds >50 kb	0
Pct of genome in scaffolds >50 kb	0.0
Pct of reads asssembled (raw)	53.3
Pct of reads asssembled (decontam)	18.1

5. Assembly QC Results

GC histogram of the predicted genes on each contig, overlaid with GC of hits based on BLASTP, shown for different taxonomic levels.

Kingdom

Phylum

Class

Order

4

Family

Family level GC of Allpaths Contigs (sag_decontam_output_clean.fna)

Genus

Genus level GC of Allpaths Contigs (sag_decontam_output_clean.fna)

Species

Species level GC of Allpaths Contigs (sag_decontam_output_clean.fna)
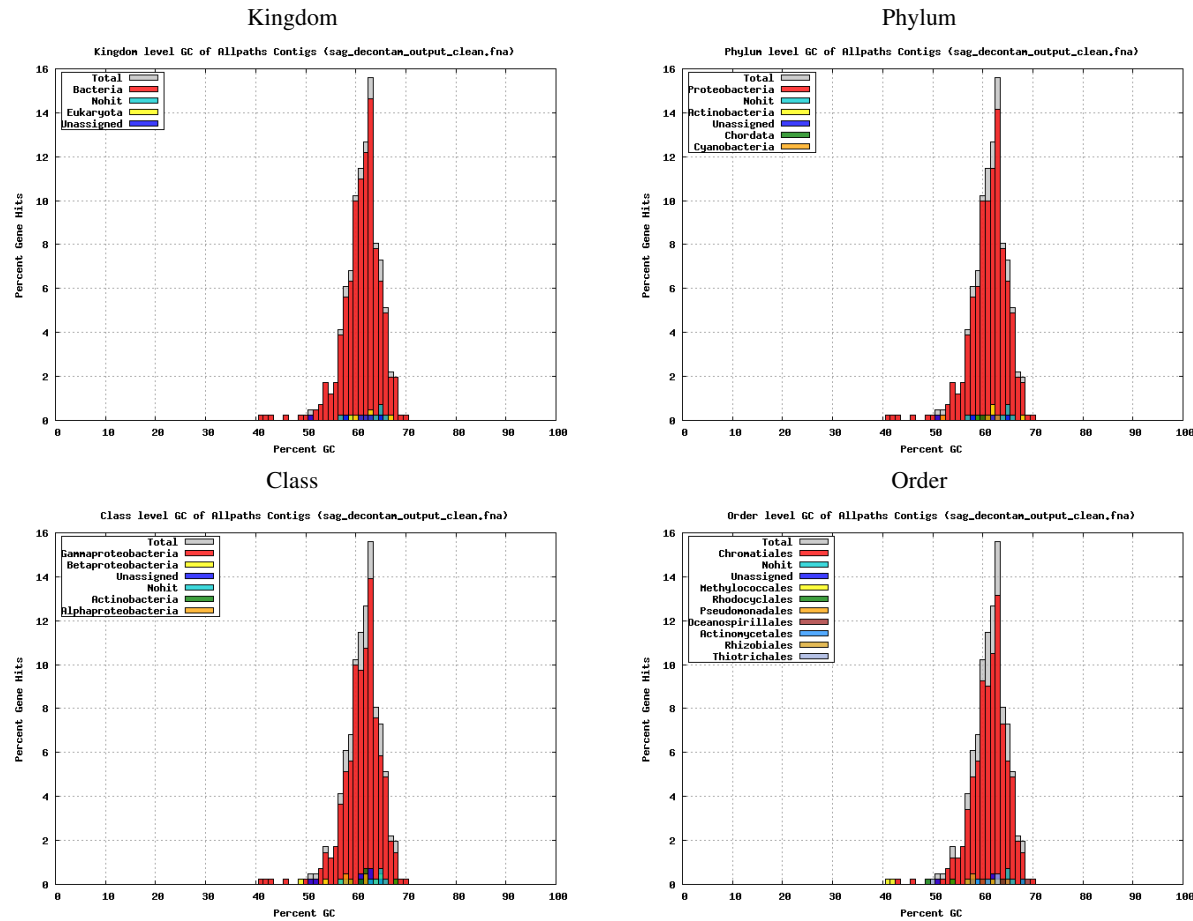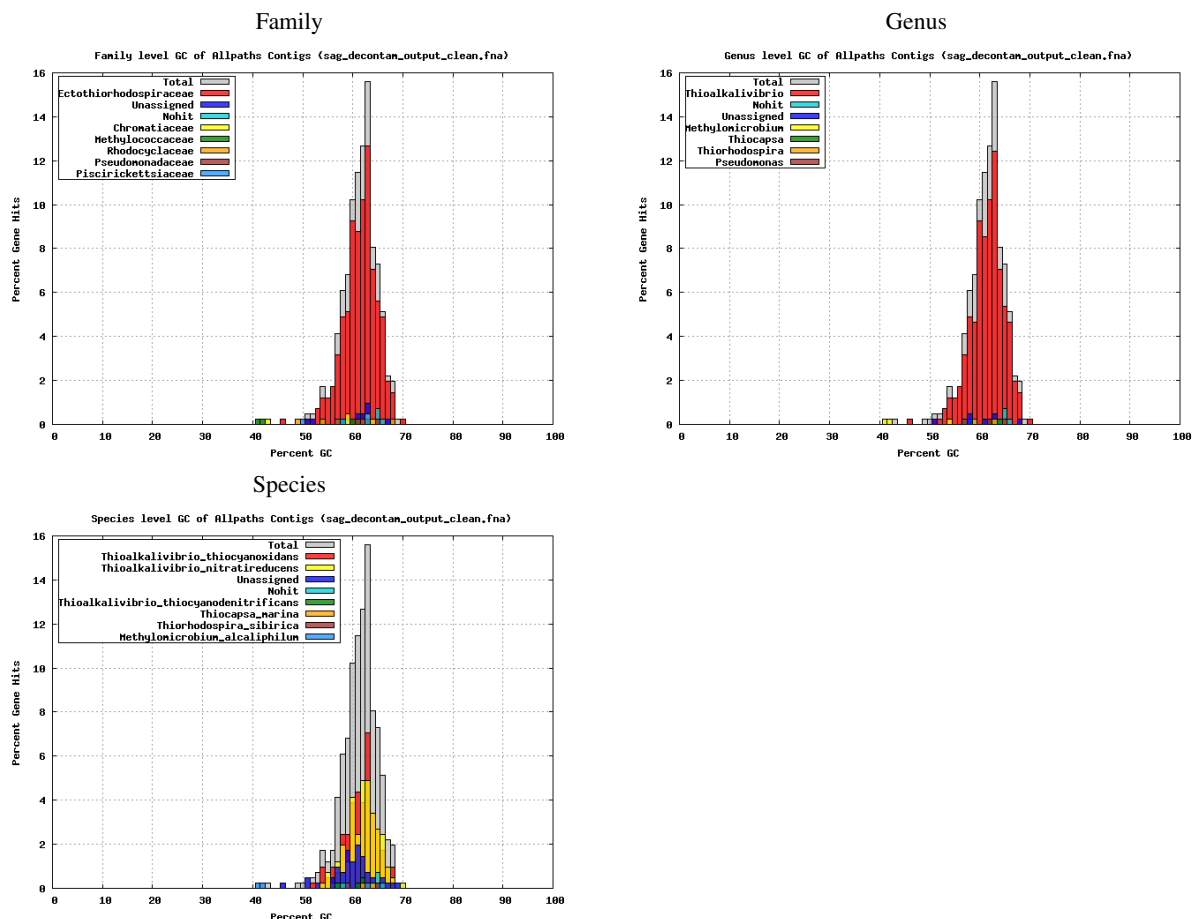
GC vs coverage based on GC of NCBI nt and Greengenes 16S rRNA gene hits to the assembly using megablast, shown for different taxonomic levels.

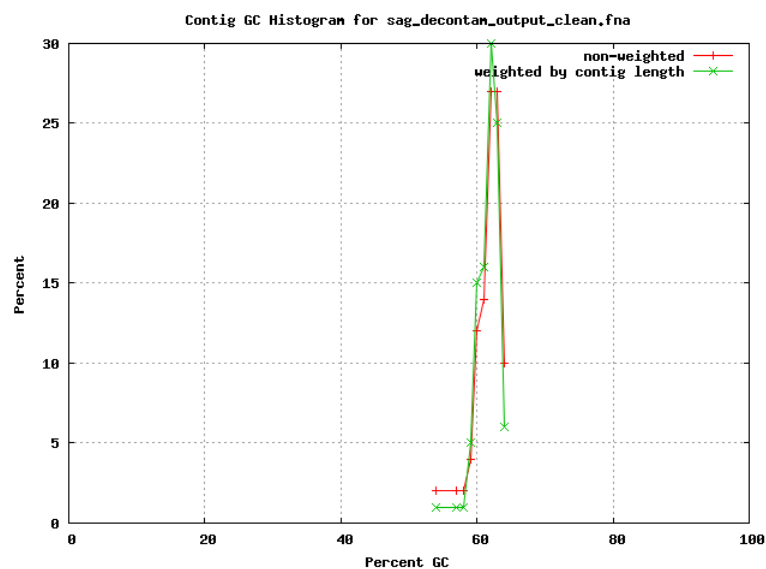## Kingdom

Kingdom Level GC vs Cov For sag_decontam_output_clean.fna.shreds.fa

Phylum

Phylum Level GC vs Cov For sag_decontam_output_clean.fna.shreds.fa

Class

Class Level GC vs Cov For sag_decontam_output_clean.fna.shreds.fa

Order

Order Level GC vs Cov For sag_decontam_output_clean.fna.shreds.fa

Family

Family Level GC vs Cov For sag_decontam_output_clean.fna.shreds.fa

Genus

Genus Level GC vs Cov For sag_decontam_output_clean.fna.shreds.fa

Species

Species Level GC vs Cov For sag_decontam_output_clean.fna.shreds.fa

Coverage vs GC. Contigs were shredded into non-overlapping 5kbp and the GC of each shred was plotted as a point, colored by scaffold id. Coverage was calculated by mapping the fragment library to the final asssembly and plotted as connected points.
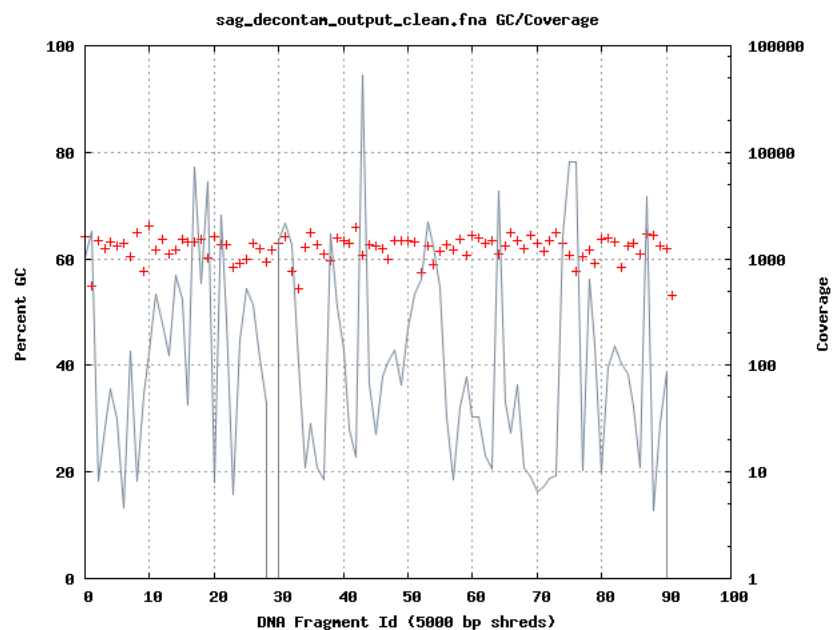
GC histogram of the contigs, including contig length weighted distribution.

List of contigs and average percent GC, grouped in bins of 5:

Pct GC Bin	Contig Name
50	NODE_85_length_3020_cov_76.5464_ID_183
55	NODE_6_length_14902_cov_1112.88_ID_11, NODE_58_length_4309_cov_107.353_ID_127, NODE_60_length_4238_cov_33.8601_ID_131, NODE_96_length_2669_cov_4.08263_ID_203
60	NODE_1_length_33201_cov_5220_ID_1, NODE_2_length_19479_cov_164.308_ID_3, NODE_5_length_15485_cov_33.0412_ID_9, NODE_8_length_14141_cov_516.636_ID_15, NODE_9_length_13920_cov_235.997_ID_17, NODE_10_length_13686_cov_3848.9_ID_19, NODE_13_length_12511_cov_316.52_ID_25, NODE_16_length_11360_cov_27.028_ID_31,

NODE_17_length_10943_cov_37.449_ID_33, NODE_18_length_10140_cov_38.7786_ID_35,
NODE_19_length_10060_cov_52.7605_ID_37, NODE_21_length_8878_cov_13.8329_ID_41,
NODE_24_length_8458_cov_2000.48_ID_47, NODE_25_length_8432_cov_8.45816_ID_49,
NODE_26_length_8287_cov_5.11285_ID_51, NODE_28_length_7886_cov_874.309_ID_55,
NODE_29_length_7577_cov_16.0838_ID_59, NODE_31_length_7486_cov_3354.9_ID_63,
NODE_32_length_7224_cov_1205.25_ID_65, NODE_34_length_7199_cov_1653.8_ID_69,
NODE_35_length_6224_cov_6.81375_ID_81, NODE_38_length_5921_cov_6.15922_ID_87,
NODE_39_length_5917_cov_38.6341_ID_89, NODE_40_length_5477_cov_99.3798_ID_91,
NODE_46_length_4931_cov_305.254_ID_107, NODE_47_length_4760_cov_7.1237_ID_109,
NODE_49_length_4658_cov_349.524_ID_113, NODE_52_length_4535_cov_4.62455_ID_119,
NODE_53_length_4524_cov_5.39069_ID_121, NODE_54_length_4520_cov_18.3532_ID_73,
NODE_61_length_3963_cov_64.6979_ID_137, NODE_62_length_4041_cov_6.42499_ID_139,
NODE_68_length_3626_cov_90.3948_ID_149, NODE_69_length_3541_cov_2.78428_ID_151,
NODE_71_length_3384_cov_30.2585_ID_155, NODE_77_length_3267_cov_375.704_ID_167,
NODE_82_length_3062_cov_975.101_ID_177, NODE_89_length_3000_cov_6.74737_ID_191,
NODE_92_length_2702_cov_2644.66_ID_195, NODE_95_length_2677_cov_18.1621_ID_201,
NODE_97_length_2589_cov_5.34096_ID_205, NODE_106_length_2302_cov_3.13485_ID_221,
NODE_109_length_2174_cov_148.313_ID_225, NODE_111_length_2080_cov_2981.96_ID_229

List of the top contig megablast hits against potential reagent and process contaminants.

Organism	Align Length (bp)	Pct Id	Contig Name
Vibrio_vulnificus_YJ016_DNA_chromosome_I_complete_sequence	88	96.59	NODE_19_length_10060_cov_52.7605_ID_37

Principal component analysis of tetramer frequencies of contigs. Detectable variations are highlighted in color.

sag_decontam_output_clean.fna - PC1 vs PC2
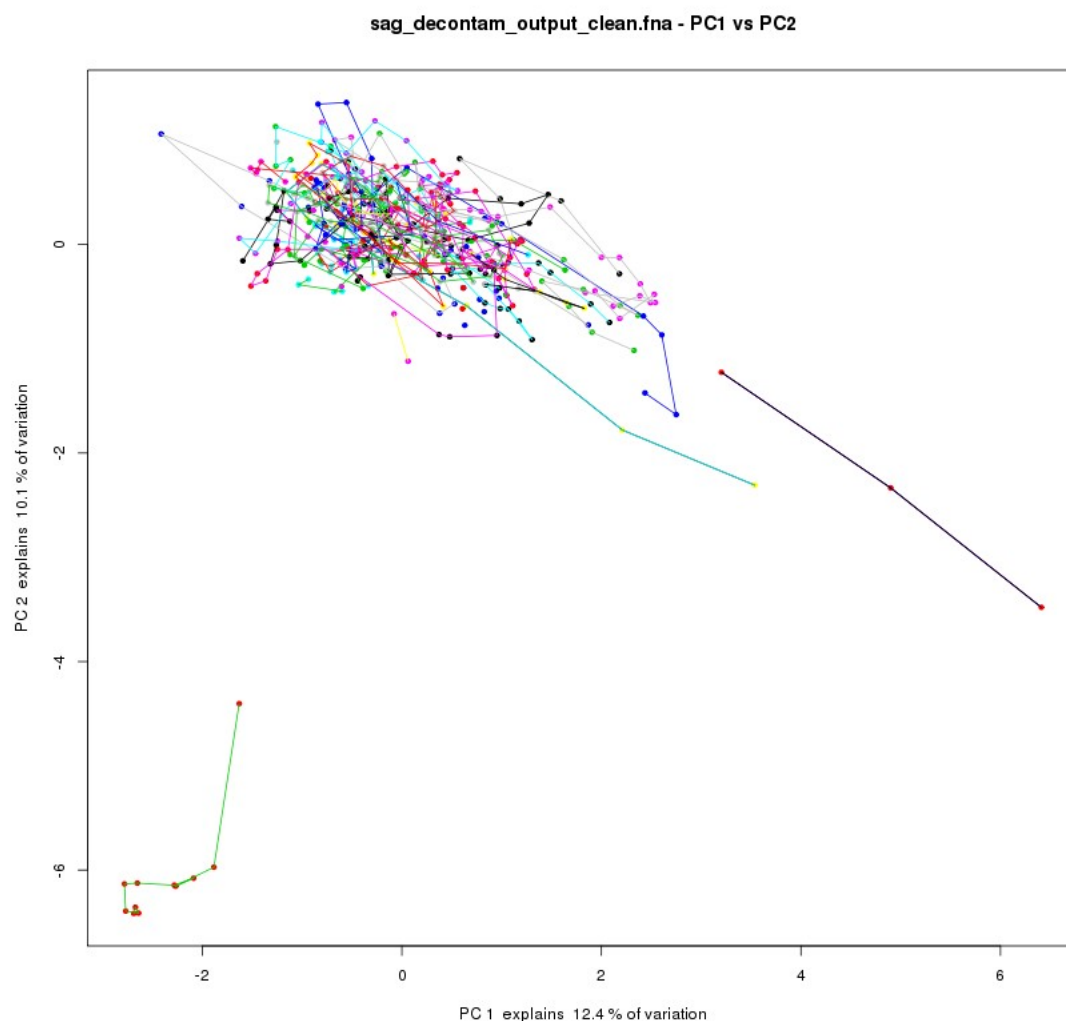
Estimated genome recovery derived from analysis of universal single-copy genes detected in final assembly.

HMM	Pct Recovered
bacteria	31.18 %
archaea	17.83 %

6. Sequence Data Availability

The following sequence fasta files can be downloaded from our JGI portal website.
http://www.jgi.doe.gov/genome-projects

Filename	Description
sag_decontam_output_clean.fna	SPAdes with auto decontamination

7. Annotation Data Availiability

The annotation of the assembled contigs can be found within IMG.
http://img.jgi.doe.gov

8. Methods

Single Cell Minimal Draft

Genome sequencing and assembly
The draft genome of was generated at the DOE Joint genome Institute (JGI) using the Illumina technology [1]. An Illumina std shotgun library was constructed and sequenced using the Illumina HiSeq 2000 platform which generated 23,581,872 reads totaling 3,537.3 Mb. All general aspects of library construction and sequencing performed at the JGI can be found at http://www.jgi.doe.gov. All raw Illumina sequence data was passed through DUK, a filtering program developed at JGI, which removes known Illumina sequencing and library preparation artifacts [2]. Following steps were then performed for assembly: (1) artifact filtered Illumina reads were assembled using SPAdes [3] (version 3.0.0), (3) Parameters for assembly steps were –t 16 –m 120 —sc —careful —12. The final draft assembly contained 49 contigs in 49 scaffolds, totalling 359.4 Kb in size. The final assembly was based on 3,000.0 Mb of Illumina data. Based on a presumed genome size of 5.0 Mb, the average input read coverage used for the assembly was 600.0X.

Genome annotation
Genes were identified using Prodigal [4], followed by a round of manual curation using GenePRIMP [5] for finished genomes and Draft genomes in fewer than 20 scaffolds. The predicted CDSs were translated and used to search the National Center for Biotechnology Information (NCBI) nonredundant database, UniProt, TIGRFam, Pfam, KEGG, COG, and InterPro databases. The tRNAScanSE tool [6] was used to find tRNA genes, whereas ribosomal RNA genes were found by searches against models of the ribosomal RNA genes built from SILVA [7]. Other non–coding RNAs such as the RNA components of the protein secretion complex and the RNase P were identified by searching the genome for the corresponding Rfam profiles using INFERNAL [8]. Additional gene prediction analysis and manual functional annotation was performed within the Integrated Microbial Genomes (IMG) platform [9] developed by the Joint Genome Institute, Walnut Creek, CA, USA [10].

1. Bennett S. Solexa Ltd. Pharmacogenomics. 2004;5(4):433–8.
2. Mingkun L, Copeland A, Han J. DUK, unpublished, 2011.
3. Bankevich A, et.al, SPAdes: a new genome assembly algorithm and its applications to single–cell sequencing. J Comput Biol 2012; 19:455–77.
4. Hyatt D, Chen GL, Lacascio PF, Land ML, Larimer FW, Hauser LJ. Prodigal: prokaryotic gene recognition and translation initiation site identification. BMC Bioinformatics 2010; 11:119.
5. Pati A, Ivanova NN, Mikhailova N, Ovchinnikova G, Hooper SD, Lykidis A, Kyrpides NC. GenePRIMP: a gene prediction improvement pipeline for prokaryotic genomes. Nat Methods 2010; 7:455–457.
6. Lowe TM, Eddy SR. tRNAscan–SE: a program for improved detection of transfer RNA genes in genomic sequence. Nucleic Acids Res 1997; 25:955–964.
7. Pruesse E, Quast C, Knittel, Fuchs B, Ludwig W, Peplies J, Glckner FO. SILVA: a comprehensive online resource for quality checked and aligned ribosomal RNA sequence data compatible with ARB. Nuc Acids Res 2007; 35: 2188–7196.
8. INFERNAL. Inference of RNA alignments. http://infernal.janelia.org.
9. The Integrated Microbial Genomes (IMG) platform. http://www.ncbi.nlm.nih.gov/pubmed/24165883
10. Markowitz VM, Mavromatis K, Ivanova NN, Chen IMA, Chu K, Kyrpides NC. IMG ER: a system for microbial genome annotation expert review and curation. Bioinformatics 2009; 25:2271–2278.