Full wwPDB X-ray Structure Validation Report ⓘ

Apr 28, 2024 – 02:47 pm BST

PDB ID	:	4C0H
Title	:	Extended interface between Pcf11p and Clp1p and structural basis for ATP loss in Gly135Arg point mutant
Authors	:	Dupin, A.F.; Fribourg, S.
Deposited on	:	2013-08-02
Resolution	:	2.70 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references ⓘ) were used in the production of this report:

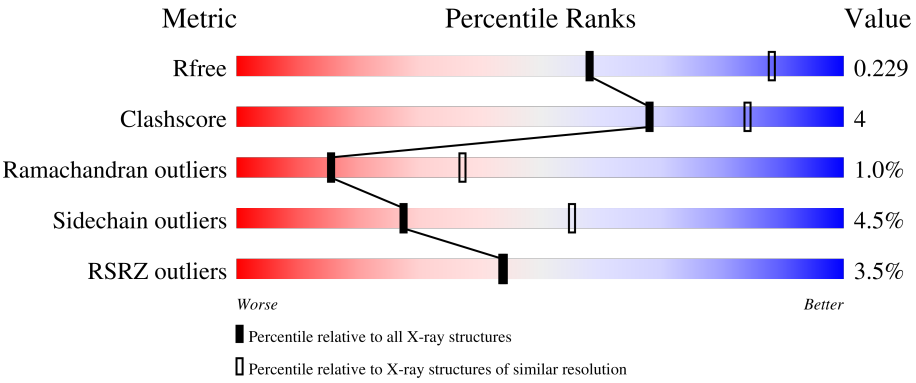
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	445	3% 85% 9% 5%
1	B	445	3% 85% 9%
2	C	110	3% 20% 75%
2	D	110	2% 23% 6% 70%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 7336 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called MRNA CLEAVAGE AND POLYADENYLATION FACTOR CLP1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	422	Total	C	N	O	S	0	1	0
			3391	2180	569	630	12			
1	B	427	Total	C	N	O	S	0	1	0
			3421	2198	574	637	12			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	135	ARG	GLY	engineered mutation	UNP Q08685
B	135	ARG	GLY	engineered mutation	UNP Q08685

- Molecule 2 is a protein called PCF11P.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	28	Total	C	N	O	0	0	0
			231	141	40	50			
2	D	33	Total	C	N	O	0	0	0
			268	165	47	56			

- Molecule 3 is water.

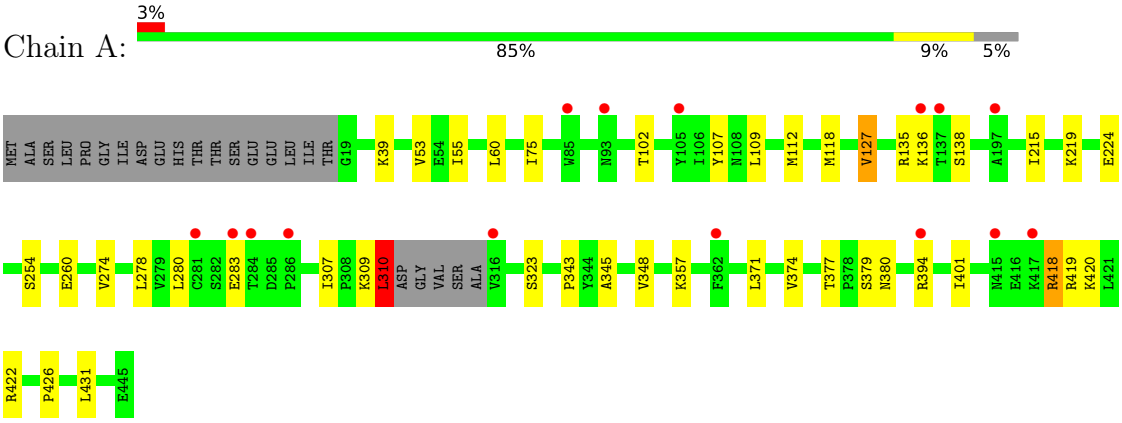
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	8	Total	O	0	0
			8	8		
3	B	14	Total	O	0	0
			14	14		
3	C	1	Total	O	0	0
			1	1		
3	D	2	Total	O	0	0
			2	2		

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

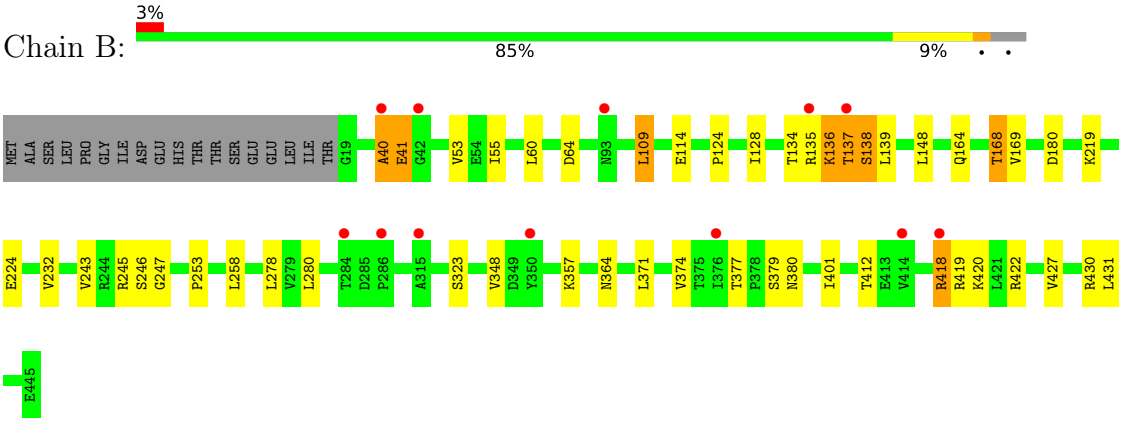
• Molecule 1: MRNA CLEAVAGE AND POLYADENYLATION FACTOR CLP1

Chain A:



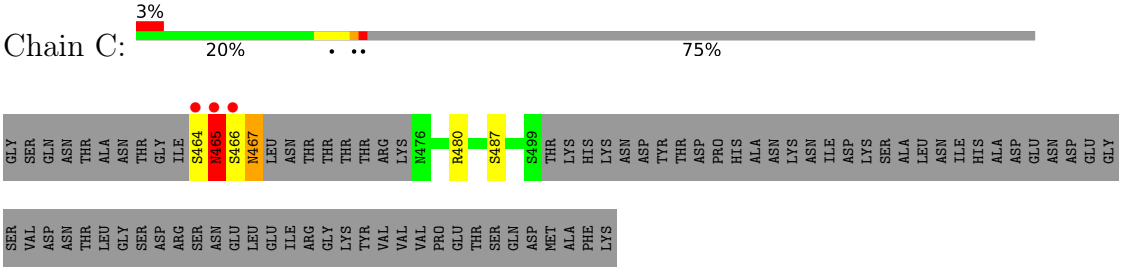
• Molecule 1: MRNA CLEAVAGE AND POLYADENYLATION FACTOR CLP1

Chain B:



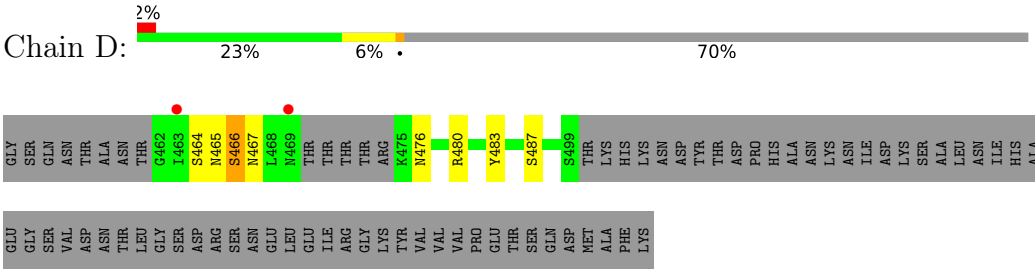
• Molecule 2: PCF11P

Chain C:



• Molecule 2: PCF11P

Chain D:


2%
23%
6%
70%
GLY SER GLN ASN THR ALA ASN THR G462 I463 S464 N465 S466 N467 L468 N469 THR THR THR THR ARG K475 N476 R480 Y483 S487 S499 THR LYS HIS LYS ASN ASP TYR THR ASP PRO HIS ALA ASN LYS ASN ILE ASP LYS SER ALA LEU ASN ILE HIS ALA ASP GLU ASN ASP
GLU GLY SER VAL ASP ASN THR LEU GLY SER ASP ARG SER ASN GLU LEU GLU ILE ARG GLY LYS TYR VAL VAL VAL PRO GLU THR SER GLN ASP MET ALA PHE LYS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	89.39Å 95.61Å 182.06Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.80 – 2.70 46.24 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.7 (47.80-2.70) 99.7 (46.24-2.70)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$	-	Xtriage
Refinement program	BUSTER 2.10.0	Depositor
R, R_{free}	0.191 , 0.223 0.201 , 0.229	Depositor DCC
R_{free} test set	2188 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	55.4	Xtriage
Anisotropy	0.048	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 52.7	EDS
L-test for twinning[1]	$< \|L\| > = 0.53$, $< L^2 > = 0.37$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	7336	wwPDB-VP
Average B, all atoms (Å^2)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.41% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.48	0/3467	0.74	1/4713 (0.0%)
1	B	0.51	0/3498	0.76	0/4758
2	C	0.50	0/235	0.70	0/317
2	D	0.62	0/272	0.75	0/366
All	All	0.50	0/7472	0.75	1/10154 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	310	LEU	N-CA-CB	5.00	120.41	110.40

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3391	0	3430	21	0
1	B	3421	0	3459	26	0
2	C	231	0	200	10	0
2	D	268	0	244	5	0
3	A	8	0	0	0	0
3	B	14	0	0	0	0
3	C	1	0	0	0	0
3	D	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	7336	0	7333	55	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (55) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:343:PRO:O	2:C:467:ASN:HA	1.70	0.91
1:B:168:THR:HG23	2:D:483:TYR:OH	1.75	0.85
1:A:345:ALA:HB3	2:C:466:SER:HA	1.62	0.80
1:A:127:VAL:HG22	1:A:274:VAL:HG11	1.66	0.78
2:C:467:ASN:ND2	2:C:467:ASN:H	1.87	0.72
1:B:348:VAL:HG11	1:B:431:LEU:HD22	1.70	0.72
2:D:466:SER:OG	2:D:467:ASN:N	2.22	0.71
1:B:412:THR:HG21	1:B:422:ARG:HE	1.56	0.70
1:B:135:ARG:HH22	1:B:253:PRO:C	1.99	0.65
1:A:53:VAL:HG13	1:A:75:ILE:HG23	1.82	0.62
2:C:467:ASN:H	2:C:467:ASN:HD22	1.47	0.62
1:B:124:PRO:O	1:B:247:GLY:HA3	2.00	0.60
1:A:348:VAL:HG11	1:A:431:LEU:HD22	1.84	0.59
1:B:137:THR:HG23	1:B:138:SER:H	1.70	0.57
2:C:465:ASN:ND2	2:C:466:SER:OG	2.37	0.56
1:A:371:LEU:HG	1:A:401:ILE:HD12	1.91	0.53
1:B:412:THR:HG21	1:B:422:ARG:NE	2.22	0.53
1:B:134:THR:O	1:B:138:SER:HB3	2.09	0.53
1:B:243:VAL:O	1:B:246:SER:O	2.27	0.52
1:A:357:LYS:HB2	1:A:374:VAL:HG22	1.92	0.52
1:A:55:ILE:HD12	1:A:60:LEU:HD21	1.92	0.51
1:B:55:ILE:HD12	1:B:60:LEU:HD21	1.91	0.51
1:B:128:ILE:CG2	1:B:135:ARG:HB2	2.40	0.51
1:B:371:LEU:HG	1:B:401:ILE:HD12	1.92	0.50
1:A:135:ARG:HB3	1:A:280:LEU:HD22	1.94	0.50
2:D:465:ASN:O	2:D:466:SER:HB3	2.12	0.49
1:B:137:THR:O	1:B:138:SER:C	2.50	0.49
1:B:109:LEU:HD21	1:B:278:LEU:HD21	1.95	0.49
1:A:53:VAL:CG1	1:A:75:ILE:HG23	2.42	0.49
1:B:148:LEU:HD21	1:B:180:ASP:C	2.33	0.49
1:B:168:THR:HG22	1:B:169:VAL:H	1.78	0.48
1:B:357:LYS:HB2	1:B:374:VAL:HG22	1.95	0.48
2:C:467:ASN:ND2	2:C:467:ASN:N	2.60	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:426:PRO:HB2	2:C:480:ARG:HB3	1.96	0.47
1:B:253:PRO:HG2	1:B:258:LEU:HD21	1.95	0.47
1:B:168:THR:HG23	2:D:483:TYR:HH	1.77	0.46
1:B:139:LEU:HD22	1:B:280:LEU:HD11	1.98	0.45
1:A:418:ARG:O	1:A:420:LYS:N	2.50	0.45
1:B:137:THR:CG2	1:B:138:SER:H	2.29	0.45
2:C:467:ASN:HD22	2:C:467:ASN:N	2.15	0.45
1:B:40:ALA:HB3	1:B:41:GLU:OE1	2.19	0.43
2:C:465:ASN:HA	2:C:466:SER:HA	1.73	0.43
1:B:418:ARG:O	1:B:420:LYS:N	2.50	0.43
1:A:135:ARG:HH21	1:A:254:SER:HA	1.83	0.43
1:B:136:LYS:HD3	1:B:164:GLN:HG2	2.00	0.43
1:A:377:THR:HG22	1:A:379:SER:H	1.83	0.42
1:A:135:ARG:HG3	1:A:136:LYS:N	2.35	0.41
1:B:427:VAL:HG22	2:D:480:ARG:O	2.20	0.41
1:A:102:THR:OG1	1:A:310:LEU:HB3	2.20	0.41
1:B:377:THR:HG22	1:B:379:SER:H	1.83	0.41
1:A:107:TYR:N	1:A:107:TYR:CD1	2.88	0.41
1:A:102:THR:HG21	1:A:310:LEU:HA	2.03	0.41
1:A:215:ILE:HG22	1:A:219:LYS:HD3	2.03	0.41
1:A:278:LEU:HB3	1:A:307:ILE:CD1	2.51	0.41
1:A:345:ALA:H	2:C:466:SER:HB3	1.86	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	419/445 (94%)	395 (94%)	21 (5%)	3 (1%)	22 46
1	B	426/445 (96%)	408 (96%)	15 (4%)	3 (1%)	22 46
2	C	24/110 (22%)	20 (83%)	3 (12%)	1 (4%)	3 5

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
2	D	29/110 (26%)	25 (86%)	2 (7%)	2 (7%)	1 1
All	All	898/1110 (81%)	848 (94%)	41 (5%)	9 (1%)	15 37

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	309	LYS
1	A	419	ARG
1	B	138	SER
1	B	419	ARG
2	D	464	SER
2	C	465	ASN
2	D	466	SER
1	B	40	ALA
1	A	138	SER

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	383/401 (96%)	369 (96%)	14 (4%)	34 63
1	B	386/401 (96%)	368 (95%)	18 (5%)	26 54
2	C	26/98 (26%)	22 (85%)	4 (15%)	2 7
2	D	30/98 (31%)	28 (93%)	2 (7%)	16 37
All	All	825/998 (83%)	787 (95%)	38 (5%)	27 54

All (38) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	LYS
1	A	109	LEU
1	A	112	MET
1	A	118	MET
1	A	127	VAL

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Mol	Chain	Res	Type
1	A	224	GLU
1	A	260	GLU
1	A	283	GLU
1	A	310	LEU
1	A	323	SER
1	A	380	ASN
1	A	394	ARG
1	A	418	ARG
1	A	422	ARG
1	B	41	GLU
1	B	53	VAL
1	B	64	ASP
1	B	109	LEU
1	B	114[A]	GLU
1	B	114[B]	GLU
1	B	136	LYS
1	B	137	THR
1	B	168	THR
1	B	219	LYS
1	B	224	GLU
1	B	232	VAL
1	B	245	ARG
1	B	323	SER
1	B	364	ASN
1	B	380	ASN
1	B	418	ARG
1	B	430	ARG
2	C	464	SER
2	C	465	ASN
2	C	467	ASN
2	C	487	SER
2	D	476	ASN
2	D	487	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
2	C	465	ASN
2	C	467	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	422/445 (94%)	0.05	15 (3%) 42 42	32, 62, 102, 122	0
1	B	427/445 (95%)	-0.07	12 (2%) 53 54	27, 49, 90, 113	0
2	C	28/110 (25%)	0.33	3 (10%) 6 4	32, 49, 102, 111	0
2	D	33/110 (30%)	0.02	2 (6%) 21 20	27, 40, 99, 105	0
All	All	910/1110 (81%)	0.00	32 (3%) 44 44	27, 55, 98, 122	0

All (32) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	466	SER	6.4
1	A	284	THR	4.1
1	B	137	THR	3.8
1	B	284	THR	3.5
2	D	469	ASN	2.9
1	A	417	LYS	2.9
1	B	418	ARG	2.8
1	A	283	GLU	2.7
1	B	93	ASN	2.6
1	B	135	ARG	2.5
1	A	362	PHE	2.4
2	C	464	SER	2.4
2	D	463	ILE	2.4
1	B	414	VAL	2.4
2	C	465	ASN	2.4
1	B	315	ALA	2.4
1	A	85	TRP	2.4
1	A	136	LYS	2.3
1	A	93	ASN	2.3
1	A	281	CYS	2.3
1	A	415	ASN	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	394	ARG	2.3
1	B	42	GLY	2.3
1	B	350	TYR	2.3
1	A	197	ALA	2.2
1	A	105	TYR	2.2
1	A	137	THR	2.2
1	A	316	VAL	2.1
1	B	286	PRO	2.1
1	B	40	ALA	2.1
1	A	286	PRO	2.0
1	B	376	ILE	2.0

6.2 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.