



# wwPDB X-ray Structure Validation Summary Report

May 26, 2020 – 01:14 pm BST

PDB ID : 6Q8I  
Title : Nterminal domain of human SMU1 in complex with human REDmid  
Authors : Tengo, L.; Le Corre, L.; Fournier, G.; Ashraf, U.; Busca, P.; Rameix-Welti, M.-A.; Gravier-Pelletier, C.; Ruigrok, R.W.H.; Jacob, Y.; Vidalain, P.-O.; Pietrancosta, N.; Naffakh, N.; McCarthy, A.A.; Crepin, T.  
Deposited on : 2018-12-14  
Resolution : 3.17 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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.

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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 : 2.11  
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) : 2.11

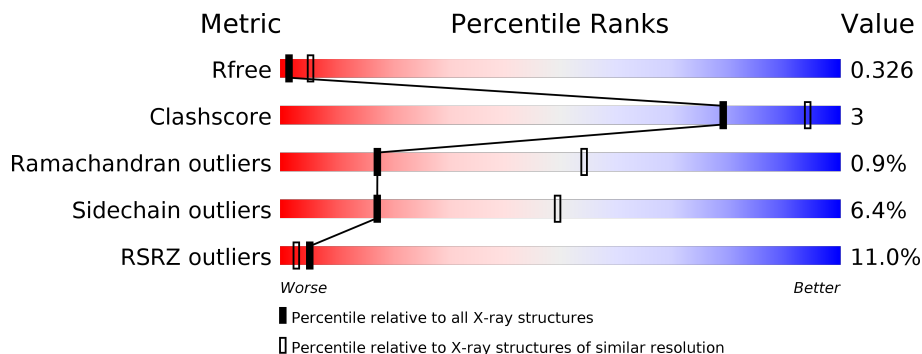
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.17 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	1467 (3.20-3.16)
Clashscore	141614	1599 (3.20-3.16)
Ramachandran outliers	138981	1574 (3.20-3.16)
Sidechain outliers	138945	1573 (3.20-3.16)
RSRZ outliers	127900	1423 (3.20-3.16)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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  $\leq 5\%$ . 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	514	 32% 64%
1	B	514	 2% 32% 65%
1	E	514	 31% 5% 64%
1	F	514	 6% 29% 68%
1	I	514	 32% 64%
1	J	514	 32% 64%

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Mol	Chain	Length	Quality of chain
1	M	514	 15% 33% 64%
1	N	514	 8% 32% 64%
2	C	557	 5% 93%
2	D	557	 5% 93%
2	G	557	 7% 92%
2	H	557	 5% 94%
2	L	557	 5% 93%
2	O	557	 6% 93%
2	P	557	 3% 5% 93%
3	K	557	 6% 93%

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 13701 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 WD40 repeat-containing protein SMU1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	187	Total 1473	C 933	N 253	O 282	S 5	0	0	0
1	B	182	Total 1388	C 877	N 243	O 264	S 4	0	0	0
1	E	186	Total 1475	C 934	N 255	O 281	S 5	0	0	0
1	F	167	Total 1284	C 814	N 222	O 244	S 4	0	0	0
1	I	186	Total 1475	C 934	N 255	O 281	S 5	0	0	0
1	J	183	Total 1408	C 890	N 245	O 269	S 4	0	0	0
1	M	186	Total 1470	C 931	N 255	O 280	S 4	0	0	0
1	N	185	Total 1398	C 882	N 246	O 265	S 5	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP Q2TAY7
A	1	GLY	-	expression tag	UNP Q2TAY7
B	0	MET	-	initiating methionine	UNP Q2TAY7
B	1	GLY	-	expression tag	UNP Q2TAY7
E	0	MET	-	initiating methionine	UNP Q2TAY7
E	1	GLY	-	expression tag	UNP Q2TAY7
F	0	MET	-	initiating methionine	UNP Q2TAY7
F	1	GLY	-	expression tag	UNP Q2TAY7
I	0	MET	-	initiating methionine	UNP Q2TAY7
I	1	GLY	-	expression tag	UNP Q2TAY7
J	0	MET	-	initiating methionine	UNP Q2TAY7
J	1	GLY	-	expression tag	UNP Q2TAY7
M	0	MET	-	initiating methionine	UNP Q2TAY7

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Chain	Residue	Modelled	Actual	Comment	Reference
M	1	GLY	-	expression tag	UNP Q2TAY7
N	0	MET	-	initiating methionine	UNP Q2TAY7
N	1	GLY	-	expression tag	UNP Q2TAY7

- Molecule 2 is a protein called Protein Red.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	41	Total 313	C 201	N 54	O 56	S 2	0	0	0
2	D	37	Total 274	C 179	N 44	O 49	S 2	0	0	0
2	G	45	Total 331	C 210	N 55	O 64	S 2	0	0	0
2	H	36	Total 257	C 165	N 40	O 50	S 2	0	0	0
2	L	37	Total 275	C 177	N 44	O 52	S 2	0	0	0
2	O	39	Total 271	C 175	N 49	O 45	S 2	0	0	0
2	P	37	Total 286	C 185	N 50	O 49	S 2	0	0	0

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	2	GLY	PRO	conflict	UNP Q13123
D	2	GLY	PRO	conflict	UNP Q13123
G	2	GLY	PRO	conflict	UNP Q13123
H	2	GLY	PRO	conflict	UNP Q13123
L	2	GLY	PRO	conflict	UNP Q13123
O	2	GLY	PRO	conflict	UNP Q13123
P	2	GLY	PRO	conflict	UNP Q13123

- Molecule 3 is a protein called Protein Red.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	K	40	Total 323	C 210	N 53	O 58	S 2	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

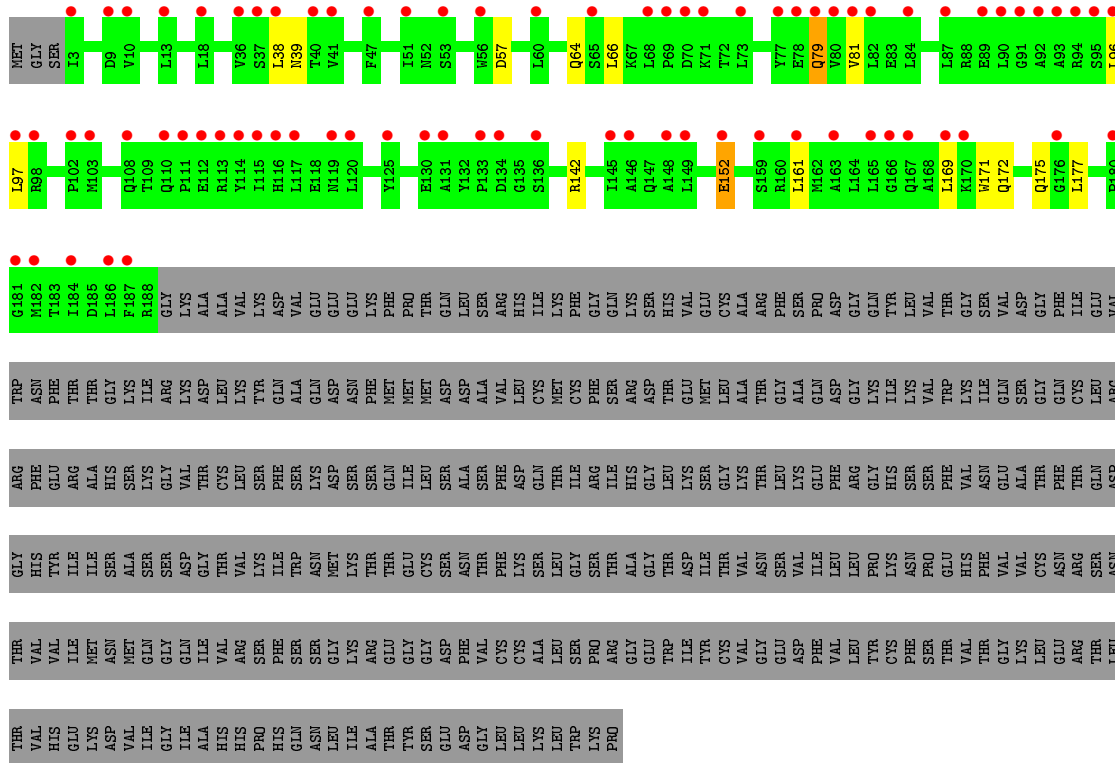
Chain	Residue	Modelled	Actual	Comment	Reference
K	2	GLY	PRO	conflict	UNP Q13123
K	257	LYS	ILE	conflict	UNP Q13123



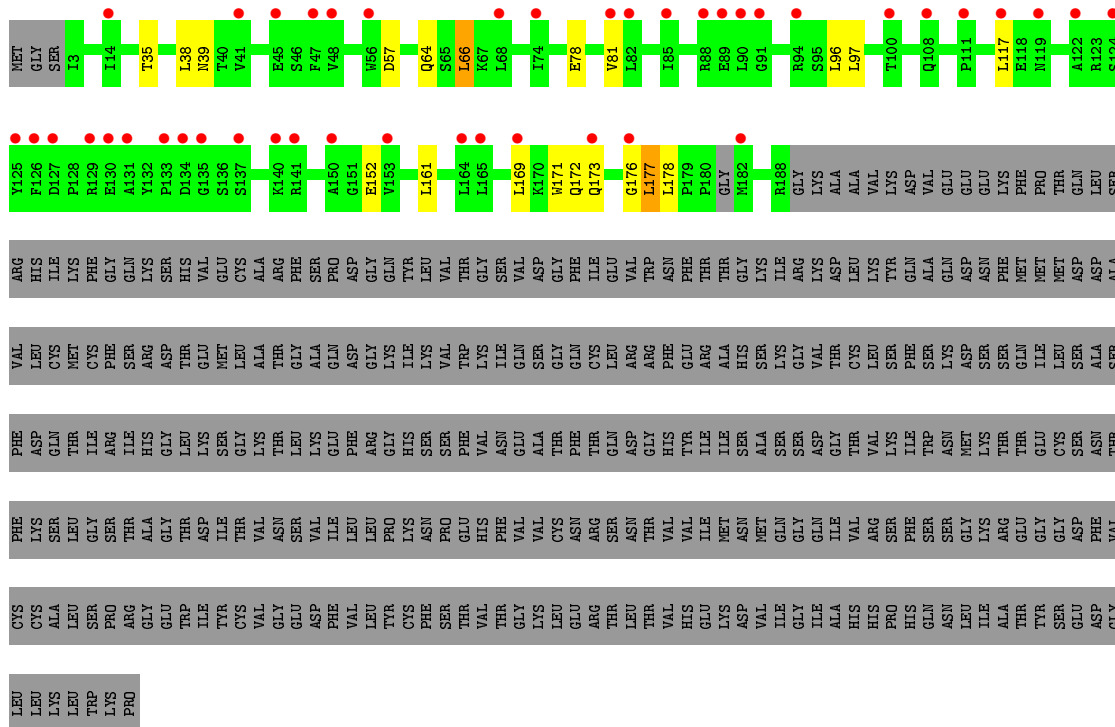








• Molecule 1: WD40 repeat-containing protein SMU1



• Molecule 2: Protein Red











## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	127.98Å 68.16Å 145.30Å 90.00° 109.40° 90.00°	Depositor
Resolution (Å)	49.00 – 3.17 49.00 – 3.10	Depositor EDS
% Data completeness (in resolution range)	90.8 (49.00-3.17) 90.8 (49.00-3.10)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.44 (at 3.12Å)	Xtrriage
Refinement program	BUSTER 2.10.2	Depositor
R, $R_{free}$	0.256 , 0.277 0.299 , 0.326	Depositor DCC
$R_{free}$ test set	1940 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	66.5	Xtrriage
Anisotropy	0.749	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 71.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.43$ , $\langle L^2 \rangle = 0.26$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.86	EDS
Total number of atoms	13701	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	132.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.40% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup> Intensities estimated from amplitudes.

<sup>2</sup> Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.



## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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	0.39	0/1497	0.58	0/2032
1	B	0.39	0/1407	0.57	0/1912
1	E	0.39	0/1499	0.59	0/2034
1	F	0.38	0/1301	0.56	0/1766
1	I	0.39	0/1499	0.57	0/2034
1	J	0.39	0/1429	0.56	0/1942
1	M	0.38	0/1494	0.56	0/2028
1	N	0.39	0/1419	0.58	0/1931
2	C	0.44	0/317	0.80	1/428 (0.2%)
2	D	0.42	0/277	0.65	0/375
2	G	0.40	0/336	0.66	0/456
2	H	0.41	0/259	0.60	0/352
2	L	0.42	0/278	0.63	0/376
2	O	0.42	0/274	0.63	1/371 (0.3%)
2	P	0.41	0/289	0.61	0/389
3	K	0.43	0/327	0.69	1/440 (0.2%)
All	All	0.39	0/13902	0.59	3/18866 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	249	ASP	C-N-CA	7.05	139.31	121.70
3	K	236	ARG	C-N-CA	5.49	135.41	121.70
2	O	236	ARG	C-N-CA	5.32	135.00	121.70

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	1473	0	1494	12	0
1	B	1388	0	1376	6	0
1	E	1475	0	1502	13	0
1	F	1284	0	1280	10	0
1	I	1475	0	1502	8	0
1	J	1408	0	1399	9	0
1	M	1470	0	1490	7	0
1	N	1398	0	1373	7	0
2	C	313	0	288	4	0
2	D	274	0	252	3	0
2	G	331	0	283	3	0
2	H	257	0	225	2	0
2	L	275	0	248	4	0
2	O	271	0	232	1	0
2	P	286	0	274	3	0
3	K	323	0	313	3	0
All	All	13701	0	13531	76	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 3.

The worst 5 of 76 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)
2:D:233:LEU:HB3	2:D:234:PRO:HD3	1.54	0.88
2:D:233:LEU:HB3	2:D:234:PRO:CD	2.07	0.85
1:A:25:ARG:HD3	1:J:122:ALA:HB1	1.69	0.74
1:N:39:ASN:HA	1:N:66:LEU:HB3	1.67	0.73
2:P:233:LEU:HB3	2:P:234:PRO:CD	2.18	0.73

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	185/514 (36%)	178 (96%)	7 (4%)	0	100	100
1	B	176/514 (34%)	170 (97%)	6 (3%)	0	100	100
1	E	184/514 (36%)	176 (96%)	6 (3%)	2 (1%)	14	50
1	F	157/514 (30%)	152 (97%)	5 (3%)	0	100	100
1	I	184/514 (36%)	177 (96%)	6 (3%)	1 (0%)	29	66
1	J	179/514 (35%)	174 (97%)	4 (2%)	1 (1%)	25	63
1	M	184/514 (36%)	177 (96%)	7 (4%)	0	100	100
1	N	181/514 (35%)	173 (96%)	6 (3%)	2 (1%)	14	50
2	C	35/557 (6%)	27 (77%)	5 (14%)	3 (9%)	1	4
2	D	31/557 (6%)	27 (87%)	3 (10%)	1 (3%)	4	23
2	G	41/557 (7%)	30 (73%)	10 (24%)	1 (2%)	6	31
2	H	30/557 (5%)	27 (90%)	3 (10%)	0	100	100
2	L	31/557 (6%)	26 (84%)	4 (13%)	1 (3%)	4	23
2	O	33/557 (6%)	27 (82%)	4 (12%)	2 (6%)	1	10
2	P	31/557 (6%)	28 (90%)	2 (6%)	1 (3%)	4	23
3	K	34/557 (6%)	30 (88%)	3 (9%)	1 (3%)	4	26
All	All	1696/8568 (20%)	1599 (94%)	81 (5%)	16 (1%)	17	54

5 of 16 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	233	LEU
2	G	246	GLU
2	L	233	LEU
2	C	234	PRO
2	C	237	MET

### 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	162/450 (36%)	154 (95%)	8 (5%)	25	59
1	B	146/450 (32%)	139 (95%)	7 (5%)	25	60
1	E	163/450 (36%)	157 (96%)	6 (4%)	34	67
1	F	138/450 (31%)	130 (94%)	8 (6%)	20	53
1	I	163/450 (36%)	155 (95%)	8 (5%)	25	59
1	J	150/450 (33%)	141 (94%)	9 (6%)	19	51
1	M	161/450 (36%)	153 (95%)	8 (5%)	24	58
1	N	145/450 (32%)	137 (94%)	8 (6%)	21	55
2	C	30/497 (6%)	24 (80%)	6 (20%)	1	6
2	D	26/497 (5%)	21 (81%)	5 (19%)	1	7
2	G	30/497 (6%)	26 (87%)	4 (13%)	4	17
2	H	24/497 (5%)	22 (92%)	2 (8%)	11	38
2	L	27/497 (5%)	24 (89%)	3 (11%)	6	24
2	O	21/497 (4%)	19 (90%)	2 (10%)	8	30
2	P	28/497 (6%)	25 (89%)	3 (11%)	6	25
3	K	34/497 (7%)	29 (85%)	5 (15%)	3	14
All	All	1448/7576 (19%)	1356 (94%)	92 (6%)	17	49

5 of 92 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	G	214	ARG
1	I	96	LEU
1	N	152	GLU
2	G	219	MET
1	I	38	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	110	GLN
1	I	110	GLN
1	M	79	GLN
1	F	79	GLN
1	N	108	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

### 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

### 5.7 Other polymers [i](#)

There are no such residues in this entry.

### 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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<sup>th</sup> 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 <sup>2</sup> )	Q < 0.9
1	A	187/514 (36%)	-0.14	1 (0%) 91 86	40, 70, 104, 118	0
1	B	182/514 (35%)	0.33	9 (4%) 29 16	52, 116, 215, 236	1 (0%)
1	E	186/514 (36%)	-0.14	0 100 100	44, 70, 106, 135	0
1	F	167/514 (32%)	0.86	31 (18%) 1 0	68, 176, 238, 250	1 (0%)
1	I	186/514 (36%)	0.12	4 (2%) 62 48	57, 89, 131, 149	0
1	J	183/514 (35%)	0.10	3 (1%) 72 59	62, 100, 174, 198	1 (0%)
1	M	186/514 (36%)	1.92	78 (41%) 0 0	167, 239, 278, 288	0
1	N	185/514 (35%)	1.23	43 (23%) 0 0	128, 219, 269, 283	1 (0%)
2	C	41/557 (7%)	-0.11	0 100 100	59, 72, 100, 124	0
2	D	37/557 (6%)	-0.12	1 (2%) 54 39	49, 79, 129, 153	0
2	G	45/557 (8%)	-0.20	0 100 100	39, 81, 100, 104	0
2	H	36/557 (6%)	0.28	6 (16%) 1 1	56, 75, 248, 253	0
2	L	37/557 (6%)	0.04	0 100 100	78, 100, 126, 152	0
2	O	39/557 (7%)	0.78	5 (12%) 3 2	142, 192, 248, 261	0
2	P	37/557 (6%)	1.23	14 (37%) 0 0	89, 232, 251, 256	0
3	K	40/557 (7%)	-0.24	0 100 100	68, 85, 110, 142	0
All	All	1774/8568 (20%)	0.47	195 (10%) 5 3	39, 102, 252, 288	4 (0%)

The worst 5 of 195 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	N	134	ASP	11.4
1	M	149	LEU	9.5
1	M	41	VAL	7.2
1	N	90	LEU	6.8
1	M	92	ALA	6.6

## 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 carbohydrates 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.