



Full wwPDB NMR Structure Validation Report ⓘ

Feb 19, 2022 – 05:18 PM EST

PDB ID : 1RFH
Title : Solution structure of the C1 domain of Nore1, a novel Ras effector
Authors : Guiberman, E.; Wohlgemuth, S.; Herrmann, C.; Harjes, S.; Mueller, K.H.;
Bayer, P.
Deposited on : 2003-11-09

This is a Full wwPDB NMR 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/NMRValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
RCI : v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV : Wang et al. (2010)
ShiftChecker : 2.26
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.26

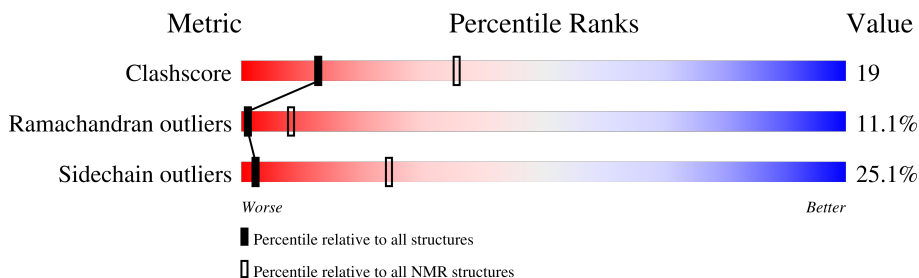
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	59	 37% 32% 5% 25%

2 Ensemble composition and analysis

This entry contains 21 models. The atoms present in the NMR models are not consistent. Some calculations may have failed as a result. All residues are included in the validation scores. Model 21 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *minimized average structure*.

The following residues are included in the computation of the global validation metrics.

Well-defined (core) protein residues			
Well-defined core	Residue range (total)	Backbone RMSD (Å)	Medoid model
1	A:118-A:123, A:129-A:166 (44)	0.25	21

Ill-defined regions of proteins are excluded from the global statistics.

Ligands and non-protein polymers are included in the analysis.

NmrClust was unable to cluster the ensemble.

Error message: Inconsistent models in file

3 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 924 atoms, of which 458 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Ras association (RalGDS/AF-6) domain family 5.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	59	922	282	458	95	80	7	0

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	
			Total	Zn
2	A	2	2	2

4 Residue-property plots

4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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. Stretches of 2 or more consecutive residues without any outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5

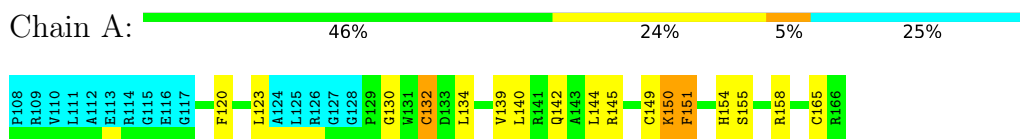


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

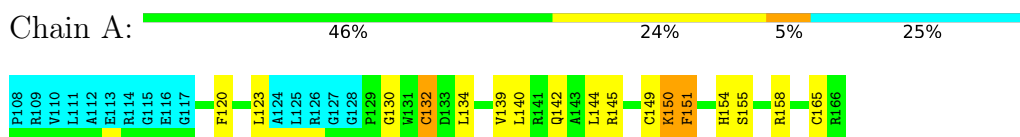
4.2.1 Score per residue for model 1

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



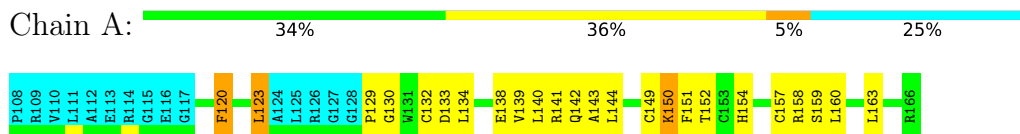
4.2.2 Score per residue for model 2

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



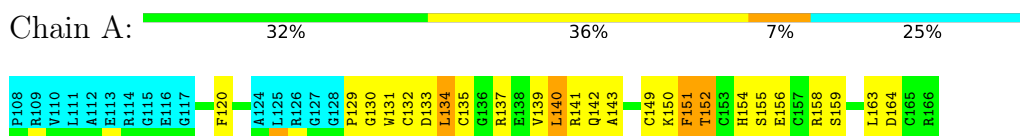
4.2.3 Score per residue for model 3

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



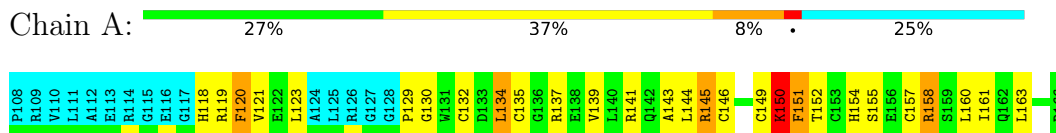
4.2.4 Score per residue for model 4

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



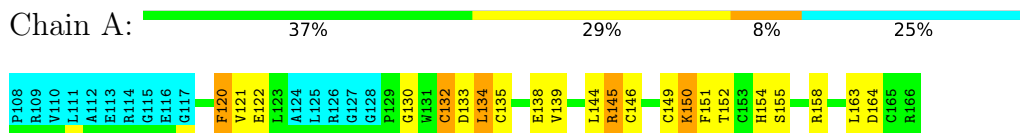
4.2.5 Score per residue for model 5

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



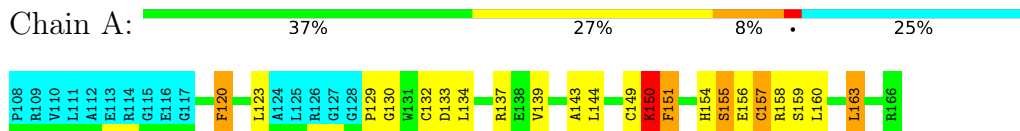
4.2.6 Score per residue for model 6

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



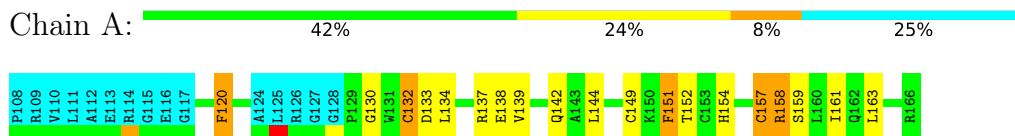
4.2.7 Score per residue for model 7

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



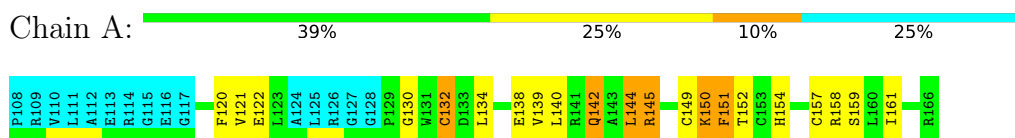
4.2.8 Score per residue for model 8

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



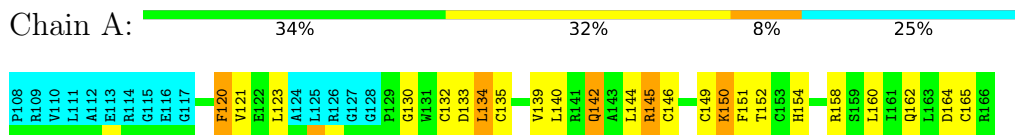
4.2.9 Score per residue for model 9

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



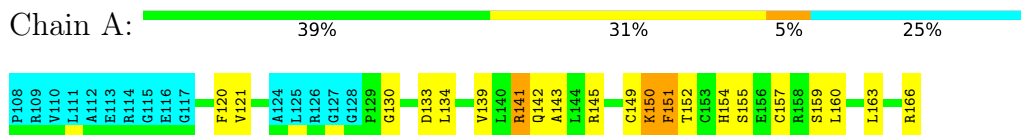
4.2.10 Score per residue for model 10

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



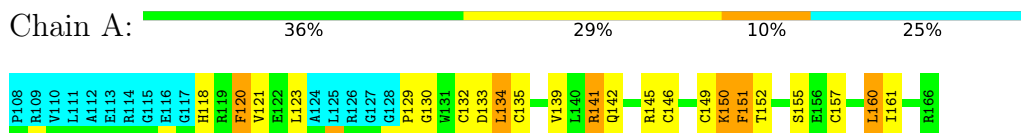
4.2.11 Score per residue for model 11

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



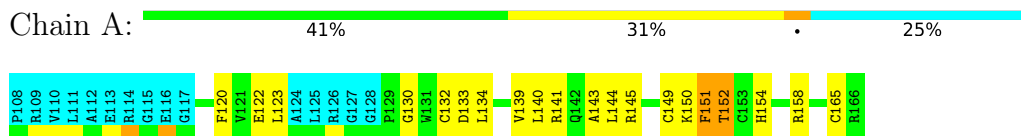
4.2.12 Score per residue for model 12

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



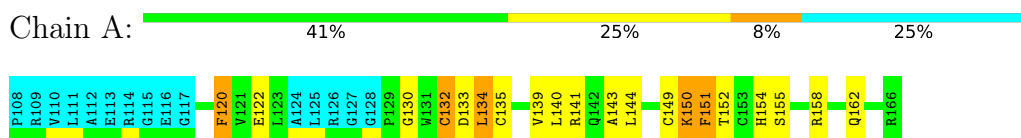
4.2.13 Score per residue for model 13

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



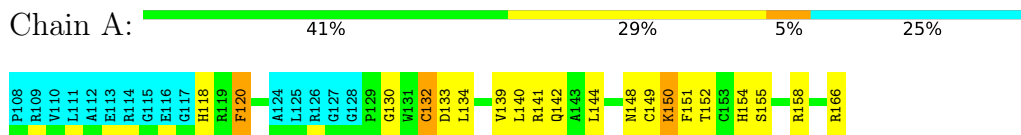
4.2.14 Score per residue for model 14

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



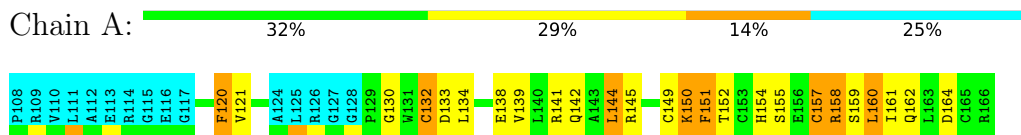
4.2.15 Score per residue for model 15

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



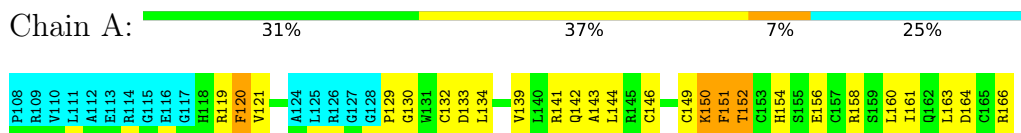
4.2.16 Score per residue for model 16

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



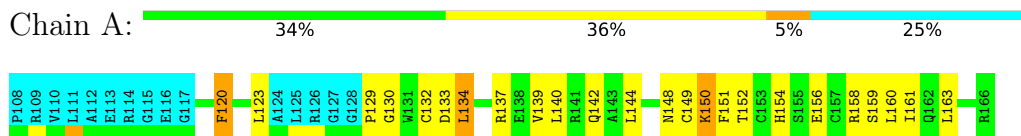
4.2.17 Score per residue for model 17

- Molecule 1: Ras association (RalGDS/AF-6) domain family 5

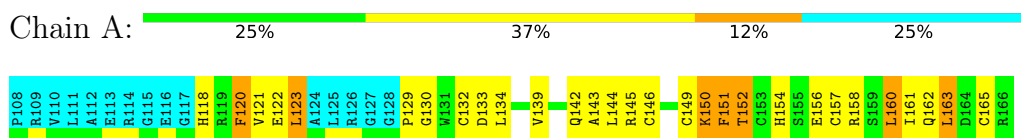


4.2.18 Score per residue for model 18

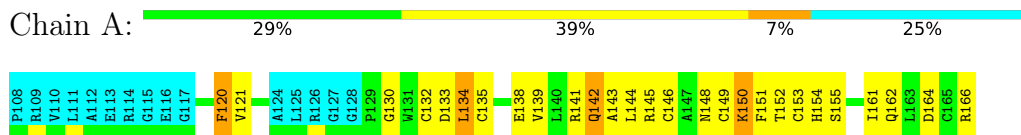
- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



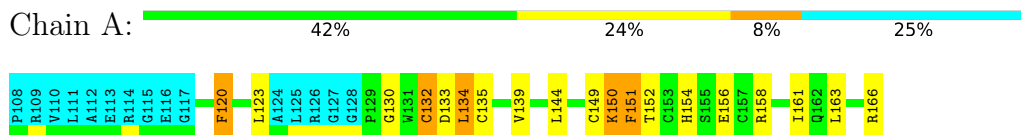
- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



- Molecule 1: Ras association (RalGDS/AF-6) domain family 5



5 Refinement protocol and experimental data overview

The models were refined using the following method: *simulated annealing torsion angle dynamics*.

Of the 50 calculated structures, 21 were deposited, based on the following criterion: *structures with the least restraint violations, structures with the lowest energy*.

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
CNS	structure solution	1.1
CNS	refinement	1.1

No chemical shift data was provided.

6 Model quality i

6.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section:
ZN

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

6.2 Too-close contacts i

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	356	345	345	13±4
All	All	7519	7245	7245	276

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 19.

All unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:139:VAL:HG12	1:A:154:HIS:CD2	0.84	2.07	18	20
1:A:139:VAL:HG21	1:A:143:ALA:HB2	0.83	1.50	4	7
1:A:160:LEU:O	1:A:160:LEU:HD22	0.76	1.81	12	1
1:A:121:VAL:HG22	1:A:145:ARG:O	0.74	1.82	19	9
1:A:160:LEU:HD13	1:A:161:ILE:N	0.73	1.98	12	1
1:A:123:LEU:HD22	1:A:152:THR:HG21	0.73	1.61	13	1
1:A:133:ASP:OD2	1:A:152:THR:HG22	0.72	1.85	14	10
1:A:150:LYS:NZ	1:A:161:ILE:HG21	0.71	2.00	19	1
1:A:130:GLY:O	1:A:139:VAL:HG22	0.71	1.85	4	19
1:A:157:CYS:O	1:A:160:LEU:HD12	0.70	1.86	12	1
1:A:120:PHE:HB3	1:A:144:LEU:HD12	0.70	1.62	7	1
1:A:158:ARG:HA	1:A:161:ILE:HD12	0.70	1.62	8	2

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:120:PHE:HB3	1:A:144:LEU:HD22	0.68	1.65	8	12
1:A:130:GLY:C	1:A:139:VAL:HG22	0.67	2.08	6	20
1:A:143:ALA:HB1	1:A:152:THR:HG22	0.66	1.66	19	4
1:A:144:LEU:HD13	1:A:158:ARG:HD2	0.65	1.68	5	2
1:A:157:CYS:HA	1:A:160:LEU:HD12	0.64	1.69	16	2
1:A:150:LYS:HZ1	1:A:161:ILE:HG21	0.64	1.51	19	1
1:A:150:LYS:HE3	1:A:161:ILE:HD11	0.61	1.73	17	1
1:A:139:VAL:HG12	1:A:154:HIS:NE2	0.60	2.10	1	17
1:A:150:LYS:HE2	1:A:161:ILE:HG21	0.60	1.73	5	1
1:A:139:VAL:O	1:A:139:VAL:HG23	0.59	1.98	17	10
1:A:130:GLY:O	1:A:139:VAL:HG13	0.58	1.98	4	1
1:A:144:LEU:HD13	1:A:158:ARG:HG3	0.58	1.75	13	1
1:A:161:ILE:HG23	1:A:161:ILE:O	0.57	1.99	18	3
1:A:123:LEU:HD23	1:A:143:ALA:HB3	0.56	1.78	3	1
1:A:160:LEU:HD12	1:A:160:LEU:O	0.55	2.01	7	2
1:A:144:LEU:HD13	1:A:158:ARG:CD	0.54	2.32	5	1
1:A:123:LEU:CD2	1:A:143:ALA:HB3	0.53	2.33	3	2
1:A:123:LEU:HD12	1:A:123:LEU:O	0.53	2.03	5	1
1:A:156:GLU:O	1:A:160:LEU:HD23	0.53	2.03	17	1
1:A:160:LEU:HD13	1:A:160:LEU:C	0.52	2.24	12	1
1:A:121:VAL:O	1:A:121:VAL:HG23	0.52	2.05	19	5
1:A:123:LEU:HD22	1:A:145:ARG:HD3	0.52	1.81	12	1
1:A:139:VAL:HG21	1:A:143:ALA:CB	0.52	2.29	4	1
1:A:157:CYS:O	1:A:161:ILE:HD12	0.52	2.04	9	1
1:A:152:THR:HG23	1:A:152:THR:O	0.51	2.06	16	6
1:A:157:CYS:HA	1:A:160:LEU:HD23	0.51	1.82	19	1
1:A:160:LEU:HD22	1:A:160:LEU:C	0.51	2.24	12	1
1:A:143:ALA:CB	1:A:152:THR:HG22	0.51	2.35	19	3
1:A:123:LEU:HD21	1:A:152:THR:HG21	0.50	1.84	5	1
1:A:130:GLY:CA	1:A:139:VAL:HG22	0.50	2.37	14	19
1:A:123:LEU:CD2	1:A:152:THR:HG21	0.49	2.36	19	1
1:A:134:LEU:HD13	1:A:161:ILE:HD12	0.49	1.85	18	1
1:A:150:LYS:NZ	1:A:163:LEU:HD13	0.48	2.24	7	1
1:A:123:LEU:HD22	1:A:143:ALA:HB3	0.46	1.87	7	1
1:A:156:GLU:O	1:A:160:LEU:HD12	0.46	2.09	18	1
1:A:146:CYS:HB3	1:A:150:LYS:CG	0.46	2.41	19	1
1:A:134:LEU:HD23	1:A:135:CYS:SG	0.46	2.51	4	8
1:A:151:PHE:CD1	1:A:151:PHE:N	0.46	2.84	13	11
1:A:118:HIS:CB	1:A:120:PHE:CE2	0.46	2.99	19	4
1:A:139:VAL:HG23	1:A:139:VAL:O	0.45	2.12	19	2
1:A:132:CYS:HB2	1:A:154:HIS:CE1	0.45	2.47	9	9

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:151:PHE:N	1:A:151:PHE:CD1	0.45	2.83	5	2
1:A:154:HIS:HB2	1:A:157:CYS:HB2	0.44	1.89	8	5
1:A:120:PHE:CD1	1:A:146:CYS:HB2	0.44	2.48	17	6
1:A:132:CYS:CB	1:A:154:HIS:CE1	0.44	3.00	21	2
1:A:123:LEU:HD22	1:A:152:THR:CG2	0.44	2.39	13	1
1:A:120:PHE:HB3	1:A:144:LEU:HB3	0.44	1.89	16	1
1:A:122:GLU:HB3	1:A:144:LEU:HD23	0.43	1.90	9	1
1:A:131:TRP:O	1:A:133:ASP:N	0.43	2.52	4	1
1:A:133:ASP:HB2	1:A:151:PHE:CG	0.43	2.49	7	7
1:A:123:LEU:HD23	1:A:143:ALA:O	0.42	2.15	7	1
1:A:133:ASP:CB	1:A:151:PHE:CG	0.42	3.03	19	3
1:A:145:ARG:HG2	1:A:152:THR:HG23	0.42	1.91	12	1
1:A:145:ARG:HA	1:A:152:THR:HA	0.41	1.91	19	1
1:A:160:LEU:HD13	1:A:161:ILE:HG13	0.41	1.92	12	1
1:A:153:CYS:SG	1:A:161:ILE:HD11	0.41	2.56	20	1
1:A:123:LEU:HD23	1:A:123:LEU:H	0.41	1.76	7	1
1:A:150:LYS:NZ	1:A:163:LEU:CD1	0.41	2.84	7	1
1:A:130:GLY:HA3	1:A:139:VAL:HG22	0.41	1.93	14	1
1:A:139:VAL:O	1:A:139:VAL:CG2	0.41	2.67	17	1
1:A:118:HIS:HB2	1:A:120:PHE:CE2	0.40	2.52	12	1
1:A:118:HIS:CE1	1:A:163:LEU:O	0.40	2.75	19	1

6.3 Torsion angles [i](#)

6.3.1 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 PDB entries followed by that with respect to all NMR entries. 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	43/59 (73%)	33±2 (77±4%)	5±2 (12±5%)	5±1 (11±2%)	1 8
All	All	903/1239 (73%)	694 (77%)	109 (12%)	100 (11%)	1 8

All 9 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	120	PHE	21

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Models (Total)
1	A	149	CYS	21
1	A	132	CYS	20
1	A	150	LYS	16
1	A	142	GLN	9
1	A	129	PRO	8
1	A	141	ARG	3
1	A	155	SER	1
1	A	163	LEU	1

6.3.2 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 PDB entries followed by that with respect to all NMR entries. 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	40/49 (82%)	30±2 (75±4%)	10±2 (25±4%)	2 24
All	All	840/1029 (82%)	629 (75%)	211 (25%)	2 24

All 26 unique residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	134	LEU	21
1	A	151	PHE	21
1	A	150	LYS	20
1	A	158	ARG	16
1	A	155	SER	12
1	A	140	LEU	10
1	A	141	ARG	10
1	A	163	LEU	10
1	A	159	SER	8
1	A	142	GLN	8
1	A	145	ARG	7
1	A	138	GLU	6
1	A	160	LEU	6
1	A	152	THR	6
1	A	164	ASP	6
1	A	165	CYS	5
1	A	137	ARG	5

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Models (Total)
1	A	162	GLN	5
1	A	166	ARG	5
1	A	144	LEU	4
1	A	123	LEU	4
1	A	156	GLU	4
1	A	122	GLU	4
1	A	157	CYS	3
1	A	148	ASN	3
1	A	119	ARG	2

6.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

6.7 Other polymers [i](#)

There are no such molecules in this entry.

6.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

7 Chemical shift validation

No chemical shift data were provided