



# Full wwPDB X-ray Structure Validation Report ⓘ

May 13, 2020 – 02:09 am BST

PDB ID : 6JWH  
Title : Yeast Npl4 zinc finger, MPN and CTD domains  
Authors : Sato, Y.; Fukai, S.  
Deposited on : 2019-04-20  
Resolution : 1.72 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](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  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
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

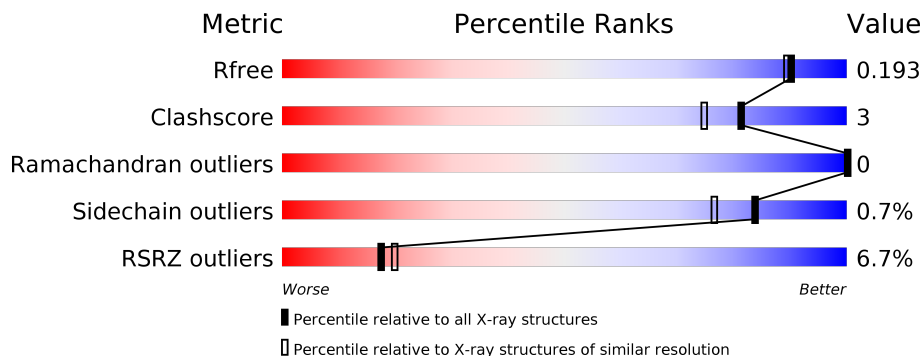
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.72 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	5722 (1.74-1.70)
Clashscore	141614	6152 (1.74-1.70)
Ramachandran outliers	138981	6051 (1.74-1.70)
Sidechain outliers	138945	6051 (1.74-1.70)
RSRZ outliers	127900	5629 (1.74-1.70)

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 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	473	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	GOL	A	611	-	-	-	X

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 4171 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 Nuclear protein localization protein 4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	460	3709	2351	619	718	21	0	4	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	108	GLY	-	expression tag	UNP P33755
A	109	PRO	-	expression tag	UNP P33755
A	110	LEU	-	expression tag	UNP P33755
A	111	GLY	-	expression tag	UNP P33755
A	112	SER	-	expression tag	UNP P33755
A	123	ALA	GLU	engineered mutation	UNP P33755
A	124	ALA	LYS	engineered mutation	UNP P33755
A	125	ALA	GLU	engineered mutation	UNP P33755

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

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Zn	0	0
			2	2		

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0

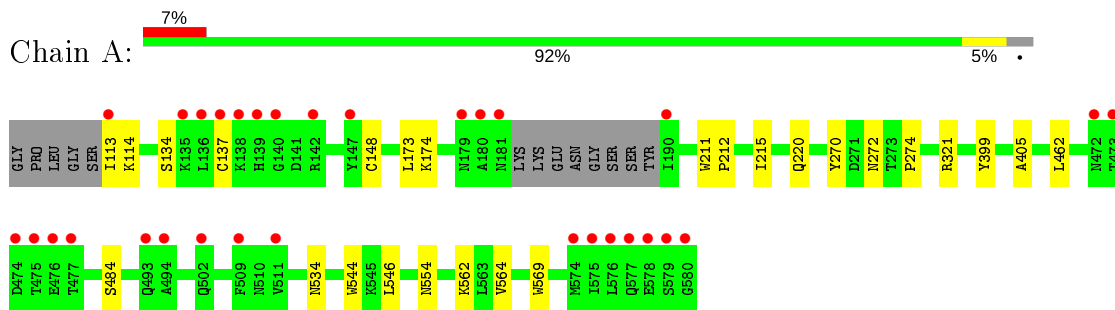
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	406	Total O 406 406	0	0

### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: Nuclear protein localization protein 4



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	75.97Å 82.94Å 92.12Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.87 – 1.72 47.87 – 1.72	Depositor EDS
% Data completeness (in resolution range)	93.1 (47.87-1.72) 93.0 (47.87-1.72)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.26 (at 1.72Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, $R_{free}$	0.163 , 0.193 0.164 , 0.193	Depositor DCC
$R_{free}$ test set	2876 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	28.1	Xtrriage
Anisotropy	0.646	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 47.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	4171	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	39.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.97% 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](#)

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

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	0.49	0/3808	0.57	0/5146

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	399	TYR	Peptide

### 5.2 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 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	3709	0	3591	17	0
2	A	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	54	0	72	8	0
4	A	406	0	0	3	0
All	All	4171	0	3663	19	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.

All (19) 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:174:LYS:NZ	4:A:705:HOH:O	2.34	0.61
3:A:609:GOL:H31	4:A:1051:HOH:O	2.01	0.60
1:A:270:TYR:HD1	3:A:606:GOL:H32	1.72	0.54
1:A:173:LEU:HD23	3:A:608:GOL:H12	1.91	0.53
1:A:274:PRO:HA	3:A:605:GOL:H11	1.92	0.51
1:A:215:ILE:HG12	1:A:220:GLN:HB2	1.95	0.49
1:A:321:ARG:O	3:A:611:GOL:O2	2.32	0.47
1:A:113:ILE:HG23	1:A:114:LYS:N	2.30	0.47
1:A:546:LEU:HD21	1:A:562:LYS:HB3	1.99	0.44
1:A:270:TYR:CZ	1:A:272:ASN:HB2	2.52	0.44
1:A:270:TYR:CD1	3:A:606:GOL:H32	2.52	0.44
1:A:174:LYS:HG2	3:A:608:GOL:H31	2.01	0.43
1:A:137:CYS:SG	1:A:148:CYS:HB3	2.59	0.42
3:A:611:GOL:H31	4:A:900:HOH:O	2.17	0.42
1:A:546:LEU:HA	1:A:546:LEU:HD12	1.83	0.42
1:A:534:ASN:HB2	1:A:544:TRP:CZ3	2.55	0.42
1:A:211:TRP:CD2	1:A:212:PRO:HA	2.56	0.41
1:A:405:ALA:HB2	1:A:462:LEU:HB3	2.04	0.40
1:A:564:VAL:HA	1:A:569:TRP:CD1	2.57	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	460/473 (97%)	450 (98%)	10 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	414/420 (99%)	411 (99%)	3 (1%)	84	76

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	134	SER
1	A	484	SER
1	A	554	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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

Of 11 ligands modelled in this entry, 2 are monoatomic - leaving 9 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	GOL	A	603	-	5,5,5	0.38	0	5,5,5	0.47	0
3	GOL	A	608	-	5,5,5	0.38	0	5,5,5	0.39	0
3	GOL	A	607	-	5,5,5	0.37	0	5,5,5	0.26	0
3	GOL	A	610	-	5,5,5	0.36	0	5,5,5	0.49	0
3	GOL	A	606	-	5,5,5	0.31	0	5,5,5	0.31	0
3	GOL	A	605	-	5,5,5	0.60	0	5,5,5	1.04	0
3	GOL	A	609	-	5,5,5	0.39	0	5,5,5	0.57	0
3	GOL	A	611	-	5,5,5	0.38	0	5,5,5	0.20	0
3	GOL	A	604	-	5,5,5	0.40	0	5,5,5	0.39	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GOL	A	603	-	-	2/4/4/4	-
3	GOL	A	608	-	-	2/4/4/4	-
3	GOL	A	607	-	-	0/4/4/4	-
3	GOL	A	610	-	-	2/4/4/4	-
3	GOL	A	606	-	-	2/4/4/4	-
3	GOL	A	605	-	-	4/4/4/4	-
3	GOL	A	609	-	-	0/4/4/4	-
3	GOL	A	611	-	-	4/4/4/4	-
3	GOL	A	604	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	603	GOL	O1-C1-C2-C3
3	A	606	GOL	O1-C1-C2-C3
3	A	605	GOL	O1-C1-C2-C3
3	A	605	GOL	C1-C2-C3-O3
3	A	611	GOL	O1-C1-C2-C3
3	A	611	GOL	C1-C2-C3-O3
3	A	611	GOL	O2-C2-C3-O3
3	A	604	GOL	C1-C2-C3-O3
3	A	605	GOL	O2-C2-C3-O3
3	A	608	GOL	O1-C1-C2-C3
3	A	610	GOL	C1-C2-C3-O3
3	A	603	GOL	O1-C1-C2-O2
3	A	611	GOL	O1-C1-C2-O2
3	A	604	GOL	O2-C2-C3-O3
3	A	606	GOL	O1-C1-C2-O2
3	A	608	GOL	O1-C1-C2-O2
3	A	610	GOL	O2-C2-C3-O3
3	A	605	GOL	O1-C1-C2-O2

There are no ring outliers.

5 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	608	GOL	2	0
3	A	606	GOL	2	0
3	A	605	GOL	1	0
3	A	609	GOL	1	0
3	A	611	GOL	2	0

## 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

### 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<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	460/473 (97%)	0.43	31 (6%) <span style="border: 1px solid red; padding: 2px;">17</span> <span style="border: 1px solid red; padding: 2px;">20</span>	18, 35, 70, 114	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	180	ALA	5.5
1	A	181	ASN	5.1
1	A	113	ILE	5.1
1	A	509	PHE	4.7
1	A	135	LYS	4.6
1	A	190	ILE	4.5
1	A	477	THR	4.4
1	A	476	GLU	4.2
1	A	474	ASP	3.8
1	A	136	LEU	3.7
1	A	475	THR	3.7
1	A	140	GLY	3.7
1	A	577	GLN	3.6
1	A	473	THR	3.6
1	A	578	GLU	3.6
1	A	138	LYS	3.5
1	A	580	GLY	3.4
1	A	139	HIS	3.4
1	A	511	VAL	3.3
1	A	472	ASN	3.3
1	A	142	ARG	3.2
1	A	579	SER	3.1
1	A	137	CYS	3.0
1	A	147	TYR	2.8
1	A	575	ILE	2.7
1	A	494	ALA	2.6
1	A	574	MET	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	493	GLN	2.4
1	A	179	ASN	2.4
1	A	576	LEU	2.3
1	A	502	GLN	2.2

## 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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	GOL	A	605	6/6	0.61	0.24	36,50,64,65	0
3	GOL	A	606	6/6	0.64	0.18	64,74,76,81	0
3	GOL	A	608	6/6	0.69	0.20	68,70,73,76	0
3	GOL	A	611	6/6	0.69	0.43	61,75,81,86	0
3	GOL	A	604	6/6	0.76	0.20	68,74,77,77	0
3	GOL	A	610	6/6	0.81	0.21	64,71,76,78	0
3	GOL	A	603	6/6	0.83	0.21	26,35,52,68	0
3	GOL	A	609	6/6	0.84	0.14	40,63,65,68	0
3	GOL	A	607	6/6	0.91	0.16	35,47,53,55	0
2	ZN	A	602	1/1	0.93	0.05	45,45,45,45	0
2	ZN	A	601	1/1	0.96	0.12	66,66,66,66	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.