



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 04:57 AM GMT

PDB ID : 2OV8  
Title : Crystal Structure of StaL  
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Deposited on : 2007-02-13  
Resolution : 2.58 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  
<http://wwpdb.org/validation/2016/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 : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

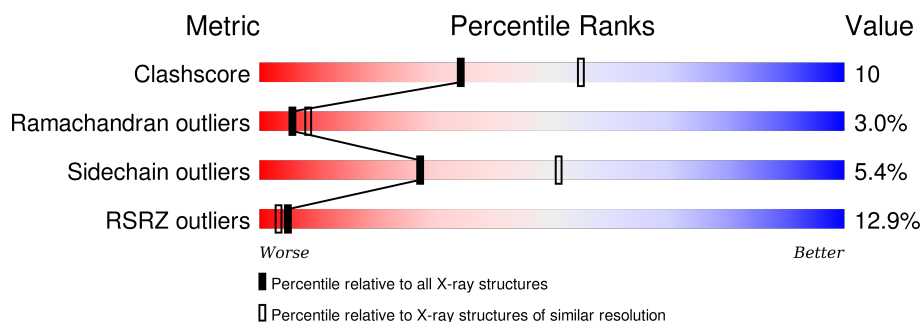
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.58 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))
Clashscore	102246	3003 (2.60-2.56)
Ramachandran outliers	100387	2956 (2.60-2.56)
Sidechain outliers	100360	2956 (2.60-2.56)
RSRZ outliers	91569	2642 (2.60-2.56)

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. 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	288	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 1781 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 StaL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	241	Total	C	N	O	S	0	0	0
			1768	1131	298	326	13			

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-17	MET	-	CLONING ARTIFACT	UNP Q8KLM3
A	-16	GLY	-	CLONING ARTIFACT	UNP Q8KLM3
A	-15	SER	-	CLONING ARTIFACT	UNP Q8KLM3
A	-14	SER	-	CLONING ARTIFACT	UNP Q8KLM3
A	-13	HIS	-	EXPRESSION TAG	UNP Q8KLM3
A	-12	HIS	-	EXPRESSION TAG	UNP Q8KLM3
A	-11	HIS	-	EXPRESSION TAG	UNP Q8KLM3
A	-10	HIS	-	EXPRESSION TAG	UNP Q8KLM3
A	-9	HIS	-	EXPRESSION TAG	UNP Q8KLM3
A	-8	HIS	-	EXPRESSION TAG	UNP Q8KLM3
A	-7	SER	-	CLONING ARTIFACT	UNP Q8KLM3
A	-6	SER	-	CLONING ARTIFACT	UNP Q8KLM3
A	-5	GLY	-	CLONING ARTIFACT	UNP Q8KLM3
A	-4	LEU	-	CLONING ARTIFACT	UNP Q8KLM3
A	-3	VAL	-	CLONING ARTIFACT	UNP Q8KLM3
A	-2	PRO	-	CLONING ARTIFACT	UNP Q8KLM3
A	-1	ARG	-	CLONING ARTIFACT	UNP Q8KLM3
A	0	GLY	-	CLONING ARTIFACT	UNP Q8KLM3
A	1	SER	-	CLONING ARTIFACT	UNP Q8KLM3
A	2	HIS	-	CLONING ARTIFACT	UNP Q8KLM3
A	3	MET	-	CLONING ARTIFACT	UNP Q8KLM3

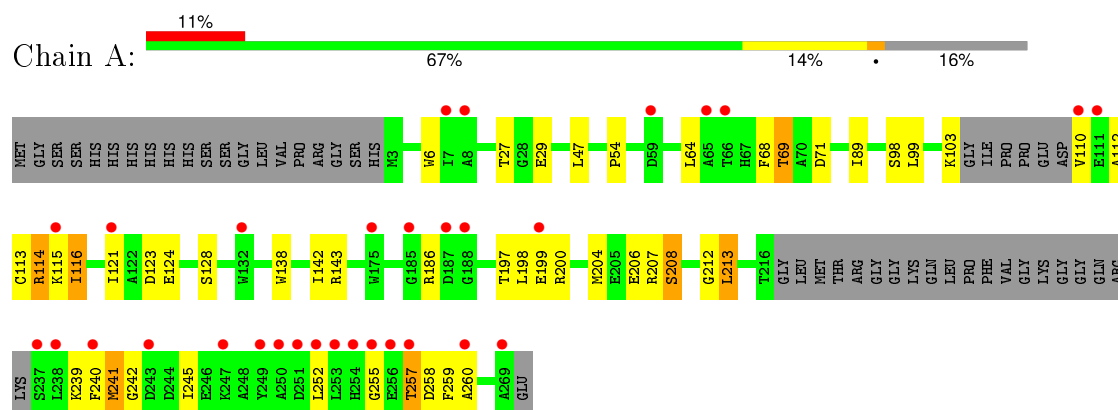
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	13	Total	O	0	0
			13	13		

### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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: StaL



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.02Å 86.02Å 164.75Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	74.54 – 2.58 38.13 – 2.58	Depositor EDS
% Data completeness (in resolution range)	99.8 (74.54-2.58) 94.0 (38.13-2.58)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	7.69 (at 2.58Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.249 , 0.279 0.262 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	DCC
Wilson B-factor (Å <sup>2</sup> )	69.8	Xtriage
Anisotropy	0.138	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 89.7	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 11526 reflections	Xtriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	1781	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.78% 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, 0.375 respectively for untwinned datasets, and 0.333, 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	0.67	1/1811 (0.1%)	0.71	0/2468

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

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	110	VAL	CB-CG1	5.73	1.64	1.52

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	68	PHE	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	1768	0	1631	34	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	13	0	0	0	0
All	All	1781	0	1631	34	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 10.

All (34) 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:69:THR:CG2	1:A:71:ASP:OD1	2.21	0.89
1:A:69:THR:HG21	1:A:71:ASP:OD1	1.72	0.88
1:A:99:LEU:O	1:A:103:LYS:HB2	1.91	0.70
1:A:212:GLY:O	1:A:213:LEU:O	2.13	0.67
1:A:112:ALA:O	1:A:116:ILE:HG22	1.96	0.65
1:A:239:LYS:O	1:A:241:MET:N	2.28	0.65
1:A:204:MET:HA	1:A:207:ARG:HH11	1.62	0.64
1:A:69:THR:CG2	1:A:71:ASP:CG	2.67	0.63
1:A:239:LYS:C	1:A:241:MET:H	2.02	0.62
1:A:204:MET:HA	1:A:207:ARG:NH1	2.15	0.62
1:A:113:CYS:HA	1:A:116:ILE:CG2	2.34	0.58
1:A:114:ARG:HA	1:A:245:ILE:HD11	1.84	0.58
1:A:27:THR:HG22	1:A:29:GLU:H	1.72	0.55
1:A:197:THR:HG22	1:A:199:GLU:H	1.74	0.51
1:A:255:GLY:O	1:A:257:THR:HG22	2.11	0.50
1:A:89:ILE:HG12	1:A:142:ILE:CD1	2.41	0.50
1:A:197:THR:HB	1:A:200:ARG:H	1.78	0.48
1:A:69:THR:HG23	1:A:71:ASP:CG	2.33	0.47
1:A:47:LEU:HD13	1:A:54:PRO:HD3	1.96	0.47
1:A:197:THR:C	1:A:199:GLU:N	2.69	0.47
1:A:252:LEU:O	1:A:260:ALA:HB2	2.15	0.47
1:A:197:THR:O	1:A:199:GLU:N	2.49	0.46
1:A:257:THR:O	1:A:259:PHE:N	2.48	0.46
1:A:89:ILE:HG12	1:A:142:ILE:HD12	1.98	0.45
1:A:186:ARG:HG2	1:A:186:ARG:O	2.17	0.45
1:A:6:TRP:HA	1:A:64:LEU:O	2.17	0.44
1:A:27:THR:HG22	1:A:29:GLU:N	2.32	0.44
1:A:197:THR:C	1:A:199:GLU:H	2.21	0.44
1:A:239:LYS:C	1:A:241:MET:N	2.70	0.43
1:A:123:ASP:O	1:A:124:GLU:HB2	2.19	0.43
1:A:138:TRP:O	1:A:142:ILE:HG12	2.20	0.42
1:A:113:CYS:C	1:A:115:LYS:H	2.23	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:204:MET:O	1:A:208:SER:OG	2.38	0.41
1:A:99:LEU:O	1:A:103:LYS:CB	2.64	0.41

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	235/288 (82%)	211 (90%)	17 (7%)	7 (3%)	<b>5</b> <b>8</b>

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	213	LEU
1	A	240	PHE
1	A	242	GLY
1	A	258	ASP
1	A	198	LEU
1	A	114	ARG
1	A	241	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	166/236 (70%)	157 (95%)	9 (5%)	27	51

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	69	THR
1	A	98	SER
1	A	116	ILE
1	A	121	ILE
1	A	128	SER
1	A	143	ARG
1	A	206	GLU
1	A	208	SER
1	A	257	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	261	HIS

### 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 carbohydrates 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<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	241/288 (83%)	1.05	31 (12%) 5 3	63, 78, 93, 96	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	252	LEU	6.6
1	A	237	SER	6.5
1	A	110	VAL	6.0
1	A	256	GLU	5.1
1	A	269	ALA	4.7
1	A	255	GLY	4.6
1	A	185	GLY	3.7
1	A	257	THR	3.7
1	A	243	ASP	3.4
1	A	111	GLU	3.3
1	A	59	ASP	3.1
1	A	188	GLY	3.1
1	A	199	GLU	3.0
1	A	247	LYS	3.0
1	A	240	PHE	2.9
1	A	187	ASP	2.7
1	A	251	ASP	2.6
1	A	66	THR	2.5
1	A	253	LEU	2.4
1	A	175	TRP	2.3
1	A	250	ALA	2.3
1	A	8	ALA	2.2
1	A	254	HIS	2.2
1	A	121	ILE	2.2
1	A	238	LEU	2.2
1	A	132	TRP	2.2
1	A	65	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	249	TYR	2.1
1	A	7	ILE	2.1
1	A	115	LYS	2.0
1	A	260	ALA	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 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.