All Fields marked with * are mandatory.

Change Request #:	**362**
Assigned OGC Document #:	**14-078**
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Document Name/Version:	*GeoPackage Encoding Standard / 1.0
OGC Project Document:	*12-128r10

If this is a revision of a previous submission and you have a Change Request Number, then check here: ☐
Enter the CR number here: [   ]
Enter the Revsion Number that you are revising here: [   ]

Title: 🔵	* [Geopackage SWG] Change WKT for SRS citation from 01-009 to 12-063
Source: 🔵	*AGC, NGA
Work item code: 🔵	
Category: 🔵	* F (Critical correction) ⏷

Reason for change: 🔵	* The WKT representation of coordinate reference systems as defined in ISO 19125-1:2004 and OGC specification 01-009 is inconsistent with the terminology and technical provisions of ISO 19111:2007 and OGC Abstract Specification topic 2 (08-015r2), â��Geographic information â�� Spatial referencing by coordinatesâ��.
Summary of change: 🔵	* Change Annex Q normative reference [32] from 01-009 to 12-063; Rewrite Clause 1.1.2.1.2. Table Data Values iaw 12-063; Rewrite Annex A Test Case ID: /base/core/gpkg_spatial_ref_sys/data_values_default
Consequences if not approved: 🔵	Unable to correctly define or use the definition of a Geodetic 3D Ellipsoidal CRS, e.g. EPSG:4979 WGS 84 Geographic 3D lat/lon/hae

Clauses affected:	*
	Clause 1.1.2.1.2 Annex A Annex Q
Additional Documents affected:	

Supporting Documentation:	1.1.2.1.2. Table Data Values
	
	Definition column WKT values in the gpkg_spatial_ref_sys table SHALL define the Spatial
	Reference Systems used by feature geometries and tile images, unless these SRS are unknown
	and therefore undefined as specified in Req 11. Values SHALL be constructed per the BNF
	syntax and syntatic element definitions in [32]. SRS definitions SHALL include the optional
	 BNF syntactic element to identify the SRS. The optional
	, ,
	and component elements of MAY be omitted.
	Values for the
	and syntatic elements MAY be obtained
	from any specified ,
	e.g. [13][14]. For example, see the return value in A.1.1.2.1.2 Test Method step (3) used to test
	the definition for WGS-84 lat/lon per Req 11.
	
	A.1.1.2.1.2 Table Data Values
	Test Method:
	3) SELECT definition FROM gpkg_spatial_ref_sys WHERE organization IN ("epsg","EPSG") AND organization_coordsys_id 4326 returns
	
	GEODCRS["WGS 84",
	    DATUM["World Geodetic System 1984",
	      ELLIPSOID["WGS 84",6378137,298.257223563]],
	    CS[ellipsoidal,2],
	      AXIS["(lat)",north,ORDER[1]],
	      AXIS["(lon)",east,ORDER[2]],
	      ANGLEUNIT["degree",0.017453292519943278],
	        ID["EPSG",4326]]
	
	(rounding the UNIT conversion factors to 16 decimal places,
	and ignoring whitespace differences in the returned text)

Comments:	There are two semantically incorrect ways to represent EPSG:4979 using 01-009 EBNF syntax.
	Using the COMPD_CS syntatic element is semantically incorrect because ellipsoidal height
	is not an independent VERT_CS:
	
	COMPD_CS[
	    "WGS 84",
	    GEOGCS["WGS 84",
	        DATUM["World Geodetic System 1984",
	                SPHEROID["WGS 84", 6378137, 298.257223563,
	                        AUTHORITY["EPSG","7030"]],
	                AUTHORITY["EPSG","6326"]],
	        PRIMEM["Greenwich", 0 ,
	                AUTHORITY["EPSG","8901"]],
	        UNIT["degree", 0.017453292519943278,
	                AUTHORITY["EPSG","9102"]],
	            AXIS["Geodetic latitude",NORTH],
	            AXIS["Geodetic longitude",EAST],
	        AUTHORITY["EPSG","4326"]
	    ],
	    VERT_CS["Ellipsoidal height",
	        VERT_DATUM["Ellipsoidal height", 2004],
	        UNIT["metre", 1.0],
	        AXIS["Ellipsoidal height", UP]]

```
            ],
            AUTHORITY[“EPSG”,”4979”]
    ]

Using the GEOCCS syntatic element is semantically incorrect because
this is a geodetic,
not a geocentric SRS.  It also lacks syntax to represent the unit of
measure for the
vertical axis:

GEOCCS["WGS 84",
    DATUM["World Geodetic System 1984",
        SPHEROID["WGS 84", 6378137, 298.257223563,
            AUTHORITY["EPSG","7030"]],
        AUTHORITY["EPSG","6326"]],
    PRIMEM["Greenwich", 0 ,
        AUTHORITY["EPSG","8901"]],
    UNIT["degree", 0.0174532925199943278,
        AUTHORITY["EPSG","9102"]],
    AXIS["Geodetic latitude",NORTH],
    AXIS["Geodetic longitude",EAST],
    AXIS[“Ellipsoidal height”,UP],
    AUTHORITY[“EPSG”,”4979”]]

Here is a semantically correct WKT definition based on 12-063:

GEODCRS["WGS 84",
  DATUM["World Geodetic System 1984",
    ELLIPSOID["WGS 84",6378137,298.257223563,
      LENGTHUNIT["metre",1.0]]],
  CS[ellipsoidal,3],
    AXIS["(lat)",north,ANGLEUNIT["degree",0.0174532925199433]],
    AXIS["(lon)",east,ANGLEUNIT["degree",0.0174532925199433]],
    AXIS["ellipsoidal height (h)",up,LENGTHUNIT["metre",1.0]],
        ID["EPSG",4979]]

OGC 12-063 addresses backward compatibility with 01-009 definitions in
Clause 6.7 and Annexes B and C.
```

Status: ⊙ [Assigned   ⇕]

Assigned To: ⊙ [GeoPackage SWG   ⇕]

Disposition: ⊙ [Referred and Posted   ⇕]