NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

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Standard Reference Material® 2367
JC Virus DNA Quantitative Standard
CERTIFICATE OF ANALYSIS

Purpose: This Standard Reference Material (SRM) is intended for use in the value assignment of JC virus deoxyribonucleic acid (DNA) quantitation materials, primarily those used for quantitative polymerase chain reaction (qPCR).

Description: SRM 2367 consists of a well-characterized, linearized plasmid, containing JC virus DNA solubilized in 10 mmol/L 2-amino-2-(hydroxymethyl)-1,3 propanediol hydrochloride-(Tris HCl) and 1 mmol/L ethylenediaminetetraacetic acid disodium salt (disodium EDTA) pH 8.0 buffer (TE), with 50 ng/µL yeast tRNA added to ensure stability. A unit of the SRM consists of one 0.5 mL tube containing approximately 110 µL of DNA solution. The tube is labeled and is sealed with a screw cap.

Certified Value: The SRM 2367 certified value is provided below. A NIST certified value is a value for which NIST has the highest confidence in that all known or suspected sources of bias have been accounted for [1]. The copy number value is metrologically traceable to the natural units count 1 and ratio 1 and the International System of Units (SI) derived unit of volume.

Certified Value for SRM 2367

Analyte	Certified Value	95 % Probability Uncertainty Interval	Standard Uncertainty, $u(X)$[(a)]	Effective Coefficient of Variation, CV = $100 \times u(X)/X$[(a)]	Units
JC Virus DNA copy number	415 600	378 000 to 442 000	21 320	5.1%	copies/µL

[(a)] Standard uncertainty, where u is the uncertainty and (X) is the measurand (copies per microliter) [2].

Period of Validity: The certified value delivered by **SRM 2367** is valid within the measurement uncertainty specified until **15 December 2031**. The certified value is nullified if the material is stored or used improperly, damaged, contaminated, or otherwise modified.

Maintenance of Certified Values: NIST will monitor this SRM over the period of its validity. If substantive technical changes occur that affect the certification, NIST will issue an amended certificate through the NIST SRM website (https://www.nist.gov/srm). Before making use of any of the values delivered by this material, users should verify they have the most recent version of this documentation, available through the NIST SRM website (https://www.nist.gov/srm).

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Safety: SRM 2367 IS A BACTERIAL DNA SOURCE MATERIAL. This is a Biosafety Level 1 material and should be handled according to applicable federal, state, and/or local regulations and according to policies and procedures of recipient's organization.

Storage and Handling: Until required for use, SRM 2367 should be stored in the dark at 4 °C (refrigerated). Do not freeze.

The screw-cap vial should be mixed briefly and centrifuged (without opening the vial cap) prior to removing sample aliquots for analysis. For the certified values to be applicable, materials should be withdrawn immediately after opening the vials and processed without delay. Certified values do not apply to any material remaining in recapped vials. The certification only applies to the initial use and the same results are not guaranteed if the remaining material is used at a later date. SRM 2367 should be disposed to in accordance with local, state, and federal regulations.

Use: For qPCR assays, value assign secondary standard DNA solutions relative to the certified copy number concentrations. Calibrate the assays to SRM 2367 using one or more dilution series prepared from SRM 2367. Users should keep in mind that a potential for pipetting error exists; therefore, suitable care should be exercised in preparing calibration solutions.

Source: The JC Virus genome construct (NCBI accession number J02226.1) was synthesized and cloned into a pUC57 plasmid. Restriction sites (AhdI and BssHII) were added on either side of the JC Virus DNA to allow the JC genome region to be isolated from the rest of the plasmid. The plasmid was transformed into *E. coli* Sure2 cells. The plasmid was grown in a 2.5 L culture, purified, and linearized with restriction enzymes (AhdI and BssHII). The linearized material was then filtered to remove precipitate from bovine serum antigen (a component in the restriction digests). JC Virus DNA solution was combined with TE buffer, and 50 ng/µL yeast tRNA was added to ensure stability.

Additional Information: Full details of the production, analysis, and statistical evaluation of SRM 2367 are provided in reference 3.

REFERENCES

[1] Beauchamp, C.R.; Camara, J.E.; Carney, J.; Choquette, S.J.; Cole, K.D.; DeRose, P.C.; Duewer, D.L.; Epstein, M.S.; Kline, M.C.; Lippa, K.A.; Lucon, E.; Molloy, J.; Nelson, M.A.; Phinney, K.W.; Polakoski, M.; Possolo, A.; Sander, L.C.; Schiel, J.E.; Sharpless, K.E.; Toman, B.; Winchester, M.R.; Windover, D.; *Metrological Tools for the Reference Materials and Reference Instruments of the NIST Material Measurement Laboratory*; NIST Special Publication (NIST SP) 260-136, 2021 edition; U.S. Government Printing Office: Washington, DC (2021); available at https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-136-2021.pdf (accessed Jun 2026).

[2] JCGM 100:2008; *Evaluation of Measurement Data — Guide to the Expression of Uncertainty in Measurement* (GUM 1995 with Minor Corrections); Joint Committee for Guides in Metrology (2008); available at https://www.bipm.org/en/committees/jc/jcgm/publications (accessed Jun 2026); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297; U.S. Government Printing Office: Washington, DC (1994); available at https://www.nist.gov/pml/nist-technical-note-1297 (accessed Jun 2026).

[3] Cleveland, M.H.; Farkas, N.; Toman, B.; Vallone, P.M.; *Certification of Standard Reference Material® 2367 JC Virus DNA Quantitative Standard*; NIST Special Publication 260-216 (2021); available at https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-216.pdf (accessed Jun 2026).

If you use this SRM in published work, please reference:

Cleveland MH, Farkas N, Toman B, Vallone PM (2021) Certification of Standard Reference Material® 2367 JC Virus DNA Quantitative Standard. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-216. https://doi.org/10.6028/NIST.SP.260-216

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Certain commercial equipment, instruments, or materials may be identified in this Certificate of Analysis to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the Office of Reference Materials 100 Bureau Drive, Stop 2300, Gaithersburg, MD 20899-2300; telephone (301) 975-2200; e-mail srminfo@nist.gov; or the Internet at https://www.nist.gov/srm.

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