Policy for U.S. Poliovirus-Essential Facilities to Manage Inventory

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NAC
U.S. NATIONAL AUTHORITY
FOR CONTAINMENT OF POLIOVIRUS

U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE
CONTROL AND PREVENTION

Office of Readiness and Response

NAC.AUDIT.POL.003.03

Contents

1. Purpose

The U.S. National Authority for the Containment of Poliovirus (NAC) Inventory policy requires U.S. facilities that possess or are in pursuit of a U.S. NAC-issued Certificate of Participation (CP) or Interim Certificate of Containment/Certificate of Containment (ICC/CC) [i] to 1) establish an inventory system, 2) maintain records that document information about all poliovirus (PV) infectious (IM) and PV potentially infectious materials (PIM) held by the facility, and 3) implement inventory monitoring and controls to safeguard these materials in the facility. Poliovirus-essential facilities may adopt additional inventory control measures based on a site-specific risk assessment. Poliovirus-essential facilities must notify annually federal, state, and local agencies and local first responders (*e.g.,* local health, police, and fire departments; private security and commercial waste disposal companies, as appropriate) of PV material possession for their awareness and support of public health surveillance and emergency response, should such be needed.

Please note that this U.S. NAC Inventory policy (NAC.AUDIT.POL.003.03) supersedes the previously published U.S. NAC Inventory policy (NAC.AUDIT.POL.003.02).

2. Scope

The following statements apply to this policy:

- **Only U.S. facilities that possess or are in pursuit of a CP [i] issued by the U.S. NAC may be in possession of or receive wild PV/vaccine-derived PV (WPV/VDPV) type 1 IM.** U.S. facilities with oral polio vaccine (OPV) PIM should consider the World Health Organization (WHO) PIM Guidance document while facilities with WPV PIM should review the U.S. NAC *Interim Guidance for U.S. Laboratory Facilities to Store and Work with Poliovirus Potentially Infectious Materials*.
- **U.S. facilities in possession of WPV/VDPV types 2 and 3 IM, as well as OPV type 2 IM must implement WHO's Global Action Plan, 3rd Edition (GAPIII) and apply for an ICC [i].**
- The U.S. NAC interprets WHO containment requirements and guidance from GAPIII, Public Health Management of Facility Related Exposure to Live Polioviruses, and other documents. With the assistance of an external working group and feedback from the affected poliovirus-essential facilities (PEFs), the U.S. NAC creates policies for implementing specific aspects of PV containment in the U.S.
- U.S. NAC policies are subject to modification depending on external circumstances such as the epidemiological situation, vaccination coverage, new international policies, or changes in eradication status.
- U.S. NAC policies excerpt information from GAPIII, shown in quotations, and/or include a reference to GAPIII elements or other materials where applicable.
- The terms: a) "shall" or "must" indicate a requirement; b) "should" or "consider" indicate a recommendation; c) "may" indicates a permission; d) "can" indicates a possibility or a capability.

3. Acronyms

Acronym	Definition
BSC	Biosafety cabinet
CC	Certificate of Containment
CDC	Centers for Disease Control and Prevention

Acronym	Definition
cDNA	Complementary deoxyribonucleic acid
CP	Certificate of Participation
cVDPV	Circulating vaccine-derived poliovirus
GAPIII	WHO Global Action Plan, Third edition
ICC	Interim Certificate of Containment
IM	Infectious material
IPV	Inactivated polio vaccine
NAC	National Authority for Containment of Poliovirus
NCC	National Certification Committee
OPV	Oral polio vaccine
PEF	Poliovirus-essential facility
PIM	Potentially infectious material
PPE	Personal protective equipment
PV	Poliovirus
RCC	Regional Certification Commission
RMS	*Risk mitigation strategies for in vitro and in vivo work with poliovirus infectious materials*
RNA	Ribonucleic acid
VDPV	Vaccine-derived poliovirus
WHO	World Health Organization
WPV	Wild poliovirus

4. Definitions

Term	Definition
Circulating VDPV	VDPV isolates for which there is evidence of person-to-person transmission in the community.
Global Action Plan III	The WHO global action plan to minimize poliovirus facility-associated risk after type-specific eradication of wild polioviruses and sequential cessation of OPV use (GAPIII). The 3rd edition of the Global Action Plan (GAPIII) aligns the safe handling and containment of poliovirus infectious and potentially infectious materials with the WHO Endgame Strategy and replaces both the 2009 draft version of the 3rd edition and the 2nd edition of the WHO global action plan for laboratory containment of wild polioviruses.
Inactivated Poliovirus Vaccine	The inactivated poliovirus vaccine was developed in 1955 by Salk and Youngner. [ii] IPV is a killed-virus vaccine and is administered by injection.

Term	Definition
Infectious materials	WPV/VDPV • "Clinical materials from confirmed wild poliovirus (including VDPV) infections; • Environmental sewage or water samples that have tested positive for the presence of wild polioviruses; • Cell culture isolates and reference strains of wild poliovirus; • Seed stocks and infectious materials from IPV production; • Infected animals or samples from such animals, including human poliovirus receptor transgenic mice; • Derivatives produced in the laboratory that have capsid sequences from wild polioviruses [1], unless demonstrably proven to be safer than Sabin strains. The safety of new derivatives containing wild poliovirus capsid sequences will be assessed by an expert panel [2], on the basis of comparison to reference Sabin strains for (i) degree and stability of attenuation; (ii) potential for person-to-person transmission; and (iii) neurovirulence in animal models; • "Cells persistently infected with poliovirus strains whose capsid sequences are derived from wild poliovirus [3]." [iii] OPV/Sabin • "Cell culture isolates and reference OPV/Sabin strains; • Seed stocks and live virus materials from OPV production; • Environmental sewage or water samples that have tested positive for the presence of OPV/Sabin strains; • Fecal or respiratory secretion samples from recent OPV recipients; • Infected animals or samples from such animals, including poliovirus receptor transgenic mice; • Derivatives produced in the laboratory that have capsid sequences from OPV/Sabin strains [4];" [iii] "Cells persistently infected with poliovirus strains whose capsid sequences are derived from OPV/Sabin strains [5]." [iii]
Oral polio vaccine/Sabin	"Attenuated poliovirus strains (approved for use in oral polio vaccines by national regulatory authorities, principally Sabin strains)." [iii] Also called 'Sabin vaccine', OPV contains live, attenuated (weakened) poliovirus strains. OPV formulations include: Trivalent OPV (tOPV) contains all three serotypes of Sabin strains (1 + 2 + 3); use of tOPV ended in April 2016 Bivalent OPV (bOPV) contains Sabin strains 1 + 3; as of April 2016, only bOPV is used routinely Monovalent OPV (mOPV) contains only one serotype of Sabin strain

[1] For U.S. facilities, PV derivatives must contain a complete full-length WPV capsid sequence to meet the WPV IM definition.
[2] Expert panel will be determined by WHO.
[3] For U.S. facilities, PV strains must contain a complete full-length WPV capsid sequence to meet the WPV IM definition.
[4] For U.S. facilities, PV derivatives must contain a complete full-length OPV/Sabin capsid sequence to meet the OPV/Sabin IM definition.
[5] For U.S. facilities, PV strains must contain a complete full-length OPV/Sabin capsid sequence to meet the OPV/Sabin IM definition.

Term	Definition
Nucleic acids	Full-length [iii] "poliovirus RNA, cDNA and total nucleic acid extracted from poliovirus infectious materials (*e.g.,* a virus isolate) or potentially infectious materials (*e.g.,* stool, respiratory specimen, sewage) using methods demonstrated to inactivate poliovirus, or synthesized RNA or cDNA (*e.g.,* cDNA clone, synthetic transcript). Poliovirus nucleic acid can be handled outside of poliovirus containment under the condition that these materials will not be introduced into poliovirus permissive cells or animals (as defined in GAPIII and in the "Guidance for non-poliovirus facilities to minimize risk of sample collections potentially infectious for polioviruses") with or without a transfection reagent, except under appropriate containment conditions as described in GAPIII Annex 2 or Annex 3." [iv] **Note: WHO has exempted full-length PV nucleic acids from GAPIII containment. However, WHO does require that full-length PV nucleic acids are included as part of the facility and national inventories.**
Poliovirus	A picornavirus consisting of three serotypes: 1, 2 and 3; protective immunity is type-specific. Poliovirus serotypes are further subdivided into wild (circulating in nature) and Sabin strains (attenuated strains used for oral polio vaccines). Poliovirus types 2 and 3 have been eliminated in the wild. In this current stage of polio eradication, only type 1 wild poliovirus continues to circulate in endemic areas. It is highly infectious and causes paralytic polio.
Poliovirus-essential facility	"A facility designated by the ministry of health or another designated national body or authority as serving critical national or international functions that involve the handling and storage of needed poliovirus infectious materials or potentially infectious materials under conditions set out in this [GAPIII] standard." [iii] U.S. PEFs will possess or be in pursuit of a CP.
Poliovirus materials	Unless a serotype is specifically identified, PV materials refer to IM and PIM, of all three PV serotypes
Potentially infectious materials	• "Faecal or respiratory secretion samples and their derivatives (*e.g.* stool suspensions, extracted nucleic acids, etc.) collected for any purpose in a geographic area where WPV/cVDPV is present or OPV is being used at the time of collection; • Products of such materials (above) from PV-permissive cells or experimentally infected polio-susceptible animals; • Uncharacterized enterovirus-like cell culture isolates derived from human specimens from countries known or suspected to have circulating WPV/VDPV or use of OPV at the time of collection; • Respiratory and enteric virus stocks derived from PV PIM and handled under conditions conducive to maintaining the viability or enabling the replication of incidental PV; and • Environmental samples (*i.e.* concentrated sewage, wastewater) collected from areas known or suspected to have circulating WPV/VDPV or use of OPV at the time of collection" [v]

Term	Definition
Vaccine derived poliovirus	Classified with wild polioviruses and usually demonstrate 1–15% sequence differences from the parental OPV strain; they may have circulated in the community (cVDPV) or have replicated for prolonged periods in immunodeficient subjects (iVDPV) or be ambiguous and of unknown origin (aVDPV).

5. Inventory Management

5.1 Inventory Conditions

In accordance with WHO GAPIII, U.S. facilities that possess or are in pursuit of a U.S. NAC-issued CP or ICC/CC must develop procedures to 1) maintain an "accurate and up-to-date inventory" of PV materials and 2) ensure facility records related to this material are "current, complete, and stored securely with adequate backup provisions." [*GAPIII subelements 3.1.1, 3.2.1*]. Facilities must continuously implement measures to reduce PV inventory to the smallest extent possible. [*GAPIII subelement 3.4.2*] When handling inventory materials, facilities must implement appropriate safety (*e.g.,* PPE, primary containment such as a BSC, durable transport containers) (*Refer to U.S. NAC RMS, Storage Outside of Containment, and PPE policies*) and security (*e.g.,* authorized personnel, limit access to laboratory) measures (*CP PEFs should refer to the RMS while ICC/CC PEFs should refer to U.S. NAC Security policy*).

5.2 Inventory System

U.S. facilities that possess or are in pursuit of a U.S. NAC-issued CP or ICC/CC must establish procedures to develop and maintain a material accountability system for all PV materials to ensure that possession, use, transfer, and destruction is documented. Facilities must develop a material identification system (*e.g.,* internal sample numbering system) with records that are reliable, legible, and stored securely (*e.g.*, inventory computer files are password protected, manual records are stored in a location accessible only to authorized staff) with adequate backup provisions (*e.g*., copies of inventory records stored in a second location). The processes established by the facility should be based on a site-specific risk assessment of the inventory system. [*GAPIII guidance 3.1.1, 3.2.1*]

5.3 Inventory Control

All PV materials must be controlled with use and storage only permitted in locations authorized by the institution and reported to U.S. NAC. Access to PV materials must be restricted to authorized, trained personnel with a legitimate need, who are enrolled in the facility personnel reliability and occupational health programs (*ICC/CC PEFs should refer to U.S. NAC Security and Occupational Health policies*). [*GAPIII subelement 3.1.1.e*] Facilities must ensure that PV materials are segregated from each other and other virus "isolates, cell lines, cultures, or other materials that could be subject to cross-contamination or misidentification" [6], according to risk. [*GAPIII guidance 3.1.1.b, 3.1.1.h*]

5.4 Records Management

Inventory records for PV materials must be current and complete. [*GAPIII subelement 3.2*] These records may be created and maintained manually or electronically, at the discretion of the facility. Records must be maintained for 10 years after withdrawal as a PEF. [*GAPIII subelements 1.4.2, 3.3.1*] The facility must limit access to PV inventory records to only authorized individuals. [*GAPIII guidance 3.2.1.b*] Inventory records include but are not limited to the following information.

[6] Serotype segregation is not possible for samples that contain more than one PV serotype.

- Geographical location (*e.g.,* country) and date of collection [*GAPIII guidance 3.2.1.e*]
- Sample type (IM or PIM; WPV, VDPV, or OPV) *[GAPIII guidance 3.2.1.i]*
- Location (building, room, and storage unit, where applicable) [*GAPIII guidance 3.2.1.d*]
- Name of person responsible for material (*i.e*., principal investigator, laboratory manager) [*GAPIII guidance 3.2.1.a*]
- Material type (*i.e.*, seed stocks/cell culture isolates, human (fecal, respiratory, tissue), animal, or environmental samples, nucleic acids (*e.g.,* RNA or cDNA) [iv], other) [*GAPIII guidance 3.1.1.i*]
- Estimated number of samples (*i.e*., vials/containers) per sample type ranges: 1-99, 100-999, 1,000-4,999, 5,000- 9,999, 10,000-49, 999, >50,000) for each material type, including volume as appropriate [*GAPIII guidance 3.2.1.d*]
- Information regarding material intra and inter-facility transfers to include the name of the receiving facility or PI, an individual point of contact, date of transfer, material type, sample type, and estimated range of vials/containers [*GAPIII subelement 3.3.1, guidance 3.1.1.c, 15.1.1.f, 15.1.1.g*] *(Refer to U.S. NAC Transfer Policy)*
- Information regarding material destroyed or inactivated (*i.e*., estimated number of vials/containers by material type and date material destroyed/inactivated), excluding IPV [*GAPIII subelement 14.2.1 and guidance 3.2.1.f*] *(Refer to U.S. NAC Inactivation policy)*
- A list of individuals with access to material to include first and last names and dates when access is granted and terminated [*GAPIII guidance 3.2.1.a*]

5.5 Inventory Monitoring

Facilities that possess or are in pursuit of a CP or ICC/CC must self-audit their PV inventory, at least annually, to ensure that inventory records are consistent with the material held by the facility and account for material in their possession. [*GAPIII subelement 3.4.1*] Facility audits must also identify PV materials that are no longer essential (*i.e.,* material not needed for experimental purposes) and which can be destroyed. [*GAPIII subelement 3.4.2*] A U.S. NAC Destruction Attestation Form (Attachment 2) must be submitted to the U.S. NAC describing any PV materials that are destroyed by the facility.

The facility self-audit must be completed and reported to the U.S. NAC each calendar year by April 30. The extent of each audit should be determined by a site-specific risk assessment. [*GAPIII guidance 3.4.1*]

The facility self-audit should include:

- Performing checks of non-PV freezers to ensure storage units that are not designated for PV material storage remain free of these materials
- Confirming that the room and storage unit where the material is physically located is recorded accurately Ensuring the correct material types are listed for the storage unit
- Ensuring the inventory is accurate

Facility inventory self-audits must be performed following transfer of inventory responsibility to another person, relocation of the material, and laboratory identified theft or loss of material (*e.g.*, laboratory worker discovers missing specimen boxes when accessing material for an experiment). Facility must develop procedures to investigate inventory discrepancies and missing, lost or stolen PV materials. All inventory investigations must be documented and, if the material cannot be found within 72 hours and/or person(s) were exposed, the facility must notify institutional

personnel and U.S. NAC (poliocontainment@cdc.gov) immediately as well as all appropriate local, state, and federal agencies. The U.S. NAC will review the investigation documentation and may notify the WHO, if necessary.

Facilities that possess or are in pursuit of a CP or ICC/CC must submit a completed Inventory Update Form (Appendix 1) to the U.S. NAC following the completion of the annual self-audit no later than April 30. [*GAPIII guidance 3.4.1*] Facilities must ensure safety (*e.g.,* appropriate PPE, primary containment, immunization status, medical surveillance) and security measures (*e.g.,* authorized personnel, limit access to laboratory when handling PV materials laboratory) are implemented during the self-audit. [*GAPIII guidance 3.1.1*] Using the form, facilities must 1) categorize material by type (IM or PIM; WPV, VDPV, or OPV), 2) include an estimate of materials using the ranges provided in the form, 3) provide a justification for retaining these materials, and 4) report destruction of materials [7]. Poliovirus inventories are reported annually by the U.S. NAC to the NCC and the RCC in compliance with Phase I of the GAPIII Containment Plan [iii].

Facilities must also upload an Inventory Update Form (Appendix 1) to the U.S. NAC Partner SharePoint Site when all materials of a single PV type are eliminated from the facility's inventory (*e.g.,* WPV type 2 IM).

6. References

6.1 Internal References

Reference
U.S. NAC *Policy for U.S. Poliovirus-essential facilities to control security of poliovirus materials and information* (Security Policy)
U.S. NAC *Policy for U.S. Facilities to Transfer Poliovirus Materials* (Transfer Policy)
U.S. NAC *Personal Protective equipment and Hand Hygiene Practices* policy (PPE Policy)
U.S. NAC *Policy for U.S. Facilities to Inactivate Poliovirus Materials* (Inactivation Policy)
U.S. NAC *Policy For Poliovirus Occupational Health Programs at U.S. Poliovirus-Essential Facilities* (Occupational Health Policy)
U.S. NAC Inventory Update Form
U.S. NAC Destruction Attestation Form

6.2 External References

#	Reference
i	WHO Containment Certification Scheme
ii	Van Damme, P., et al., The safety and immunogenicity of two novel live attenuated monovalent (serotype 2) oral poliovirus vaccines in healthy adults: a double-blind, single-centre phase 1 study. Lancet, 2019. 394(10193): p. 148-158.
iii	WHO Global Action Plan, 3rd Edition (GAPIII)
iv	WHO Containment Activity Group, Report of the Second Meeting of the Containment Advisory Group, November 2017
v	World Health Organization. Guidance to minimize risks for facilities collecting, handling, or storing materials potentially infectious for polioviruses. 2018

[7] Poliovirus material that is consumed while performing experiments does not need to be reported as destroyed. U.S. NAC defines destroyed PV material as material that is determined to be no longer essential and is subsequently inactivated via autoclaving, incineration, or using another validated method (*e.g.,* sodium hypochlorite).

7. Attachments

Attachment 1 – U.S. NAC Inventory Update Form

NAC.AUDIT.FORM.00
6.05 NAC Inventory Up

Attachment 2 – U.S. NAC Destruction Attestation Form

NAC.AUDIT.FORM.00
5.05 NAC Destruction

8. Version History

Version	Change Summary	Effective Date
01	New document	12/6/2018
02	Changed PV materials and facilities covered under this policy to include PIM and facilities that possess or are pursuing a CP. Added biosafety and security measures needed for work with PV inventory; measures to reduce inventory of unneeded materials; limiting access to materials and records to authorized individuals, procedures to investigate inventory discrepancies and report missing, lost, or stolen material; and geographical location (e.g., country) and date of collection to recordkeeping requirements. Reformatted to include cover sheet, table of contents, and definitions. Clarified risk mitigation issues observed by U.S. NAC auditors during site visits.	05/01/2021
03	Document updated to include all PV IM, including WPV1. Reformatted the policy to new NAC template. Updated embedded links to U.S. NAC Inventory Update and Destruction Attestation forms.	02/29/2024

9. Acknowledgments

Prior to publication, U.S. NAC policies are developed in consultation with biosafety, biosecurity, legal, poliovirus, public health subject matter experts as well as poliovirus-essential facilities; endorsed by the CDC Center for Preparedness and Response, Board of Scientific Counselors; and reviewed by CDC technical experts and leaders. This U.S. NAC policy is a living document and subject to ongoing improvement. Please submit feedback or suggestions to poliocontainment@cdc.gov.