

# **Guidelines for implementing the pre-eradication phase of the global action plan for laboratory containment of wild polioviruses**

- **Surveying laboratories**
- **Establishing inventories**

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**DEPARTMENT OF VACCINES  
AND BIOLOGICALS**



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# Executive summary

In 1988 the World Health Assembly adopted the resolution calling for global eradication of poliomyelitis by the year 2000. In a few years, the only source of wild polioviruses will be in the control, diagnostic, production, research, and teaching laboratories of the world. The probability of a laboratory-associated poliovirus infection is small, but the consequences grow greater with time. When polio immunization stops, a chance reintroduction of poliovirus from one of these laboratories into the community will represent a public health threat of global proportions.

Actions to be taken to prevent transmission of wild polioviruses from the laboratory are described in the *WHO global action plan for laboratory containment of wild polioviruses* (WHO/V&B/99.32).

The guidelines published here begin implementation of the pre-eradication phase of the action plan by initiating two critical steps: surveying all medical/biological laboratories that might possess wild poliovirus infectious and/or potentially infectious materials and establishing a global inventory system for laboratories that retain such materials.

The purpose of the global survey is to establish a global inventory of all laboratories with wild poliovirus infectious and/or potentially infectious materials, describe the global action plan to ensure safe handling of all such materials and to effect disposal of those materials no longer needed by the laboratory.

The global survey is hierarchical, beginning with notification by WHO and proceeding through ministries of health (MoH), agencies and institutions, and to laboratories. Because many laboratories that might possess such materials are outside the health sector, completion of the survey will require ministries of health to enlist the cooperation of other ministries, including education, defence, and environment.

The purpose of the inventories is to document location and type of wild poliovirus infectious and/or potentially infectious materials being retained; to meet the country requirements for regions to be certified as polio-free; and to maintain a current list of laboratories to be notified to initiate containment procedures one year after detection of the last wild poliovirus.

The data for the inventory system are obtained from the global survey, beginning with a thorough search by each laboratory for any materials in its possession that meet the definition of wild poliovirus infectious or potentially infectious materials. The laboratory submits a complete list of all such materials it intends to retain, if any,

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to its parent agency/institutional inventory. Data from all laboratories listed on the latter are included in the national inventory, maintained by each country. Summary data from the national inventory are submitted to the appropriate WHO regional office to be included in the regional inventory.

The data from the national inventory should be submitted to the National Committee for the Certification of the Eradication of Poliomyelitis in addition to WHO. Completion of a national inventory is a prerequisite for certification of a country as polio-free.

One year after detection of the last wild poliovirus, WHO will request countries to notify all agencies/institutions on the national inventory to instruct laboratories to begin implementation of procedures for containment of wild polioviruses.

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# Introduction

Once polio is eradicated, the laboratories of the world will be the only remaining source of the virus. Safe handling and, ultimately, maximum containment of poliovirus and potentially infectious materials in the laboratory is crucial.

Until now, poliovirus biosafety concerns have been minimal. Universal immunization with oral polio vaccine (OPV) or inactivated polio vaccine (IPV) has reduced the risk of disease for laboratory workers and the general public. Current day technologies and biosafety practices have further reduced those risks and poliovirus contamination of the environment.

The probability of a laboratory-associated poliovirus infection is small, but the consequences of an infection grow greater with time. A chance reintroduction of wild polioviruses from the laboratory into the community after cessation of transmission presents a threat to polio eradication. A chance reintroduction of wild poliovirus after cessation of immunization presents a threat to public health of global proportions.

The world now faces the formidable, but not insurmountable, challenge of locating the many laboratories that have wild poliovirus infectious, or potentially infectious, materials and ensuring that they are adequately contained in the laboratory, rendered non-infectious, or destroyed. The required action and time table for implementation are described in the *WHO global action plan for laboratory containment of wild polioviruses* (WHO/V&B/99.32). It consists of three phases which are linked to the major eradication objectives.

## Pre-global eradication

### ***Safe handling of wild poliovirus infectious or potentially infectious materials (BSL-2/polio)***

The pre-global eradication phase covers the period when wild poliovirus continues to circulate.

During this phase, countries will identify and develop an inventory of laboratories that retain wild poliovirus infectious and/or potentially infectious materials. Laboratories will institute biosafety level (BSL-2/polio) procedures for safe handling of all such materials. Countries will begin planning for implementation of biosafety requirements pre-global eradication.

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## Post-global eradication

### ***High containment of wild poliovirus infectious and potentially infectious materials (BSL-3/polio): To begin one year after detection of the last wild poliovirus***

The post-global eradication phase begins one year after detection of the last wild poliovirus anywhere in the world, at which time the probability is high that all human transmission has ceased.

In this phase all laboratories possessing wild poliovirus infectious materials or potentially infectious materials will elect one or more of the following three options: implement laboratory containment (BSL-3/polio) procedures as specified in the **WHO Action Plan**, or transfer wild poliovirus infectious and potentially infectious materials to WHO designated repositories, or render such materials non-infectious, or destroy them, under appropriate conditions.

All post-global eradication biosafety actions are to be implemented and documented as complete before global certification of polio eradication can be considered.

## Post-OPV immunization

### ***Maximum containment (BSL-4) of wild poliovirus infectious and potentially infectious materials and high containment (BSL-3/polio) of OPV and OPV-derived viruses: to begin when OPV immunization stops.***

The post-OPV immunization phase begins with the worldwide cessation of OPV administration and the subsequent rapid increase of non-immune susceptible children. The biosafety requirements for wild poliovirus infectious and potentially infectious materials increase from BSL-3/polio to BSL-4, consistent with the increased consequences of inadvertent transmission of wild poliovirus from the laboratory to the community. Biosafety requirements for OPV and OPV-derived viruses increase from BSL-2/polio to BSL-3/polio to prevent reintroduction and potential circulation of these viruses in unimmunized populations. Procedures will be developed to control or destroy unused OPV in clinics, immunization centres, physician's offices, and other sites.

## Evidence for laboratory-associated infections

From 1941 to 1976 a total of 12 laboratory associated poliomyelitis cases including two deaths, were recorded. Most cases occurred in the pre-vaccine era and before the advent of cell culture. The paucity of reports of laboratory-associated poliomyelitis since vaccines were introduced testifies to the effectiveness of vaccines and vastly improved laboratory facilities, technologies, and procedures. By inference, poliovirus infections would also be expected to be rare among laboratory workers.

Despite the advances in biosafety over the past 40 years, recent evidence indicates that the potential nevertheless exists for transmission of poliovirus from the laboratory to the community. In 1992, a wild-type 1 strain used for IPV production was documented as being transmitted from a worker in a vaccine production facility to his young child.

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Although IPV is highly effective in preventing disease, its use cannot be assumed to prevent silent infection among laboratory workers. Using the current OPV to provide a more effective, but still incomplete, barrier to infections may not be an option. At some point after eradication, OPV may be prohibited worldwide to avoid the potential spread of vaccine derived virus in the general population.

## Definitions of poliovirus

Polioviruses are defined by standard neutralization tests with specific antisera. The three poliovirus serotypes form a unique genetic group of human enteroviruses that initiate infection by binding to a specific cellular receptor (PVR:CD155). Wild polioviruses have the capacity to circulate indefinitely within susceptible human populations. Important determinants of the attenuation phenotype reside in the capsid regions of OPV strains, and these determinants are not known to occur in the capsid sequences of wild polioviruses. Candidate attenuated strains that are not approved for use in oral polio vaccines by national control authorities are regarded as wild polioviruses.

Definitions of poliovirus are presented in Box 1.

Box 1 – Definitions of poliovirus*
<ul style="list-style-type: none"><li>• <b>Polioviruses:</b> human enteroviruses that exist as three well-defined serotypes, which infect cells via a specific receptor (PVR:CD155).</li><li>• <b>Wild polioviruses:</b> field isolates and reference strains derived from polioviruses known or believed to have circulated persistently in the community.</li><li>• <b>Oral poliovirus vaccine strains:</b> attenuated polioviruses approved for use in oral vaccines by national control authorities.</li><li>• <b>Vaccine-derived polioviruses:</b> progeny of approved oral poliovirus vaccine strains</li></ul>

\* From the *WHO global action plan for laboratory containment of wild polioviruses*

## Wild poliovirus infectious or potentially infectious materials

Wild poliovirus may be present in faeces and throat specimens; less commonly in blood; and rarely in cerebrospinal fluids from patients with non-paralytic and paralytic infections. In fatal infections, wild poliovirus may be present in faeces, intestinal contents, lymph nodes, brain tissue, and spinal cord tissue. All such clinical materials, treated and stored under conditions known to preserve the virus, from persons known or suspected to be infected are defined as infectious, even though the presence of virus may not have been confirmed.

Other infectious materials are wild poliovirus isolates, reference strains, and all products of the laboratory that meet the definitions of wild poliovirus (Box 1). Also included are environmental sewage or water samples known or suspected to be contaminated, infected laboratory animals, and materials from infected animals.



Definitions and examples of infectious materials are presented in Boxes 2 and 3 respectively.

### Box 2 – Definitions of wild poliovirus infectious materials\*

- **Infectious clinical materials:** all clinical and investigative materials from confirmed or suspected cases of poliomyelitis.
- **Infectious research materials:**
  - All poliovirus derivatives produced in the laboratory that have capsid sequences derived from wild polioviruses
  - Full length poliovirus RNA or cDNA containing capsid sequences derived from wild poliovirus
  - Cells persistently infected with poliovirus strains whose capsid sequences are derived from wild poliovirus
- **Infectious environmental materials:** all sewage or water samples known or suspected to contain wild polioviruses.
- **Infectious animals:** any experimental animal infected with a strain containing capsid sequences derived from a wild poliovirus, especially PVR transgenic mice infected with wild poliovirus.

\* From the *WHO global action plan for laboratory containment of wild polioviruses*

### Box 3 – Examples of wild poliovirus infectious materials\*

- **Throat, faecal, blood, and cerebrospinal fluid specimens from suspected or confirmed polio cases collected for:**
  - Laboratory diagnosis
  - Poliovirus epidemiological studies
- **Autopsy/biopsy specimens (unfixed) from suspected or confirmed polio cases.**
- **Stocks of wild virus:**
  - Prototype strains used as controls
  - Isolates
  - Proficiency test panels
  - Seeds for inactivated vaccines
- **Research laboratory materials with wild poliovirus capsid sequences:**
  - Poliovirus derivatives
  - Full length poliovirus RNA or cDNA
  - Infected cells
- **Environmental samples of sewage and water known or suspected to be contaminated with wild poliovirus.**
- **Specimens from laboratory animals infected with wild virus (non-human primates, transgenic mice).**

\* From the *WHO global action plan for laboratory containment of wild polioviruses*

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Potentially infectious materials include any clinical and environmental specimen compatible with the potential presence of poliovirus collected for any diagnostic or research purposes at a time and in a geographic area of wild poliovirus endemicity.

All such clinical and environmental materials treated by methods known to preserve poliovirus and maintained in the laboratory under appropriate conditions must be carefully evaluated for potential infectivity.

Each collection must be assessed to determine the likelihood of the presence of wild polioviruses, based on treatment and storage history, the country of origin, the year, the time of the last indigenous wild poliovirus isolates in the area, and the type of specimen. Frozen stool samples from young children during endemic periods would have the highest probability of containing infectious polioviruses.

Routinely collected serum specimens and cerebrospinal fluids are not likely to contain sufficient levels (if any) of poliovirus to cause infection and are not considered potentially infectious. Also excluded are clinical materials stored without refrigeration for three months or more, refrigerated for one year or more, heat inactivated, treated with a disinfectant known to inactivate polioviruses, or tested and found negative for the presence of enteroviruses.

Definitions and examples of potentially infectious materials are presented in Boxes 4 and 5.

<b>Box 4 – Definition of potentially infectious laboratory materials*</b>
<b>Potentially infectious laboratory materials:</b> clinical materials such as throat swabs and faeces; and environmental samples collected for any purposes at a time and in a geographical area where wild poliovirus was known or suspected to be present and maintained under conditions known to preserve polioviruses.

\* From the *WHO global action plan for laboratory containment of wild polioviruses*

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**Box 5 – Examples of potentially infectious materials collected  
at a time and in a geographical area where wild poliovirus  
was known to have been present \*†**

- **Clinical materials:**
  - Faeces
  - Throat swabs
- **Environmental samples of sewage and untreated water**
- **Laboratory products**
  - Untyped enterovirus-like cell culture isolates
  - Undifferentiated poliovirus isolates

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\* Considered as non-infectious are such materials stored without refrigeration for three months or more, refrigerated for one year or more, heat inactivated, treated with antiviral disinfectants, or previously tested and found negative for the presence of enteroviruses

† From the *WHO global action plan for laboratory containment of wild polioviruses*

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# Global Survey of laboratories that might possess wild poliovirus infectious and/or potentially infectious materials

The purpose of the Global Survey is:

- To establish a **Global Inventory** of laboratories that retain wild poliovirus infectious and/or potentially infectious materials.
- To ensure safe handling of all such materials.
- To effect disposal of all such materials no longer needed by the laboratory.

Diagnostic and public health laboratories keep poliovirus isolates and clinical specimens for documentation of past investigations of endemic or imported cases of poliomyelitis. Some maintain multiple virus strains for test controls, reference purposes or their historic value. Educational institutions have wild polioviruses for teaching exercises. Virus research laboratories retain poliovirus stocks or infectious materials for studies on the biologic, biochemical, or genetic properties of the virus. Other research laboratories store potentially infectious materials as documentation of completed studies or for future studies. Some environmental laboratories retain contaminated materials or wild poliovirus reference strains or use wild virus for tests on the effectiveness of virucidal compounds. Vaccine producers have wild strains for the production of IPV or to test the quality of OPV. National control laboratories may have similar strains.

Channels for identifying laboratories with wild poliovirus include government sources, national laboratory registries, accrediting bodies, professional organizations, and national and institutional biosafety infrastructures.

Most challenging to identify are those other laboratories with potentially infectious clinical, epidemiological, research, or environmental specimens collected for other purposes at a time and in a geographical area of wild poliovirus endemicity.

In developed countries, potentially infectious materials will be found in research laboratories with strong international programmes. In developing countries, the laboratories most likely to possess such materials should also be identifiable based on the strengths of their respective research programs. However, the absence of such materials in other laboratories, regardless of size, cannot be assumed. The search for potentially infectious materials must include all medical/biological laboratories that maintain such materials under conditions known to preserve polioviruses.

Agencies/institutions with laboratories that might possess wild poliovirus infectious and/or potentially infectious materials are listed in Box 6.

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**Box 6 – Agencies/institutions with laboratories that might possess wild poliovirus infectious and/or potentially infectious materials\***

- **Biological control agencies**
  - National/provincial
- **Biomedical research institutions**
  - National/provincial/commercial/non-profit
- **Culture collections**
  - National/institutional
- **Environmental agencies**
  - National/provincial/local
- **Hospitals**
- **Military agencies**
  - Health/research
- **Producers**
  - Biologics/vaccines
- **Public health agencies**
  - National/provincial/local
  - Food safety
- **Universities**

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\* From the *WHO global action plan for laboratory containment of wild polioviruses*

Laboratories that might possess wild poliovirus and/or potentially infectious materials are listed in Box 7.

**Box 7 – Laboratories that might possess wild poliovirus infectious and/or potentially infectious materials†**

- **Microbiology laboratories\***
  - Control
  - Diagnostic
  - Production
  - Research
  - Teaching
- **Pathology laboratories\*\***
- **Gastroenterology laboratories\*\***
- **Nutrition laboratories\*\***
- **Environmental laboratories\*\***

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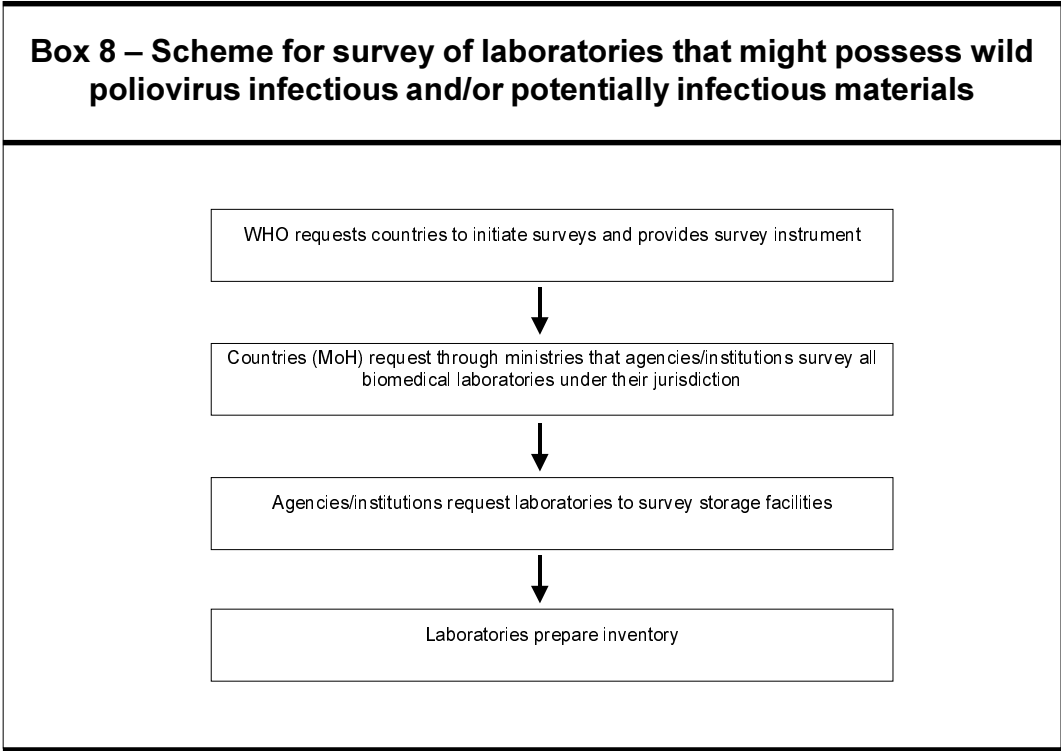
\* Includes bacteriology, mycology, parasitology, and virology

\*\* Includes types of laboratories listed under Microbiology as might apply

† From the *WHO global action plan for laboratory containment of wild polioviruses*

The **Global Survey** is hierarchical, beginning with WHO and proceeding through ministries of health, agencies/institutions, and to laboratories. Completion of the survey will require ministries of health to enlist the cooperation of other ministries, including education, defence, and environment, to reach those medical/biological laboratories outside the health sector.

The basic scheme for the survey is shown in Box 8. Each country must design its own scheme consistent with the global objectives and its internal medical/biological laboratory structure.



Sample letters which may be used by ministries of health and agencies/institutions are shown in Annex 5.

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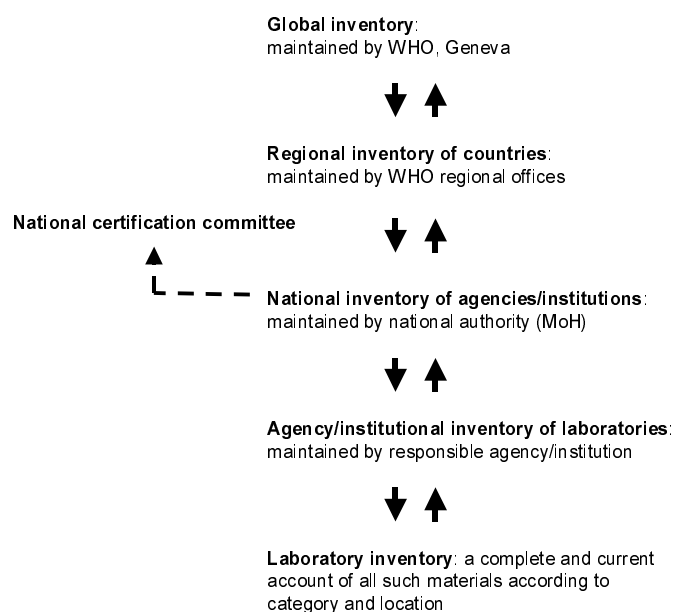
# Inventory of laboratories that retain wild poliovirus infectious and/or potentially infectious materials

The information obtained from the survey provides the data for a global inventory system for laboratories that retain wild poliovirus infectious and/or potentially infectious materials. The purpose of the inventories is:

- to document location and type of wild poliovirus infectious and/or potentially infectious materials being retained;
- to meet the country requirements for regions to be certified as polio-free; and
- to maintain a current list of laboratories for notification to initiate final containment procedures one year after detection of the last wild poliovirus.

The scheme for inventory of laboratories that retain wild poliovirus infectious and/or potentially infectious materials is shown in Box 9. The **Global Inventory** consists of data compiled from the **WHO Regional Inventories** which, in turn, consist of the survey data provided by member countries. Each country maintains a **National Inventory** consisting of data from the **Agency/Institution Inventories** of laboratories that possess wild poliovirus infectious and/or potentially infectious materials. Each Laboratory maintains a current inventory of such materials kept under conditions as specified in the **WHO Global Action Plan**.

### Box 9 – Scheme for inventory of laboratories that retain wild poliovirus and/or potentially infectious materials



Data to be submitted by each laboratory to its parent agency/institution include documentation of search, type of material (infectious and potentially infectious), whether materials are retained, description and amount of each type of material, location in the laboratory where stored, and documentation of BSL-2/polio storage conditions.

A flow chart for the **Laboratory Inventory**, and forms to be completed and submitted to the laboratory's parent agency/institution are included in Annex 1.

The **Agency/Institution Inventory** will keep the **Laboratory Inventory** report on active file. Data to be submitted by each agency/institution to the **National Inventory** will include: documentation of search for laboratories that might possess wild poliovirus infectious and/or potentially infectious materials, names of laboratories that retain such materials, types of laboratories, nature of materials, dates of most recent information, and verification of accuracy of report. The form to be used by agencies/institutions to submit to the **National Inventory** is in Annex 2.

The **National Inventory** will retain on active file the completed reports from its **Agency/Institution Inventory**, and will compile data from those reports including: documentation of search, names of agencies/institutions that retain materials, number of laboratories according to types and whether retaining infectious, potentially infectious materials, or both, and dates of most recent reports from the agencies/institutions. The form to be completed by the **National Inventory** is given in Annex 3.



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**National Inventories** should be as required for regional certification, in keeping with current progress on polio eradication. Findings should be submitted to the appropriate **WHO Regional Inventories** and the **National Committee for the Certification of the Eradication of Poliomyelitis**. Completion of **National Inventories** is a prerequisite for certification of the region as polio-free.

The **WHO Regional Inventory** will compile data from the reports on file which include the following: names of countries that retain infectious or potentially infectious materials, numbers of agencies/institutions in each country that retain materials, numbers of laboratories according to type and whether retaining such materials, and dates of most current information from countries (Annex 4).

The **WHO Global Inventory**, Geneva, will consist of a compilation of data from the regions.

One year after detection of the last wild poliovirus anywhere in the world, WHO will request countries to notify all agencies/institutions on the **National Inventory** to instruct all laboratories to begin implementation of procedures for laboratory containment of wild polioviruses as described in the **WHO Global Action Plan**.

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# Annex 1:

## Laboratory inventory of wild poliovirus infectious and/or potentially infectious materials

The full collaboration of laboratory workers and supervisors at all levels is required to assure that inadvertent transmission of wild poliovirus from the laboratory to the community does not occur. This is a serious responsibility.

Medical/biological laboratories are requested to carefully search all storage records and facilities to determine the presence or document the absence of wild poliovirus infectious and/or potentially infectious materials, including:

### Infectious

- Wild poliovirus stocks (reference strains, isolates, proficiency test panels) or research materials containing capsid sequences derived from wild polioviruses.
- Clinical materials (throat, faecal or autopsy specimens) from confirmed or suspected polio cases.
- Animals infected with wild polioviruses.
- Stored specimens from experimental animals infected with wild polioviruses.

### Potentially infectious

- Throat or faecal specimens from studies or field surveys performed for any purpose at a time or in a region where polio was endemic.
- Environmental (water and sewage) specimens collected at a time and geographical area where polio was endemic.
- Untyped enterovirus-like and undifferentiated poliovirus isolates.

A flow chart is attached to facilitate the inventory.

Non-poliovirus laboratories must take particular care to identify potentially infectious materials that may have been collected at a time or in a geographic area where polio was endemic. Please consult the accompanying list of countries and dates of last endemicity. Questions pertaining to specific materials, dates, or places should be referred to the WHO laboratory coordinator in your region.

Any wild poliovirus infectious or potentially infectious materials that are no longer critical to the laboratory mission should be destroyed by autoclaving or as described in the **WHO Global Action Plan**. Historic wild poliovirus materials to be placed in a designated repository are narrowly defined as pertaining to specific epidemiological events. Routine clinical specimens, virus isolates, and common reference virus stocks are not considered historic.

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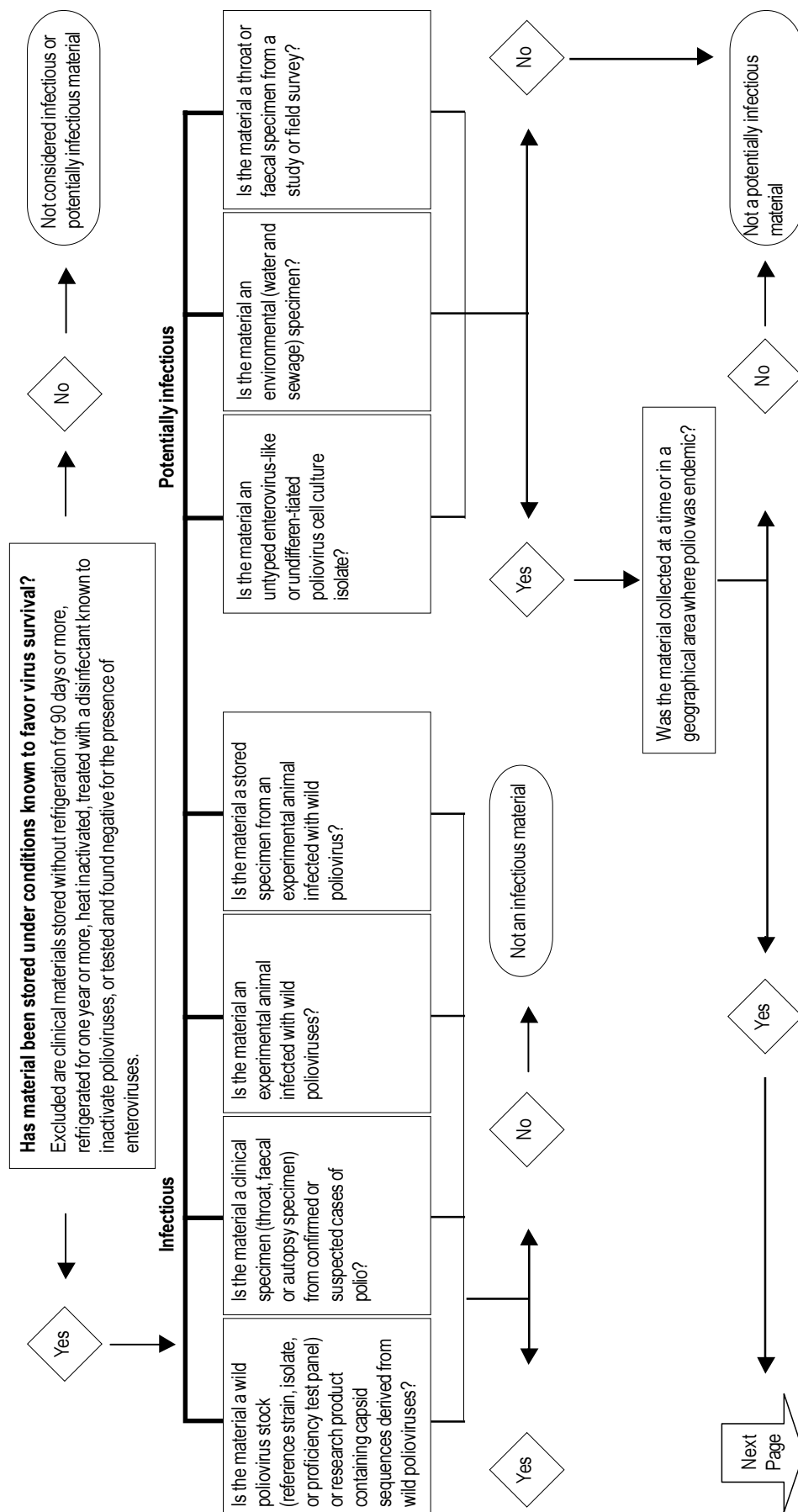
The attached **Laboratory Inventory** form should be completed in full, using duplicate pages as necessary, and submitted to its parent agency/institution on or before the requested date. Submissions should also include written documentation of how and what facilities were searched.

The **Laboratory Inventory** should be kept current at all times. Any changes in numbers or locations of wild poliovirus infectious or potentially infectious materials should be recorded as they occur. The laboratory should notify its parent agency/institution of any changes in wild poliovirus status.

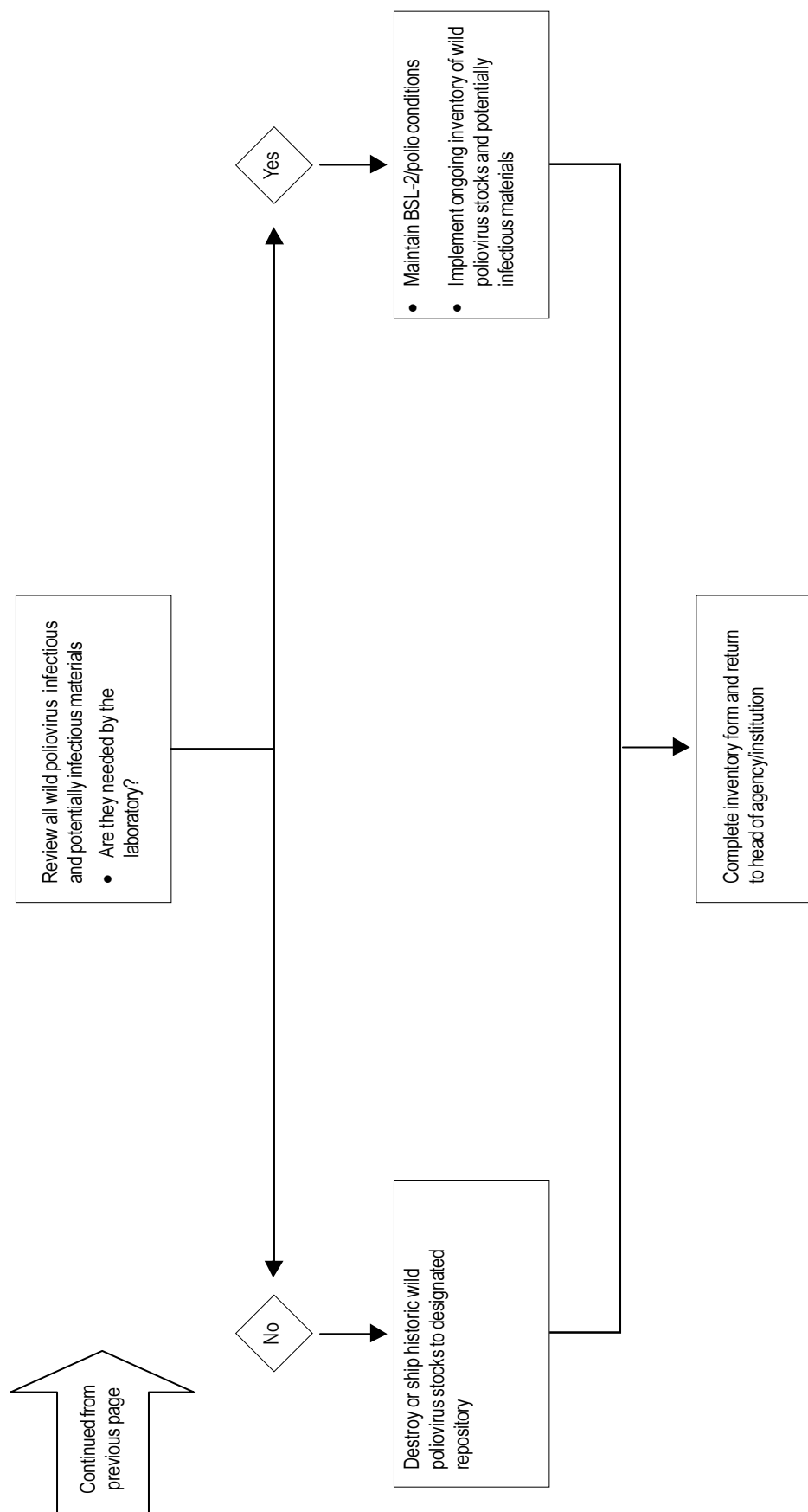
All poliovirus infectious or potentially infectious materials retained by the laboratory should be maintained under BSL-2/polio conditions. One year after detection of the last wild poliovirus, all laboratories on the **National Inventory** will be requested to destroy, transfer, or place such materials under high containment conditions.

Thank you for your help in making the world safe from polio.

**Figure 1: Flow chart for inventory of wild poliovirus infectious and/or potentially infectious materials**



**Figure 1: Flow chart for inventory of wild poliovirus infectious and/or potentially infectious materials (continued)**



**Table 1: Year of last reported indigenous poliovirus case  
by country/territory\***

Country	Year of last polio	Country	Year of last polio
Afghanistan	Ongoing	Central African Republic	Ongoing
Albania	1978	Chad	Ongoing
Algeria	1996	Chile	1975
American Samoa	1950s <sup>1</sup>	China	1994
Andorra	1958 <sup>1</sup>	Colombia	1991
Angola	Ongoing	Comoros	1983 <sup>1</sup>
Anguilla	NR	Congo	Ongoing
Antigua & Barbuda	1965 <sup>1</sup>	Cook Islands	1959
Argentina	1984 <sup>1</sup>	Costa Rica	1972
Armenia	1995	Cote d'Ivoire	Ongoing
Australia	1972 <sup>2</sup>	Croatia	1990
Austria	1980 <sup>1</sup>	Cuba	1962 <sup>1</sup>
Azerbaijan	1995	Cyprus	1995
Bahamas	1967 <sup>1</sup>	Czech Republic	1960
Bahrain	1993 <sup>1</sup>	Democratic People's Republic of Korea	Ongoing
Bangladesh	Ongoing	Denmark	1976
Barbados	1967 <sup>1</sup>	Dem. Rep. of the Congo	Ongoing
Belarus	1994 <sup>1</sup>	Djibouti	1999 <sup>2</sup>
Belgium	1979 <sup>1</sup>	Dominica	NR
Belize	1981 <sup>1</sup>	Dominican Republic	1985 <sup>2</sup>
Benin	Ongoing	Ecuador	1990
Bermuda	NR	Egypt	Ongoing
Bhutan	1998 <sup>1</sup>	El Salvador	1987 <sup>1</sup>
Bolivia	1989	Equatorial Guinea	1992 <sup>1</sup>
Bosnia & Herzegovina	1993 <sup>1</sup>	Eritrea	Ongoing
Botswana	1989 <sup>1</sup>	Estonia	1961
Brazil	1989	Ethiopia	Ongoing
British Virgin Islands	NR	Fed. S. of Micronesia	NR
Brunei Darussalam	1978 <sup>2</sup>	Fiji	1962 <sup>2</sup>
Bulgaria	1982	Finland	1963
Burkina Faso	Ongoing	T. F. Y. R. Macedonia	1993 <sup>1</sup>
Burundi	1999 <sup>2</sup>	France	1989
Cambodia	1997	French Guiana	1983 <sup>1</sup>
Cameroon	Ongoing	French Polynesia	1982 <sup>2</sup>
Canada	1985	Gabon	1996 <sup>2</sup>
Cape Verde	1988 <sup>1</sup>	Gambia	1997 <sup>1</sup>
Cayman Islands	1958 <sup>1</sup>	Georgia	1991 <sup>1</sup>

**Table 1: Year of last reported indigenous poliovirus case  
by country/territory\* (continued)**

Country	Year of last polio	Country	Year of last polio
Germany	1990	Luxembourg	1963 <sup>1</sup>
Ghana	Ongoing	Macao, SAR	1975 <sup>1</sup>
Greece	1982	Madagascar	1997
Grenada	1970 <sup>1</sup>	Malawi	1991 <sup>1</sup>
Guadeloupe	NR	Malaysia	1985 <sup>1</sup>
Guam	1964 <sup>1</sup>	Maldives	1980 <sup>1</sup>
Guatemala	1990 <sup>1</sup>	Mali	Ongoing
Guinea	Ongoing	Malta	1964 <sup>1</sup>
Guinea-Bissau	Ongoing	Marshall Islands	1976 <sup>1</sup>
Guyana	1977 <sup>1</sup>	Martinique	NR
Haiti	1989 <sup>1</sup>	Mauritania	1999 <sup>2</sup>
Honduras	1989 <sup>1</sup>	Mauritius	1980 <sup>1</sup>
Hong Kong, SAR	1983 <sup>1</sup>	Mexico	1990
Hungary	1969	Monaco	NR
Iceland	1960 <sup>1</sup>	Mongolia	1993 <sup>1</sup>
India	Ongoing	Montserrat	NR
Indonesia	1995	Morocco	1989 <sup>1</sup>
Iran (Islamic Rep.)	1997	Mozambique	1993 <sup>1</sup>
Iraq	Ongoing	Myanmar	1996
Ireland	1965 <sup>1</sup>	Namibia	1995
Israel	1988	Nauru	1910 <sup>1</sup>
Italy	1982	Nepal	Ongoing
Jamaica	1982	Netherlands	1960s <sup>1</sup>
Japan	1980	Netherlands Antilles	NR
Jordan	1988 <sup>1</sup>	New Zealand	1962 <sup>1</sup>
Kazakhstan	1995 <sup>1</sup>	New Caledonia	1982
Kenya	1988 <sup>1</sup>	Nicaragua	1981 <sup>1</sup>
Kiribati	NR	Niger	Ongoing
Kuwait	1985 <sup>1</sup>	Nigeria	Ongoing
Kyrgyzstan	1992	Niue	1950s <sup>1</sup>
Latvia	1992 <sup>1</sup>	Mariana Islands	1960s <sup>1</sup>
Lao PDR	1996	Norway	1969
Lebanon	1994 <sup>1</sup>	Oman	1993 <sup>1</sup>
Lesotho	1987 <sup>1</sup>	Pakistan	Ongoing
Liberia	Ongoing	Palau	1940s <sup>2</sup>
Libyan Arab Jamahiriya	1991 <sup>1</sup>	Palestine N.A.	1988
Lithuania	1971 <sup>1</sup>	Panama	1972 <sup>1</sup>

**Table 1: Year of last reported indigenous poliovirus case  
by country/territory\* (*continued*)**

Country	Year of last polio	Country	Year of last polio
Papua New Guinea	1996 <sup>1</sup>	Swaziland	1989 <sup>1</sup>
Paraguay	1985 <sup>1</sup>	Sweden	1977
Peru	1991	Switzerland	1982
Philippines	1993 <sup>1</sup>	Syrian Arab Republic	1998
Poland	1984	Tajikistan	1997 <sup>2</sup>
Portugal	1986	Thailand	1997
Puerto Rico	NR	Togo	Ongoing
Qatar	1990 <sup>1</sup>	Tokelau	1950s <sup>1</sup>
Republic of Korea	1983 <sup>1</sup>	Tonga	1982 <sup>1</sup>
Republic of Moldova	1996 <sup>2</sup>	Trinidad & Tobago	1972
Reunion	1979 <sup>1</sup>	Tunisia	1994
Romania	1992	Turkey	1998
Russian Federation	1996 <sup>2</sup>	Turkmenistan	1996
Rwanda	1999 <sup>2</sup>	Turks & Caicos Islands	1977
Saint Kitts & Nevis	1969 <sup>1</sup>	Tuvalu	1936 <sup>1</sup>
Saint Lucia	1970 <sup>1</sup>	Uganda	1996
St. Vincent & Gren.	1977 <sup>1</sup>	United Kingdom	1982
Samoa	1950s	Ukraine	1996 <sup>2</sup>
San Marino	NR	United Arab Emirates	1992 <sup>1</sup>
Sao Tome & Principe	NR	United Rep. Of Tanzania	1996
Saudi Arabia	1989	Uruguay	1978 <sup>1</sup>
Sierra Leone	Ongoing	U. N. R. W. A.	NR
Senegal	1998	United States of America	1986
Seychelles	1980s <sup>1</sup>	US Virgin Islands	NR
Singapore	1973	Uzbekistan	1995
Slovakia	1960s	Vanuatu	1989 <sup>2</sup>
Slovenia	1978 <sup>1</sup>	Venezuela	1989
Solomon Islands	NR	Viet Nam	1997
Somalia	Ongoing	Wallis and Futuna	1972 <sup>2</sup>
South Africa	1989	Yemen	1999 <sup>2</sup>
Spain	1988	Yugoslavia	1996
Sri Lanka	1993	Zambia	1995
Sudan	Ongoing	Zimbabwe	1991 <sup>2</sup>
Suriname	1982 <sup>1</sup>		

\* Unless noted otherwise, year of last virologically confirmed case is used. "Ongoing" refers to countries still considered endemic for wild poliovirus at the end of 1999.

<sup>1</sup> Details about case are not known.

<sup>2</sup> Clinically confirmed case.

NR= no report



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**Sample form**  
**Laboratory Inventory**  
**of wild poliovirus infectious and/or potentially infectious materials**

*(Duplicate report upon completion to be forwarded to  
requesting agency/institution)*

For year: \_\_\_\_\_

Laboratory: \_\_\_\_\_

Type of laboratory (please check (✓) one):

<input type="checkbox"/> Control	<input type="checkbox"/> Diagnostic
<input type="checkbox"/> Production	<input type="checkbox"/> Research
<input type="checkbox"/> Teaching	<input type="checkbox"/> Other _____

Institution: \_\_\_\_\_

Address: \_\_\_\_\_

Phone number: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

Report prepared by: \_\_\_\_\_

This laboratory has searched all relevant storage areas for wild poliovirus infectious and potentially infectious materials as described in the **WHO global action plan for laboratory containment of wild polioviruses** (WHO/V&B/99.32).

(Please check (✓) one or more of the following.)

☐ This laboratory has no or has destroyed all wild poliovirus infectious or potentially infectious materials.

☐ Materials of historic value have been shipped to the following designated repository(ies):

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

☐ This laboratory has the following wild poliovirus and/or potentially infectious materials:  
(see next page)

**This laboratory has the following wild poliovirus and/or potentially infectious materials:**

Type of material	Description and amount	Secure location where stored
<b>Infectious</b>		
I. Wild poliovirus stocks (reference strains, isolates, proficiency test panels) or research materials containing capsid sequences derived from wild polioviruses		
II. Clinical materials (throat, faecal or autopsy specimens) from confirmed or suspected polio cases		
III. Animals (non-human primates and transgenic mice) infected with wild polioviruses		
IV. Stored specimens from experimental animals infected with wild polioviruses		
<b>Potentially infectious**</b>		
I. Throat or faecal specimens from studies or field surveys performed for any purpose at a time or in a geographical area where polio was endemic		
II. Environmental (water and sewage) specimens collected at a time and in a geographical area where polio was endemic		
III. Untyped enterovirus-like or undifferentiated poliovirus isolates		

**\*\* See attached list of countries.**

We certify that the above is an accurate record of wild poliovirus infectious and/or potentially infectious materials currently in possession of this laboratory and maintained under BSL-2/polio conditions, including secured storage area with limited access.

We understand that one year after detection of the last wild poliovirus, WHO will request countries to notify all agencies/institutions listed in the **National Inventory** to instruct laboratories to begin implementation of procedures for laboratory containment of wild polioviruses as described in the **WHO Global Action Plan**.

Signed:

\_\_\_\_\_  
Director of laboratory

\_\_\_\_\_  
Date

\_\_\_\_\_  
Director of agency/institute

\_\_\_\_\_  
Date

---

## Annex 2:

### Agency/Institution Inventory of laboratories that retain wild poliovirus infectious and/or potentially infectious materials

Box 6 lists examples of the types of agencies/institutions with laboratories that might possess wild poliovirus infectious and/or potentially infectious materials. These and all similar organizations are to be included in the survey. They play a critical role in ensuring that all laboratories (Box 7) under their jurisdiction have been reviewed and that those retaining wild poliovirus infectious and potentially infectious materials do so under BSL-2/polio containment conditions. Agencies/institutions that document no such laboratories are located in their organizations should complete the attached form and forward it the requesting national authority.

Agencies/institutions that have jurisdiction over laboratories that elect to retain wild poliovirus infectious and potentially infectious materials should establish **Agency/Institution Inventories**. Such **Inventories** should be located at the highest organizational level. The number of **Inventories** will depend on the complexity of the biomedical laboratory infrastructure in the country and the number of qualifying laboratories. Smaller countries may elect to omit **Agency/Institution Inventories**, operating only a **National Inventory**. Although a single **Inventory** in such countries is encouraged, care must be taken to include all the information required for both.

Critical elements of the **Agency/Institution Inventory** include the following:

- documentation of search (numbers of laboratories surveyed);
- names of laboratories that retain such materials;
- types of laboratories (control, diagnostic, production, research, teaching);
- nature of material (infectious, non-infectious);
- dates of most recent information from laboratories;
- verification of accuracy of report.

A sample **Laboratory Inventory** form is attached.

---

## Sample form

### Agency/Institution Inventory of laboratories that retain wild poliovirus infectious and/or potentially infectious materials

*(Report to be forwarded upon completion to national authority)*

Report for year: \_\_\_\_\_

Agency/institution: \_\_\_\_\_

Address: \_\_\_\_\_

Phone number: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

Report prepared by: \_\_\_\_\_

---

This agency/institution has conducted a survey of all laboratories under its jurisdiction for wild poliovirus infectious and potentially infectious materials as described in the **WHO global action plan for laboratory containment of wild polioviruses** (WHO/V&B/99.32).

Number of laboratories surveyed: \_\_\_\_\_

(Please check (✓) one of the following.)

☐

This agency/institution has no laboratories that possess wild poliovirus infectious or potentially infectious materials.

☐

The following laboratories possess wild poliovirus infectious and/or potentially infectious materials:

Name and address of laboratory	Type of laboratory*	Type of material	
		Potentially infectious only	Infectious or both
1.			
2.			
3.			
4.			
5.			

Name and address of laboratory	Type of laboratory*	Type of material	
		Potentially infectious only	Infectious or both
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

\* Select one of the following which best describes the activities of the laboratory: control, diagnostic, production, research, or teaching.

I understand that one year after detection of the last wild poliovirus, WHO will request countries to notify all agencies/institutions on the **National Inventory** to instruct laboratories to begin implementation of procedures for laboratory containment of wild polioviruses as described in the **WHO Global Action Plan**.

I certify that the above is an accurate report of wild poliovirus infectious and potentially infectious materials currently being retained by all laboratories under my jurisdiction. Any change in status will be reported on an annual basis as required by the **National Registry**.

Signed:

\_\_\_\_\_  
Director of agency/institute

\_\_\_\_\_  
Date

---

## Annex 3:

### National Inventory of agencies/institutions that retain wild poliovirus infectious and/or potentially infectious materials

Every country is expected to establish a **National Inventory**. Data from the **Inventory** will constitute a critical component of the documentation required to achieve certification as polio-free.

The organization (usually the ministry of health) that conducts the national survey of laboratories that might possess wild poliovirus infectious or potentially infectious materials will assign organizational responsibility for the **National Inventory**.

The critical elements of a **National Inventory** include the following:

1. Documentation of search (number of agencies surveyed).
2. Names of agencies/institutions that retain materials.
3. Number of laboratories according to type and whether retaining infectious or potentially infectious materials.
4. Dates of most recent information from agencies/institutions.

Sample forms for compiling and maintaining the data on the critical elements are attached.

**National Inventories** should be completed by the end of the year 2000, in keeping with current progress on polio eradication. Data are to be submitted to the appropriate **WHO Regional Inventory**.

---

## Sample form

### National Inventory of laboratories that retain wild poliovirus infectious and/or potentially infectious materials

*(Report to be forwarded upon completion to the WHO regional office and the  
National Committee for the Certification of the Eradication of Poliomyelitis)*

Report for year: \_\_\_\_\_

National authority: \_\_\_\_\_

Address: \_\_\_\_\_

Phone number: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

Report prepared by: \_\_\_\_\_

---

NOTE: Completion of a **National Inventory** is a prerequisite for certification of a country as polio-free. One year after detection of the last wild poliovirus, WHO will request countries to notify all agencies/institutions on the **National Inventory** to instruct laboratories to begin implementation of procedures for maximum laboratory containment of wild polioviruses as described in the **WHO Global Action Plan**.

This national authority has conducted a survey of all agencies/organizations under its jurisdiction for laboratories with wild poliovirus infectious and potentially infectious materials as described in the **WHO global action plan for laboratory containment of wild polioviruses** (WHO/V&B/99.32).

Number of agencies/organizations surveyed: \_\_\_\_\_

Name and address of agency /institution	Number of laboratories, according to type, possessing wild poliovirus or potentially infectious materials										Date most recent information received
	Number of control laboratories		Number of diagnostic laboratories		Number of production laboratories		Number of research laboratories		Number of teaching laboratories		
	Potentially infectious	Infectious or both	Potentially infectious	Infectious or both	Potentially infectious	Infectious or both	Potentially infectious	Infectious or both	Potentially infectious	Infectious or both	

I certify that the above is an accurate report of wild poliovirus infectious and potentially infectious materials currently being retained by all laboratories under my jurisdiction.  
Any change in status will be reported on an annual basis as required by the WHO.

Signed: \_\_\_\_\_ Date \_\_\_\_\_  
Representative of National Authority



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# **Annex 4:**

## **WHO Regional Inventory of countries that retain wild poliovirus infectious and/or potentially infectious materials**

The WHO regional office will maintain an **Inventory** consisting of data compiled from the **National Inventories** of all member countries.

The critical elements of a **Regional Inventory** include:

- names of countries;
- number of agencies/institutions in each country that retain materials;
- number of laboratories according to type and whether retaining infectious or potentially infectious materials;
- dates of most recent information from countries.

Sample forms for compiling the data and maintaining the inventory are attached.

---

### Sample form

#### WHO Regional Inventory of countries that retain wild poliovirus infectious and/or potentially infectious materials

*(Report to be forwarded upon completion to WHO, Geneva and the Regional  
Committee for the Certification of the Eradication of Poliomyelitis)*

Report for year: \_\_\_\_\_

WHO Regional Office: \_\_\_\_\_

Address: \_\_\_\_\_

Phone number: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

Report prepared by: \_\_\_\_\_

---

This Regional Office has conducted a survey of all countries under its jurisdiction for laboratories with wild poliovirus infectious and potentially infectious materials as described in the **WHO global action plan for laboratory containment of wild polioviruses** (WHO/V&B/99.32).

The following countries have identified agencies/institutions with laboratories that retain such materials.



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# Annex 5:

## Sample letters

### *Sample letter from WHO to ministries of health (MoH)*

Dear (MoH),

I am writing to request your assistance in conducting a survey of agencies/institutions with laboratories that might possess wild poliovirus infectious and/or potentially infectious materials and establishing a **National Inventory** of those with laboratories that retain such materials.

In 1988 the World Health Assembly adopted the resolution calling for global eradication of poliomyelitis by the year 2000. Today, the number of reported cases in the world has been reduced nearly 90% and at least 155 countries are reporting zero cases annually. The goal of polio eradication appears to be within reach. In a few years, the only source of wild polioviruses will be in the diagnostic, research, teaching, and vaccine production laboratories of the world. When polio immunization stops, a chance reintroduction of poliovirus from one of these laboratories into the community will represent a public health threat of global proportions.

Actions to be taken to prevent transmission of wild polioviruses from the laboratory are described in the enclosed ***WHO global action plan for laboratory containment of wild polioviruses***, previously submitted to your organization as a draft for comment.

The enclosed **Guidelines** describe the first steps in implementation of the pre-eradication phase of that **Plan**, consisting of surveying all biomedical laboratories in each country and establishing a hierarchical series of **Inventories** for laboratories that retain wild poliovirus infectious and/or potentially infectious materials.

Each country will conduct a nationwide survey of all agencies/institutions with laboratories that might possess wild poliovirus infectious and/or potentially infectious materials and establish a **National Inventory** of those that do. Each agency/institution will conduct a survey of all laboratories under its jurisdiction and establish an **Agency/Institution Inventory** of those that retain such materials. Each **Laboratory** is requested to search its facilities for materials that meet the definitions of infectious and/or potentially infectious, establish an **Inventory** of that retained, and inform its parent agency/institution of its findings.

Because many laboratories are outside the health sector, completion of the **National Inventory** will require the Ministry of Health to enlist the cooperation of other ministries, including education, defence, and environment.

---

The enclosed package has been prepared to assist countries in conducting the nationwide survey and establishing a **National Inventory**.

Consistent with current progress on polio eradication, I would be grateful for completion of your **National Inventory** by the end of year 2000. Please provide the findings to your national certification committee and the WHO regional office.

One year after detection of the last wild poliovirus, WHO will request countries to notify all agencies/institutions on the **National Inventory** to instruct laboratories to initiate procedures for laboratory containment as described in the **WHO Global Action Plan**.

Thank you for your cooperation on this important global public health effort.

Yours sincerely,

***Enclosures:***

- A. *WHO global action plan for the laboratory containment of wild polioviruses*
- B. *Guidelines for implementing the pre-eradication phase of the global action plan for laboratory containment of wild polioviruses*

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***Sample letter from a national authority to agencies/institutions with  
laboratories that might possess wild poliovirus or  
potentially infectious materials***

Dear (organization/institution head):

I am writing to you to request your assistance in cooperation with the World Health Organization (WHO) to survey laboratories in your organization that might possess wild poliovirus infectious and/or potentially infectious materials and establish an **Agency/Institution Inventory** for those that retain such materials.

In 1988 the World Health Assembly adopted the resolution calling for global eradication of poliomyelitis by the year 2000. Today, the number of reported cases in the world has been reduced nearly 90% and at least 155 countries are reporting zero cases annually. The goal of polio eradication appears to be within reach. In a few years, the only source of wild polioviruses will be in the diagnostic, research, teaching, and vaccine production laboratories of the world. When polio immunization stops, a chance reintroduction of poliovirus from one of these laboratories into the community will represent a public health threat of global proportions.

The enclosed ***WHO global action plan for laboratory containment of wild polioviruses*** describes steps to be taken to prevent transmission of wild polioviruses from the laboratory to the community. A survey of biological laboratories in each country and the establishment of **National and Agency/Institution Inventories** are major steps toward implementing that plan.

Please request the appropriate laboratories in your organization to carefully review the enclosed check list of infectious and potentially infectious materials and provide documentation that they do not have such materials, have appropriately disposed of such materials, or retain wild poliovirus and infectious or potentially infectious materials.

Please urge laboratories to dispose of all wild poliovirus infectious and potentially infectious materials no longer needed for current work. The enclosed **WHO Global Action Plan** should be consulted for appropriate methods of destruction or for the addresses of designated WHO interim poliovirus repositories.

Agencies/institutions with laboratories retaining such materials will be listed in the **National Inventory**.

Please keep this office informed of any change in the status of such materials in the possession of your institution.

---

One year after the last isolation of wild poliovirus, agencies/institutions listed in the **National Inventory** will be notified to instruct all laboratories initiate procedures for maximum containment as described in the **Action Plan**.

Please return the completed and signed survey form to me by \_\_\_\_\_(date).

Yours sincerely,

---

(National Authority)

***Enclosures:***

1. *WHO global action plan for laboratory containment of wild polioviruses*
2. *Guidelines for implementing the pre-eradication phase of the global action plan for laboratory containment of wild polioviruses*

---

***Sample memo from an agency/institute head to laboratories  
requesting inventory of wild poliovirus infectious or  
potentially infectious materials***

**To:     Laboratory Director**

**From:   Agency/Institute Director**

The \_\_\_\_\_ (government agency) has requested this \_\_\_\_\_ (agency/institute) to survey all biological/biomedical laboratories under its jurisdiction that might possess wild poliovirus infectious and/or potentially infectious materials and to assist in establishing a **National Inventory** of agencies/institutions that retain such materials.

In 1988 the World Health Assembly adopted the resolution calling for global eradication of poliomyelitis by the year 2000. Today, the number of reported cases in the world has been reduced nearly 90% and at least 155 countries are reporting zero cases annually. The goal of polio eradication appears to be within reach. In a few years, the only source of wild polioviruses will be in the diagnostic, research, teaching, and vaccine production laboratories of the world. When polio immunization stops, a chance reintroduction of poliovirus from one of these laboratories into the community will represent a public health threat of global proportions.

The enclosed ***WHO global action plan for laboratory containment of wild polioviruses*** describes steps to be taken to prevent transmission of wild polioviruses from the laboratory to the community. A survey of biological laboratories in each country and the establishment of national and **Agency/Institution Inventory** are major steps toward implementing that plan.

The enclosed **Guidelines** include definitions and examples of materials to be listed in the **Laboratory Inventory**. Laboratories are urged to dispose of all such materials for which there is no longer a need.

I am asking that you carefully review the enclosed inventory flow chart and forms and document that your laboratory does not possess such materials, has properly disposed of such materials, or has accurately identified all such materials in its possession.

Laboratories wishing to retain or dispose of wild polioviruses or potentially infectious materials should request a copy of the **WHO Global Action Plan** from the Office \_\_\_\_\_ (of this institution) for guidance. Laboratories retaining such materials must do so under biosafety level-2/polio (BSL-2/polio) conditions, with secure storage and a current inventory at all times.



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Laboratories retaining such materials will be listed in the **National Inventory of agencies/institutions that possess wild polioviruses and potentially infectious materials**, which is maintained in the \_\_\_\_\_ (government agency). The Office \_\_\_\_\_ (of this institution) should be kept informed of any changes in the inventory.

Please return the completed form to the Office \_\_\_\_\_ (of this institution) by \_\_\_\_\_ (date).

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**Director of Institution/Organization**

***Enclosures:***

1. *WHO global action plan for laboratory containment of wild polioviruses*
2. *Guidelines for implementing the pre-eradication phase of the global action plan for laboratory containment of wild polioviruses*