



Input Formats and Specifications of the National Geodetic Survey Data Base

Volume III. Gravity Control Data

Silver Spring, MD 20910
September 1994

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Coast and Geodetic Survey

POLICY OF THE NATIONAL OCEAN SERVICE REGARDING THE
INCORPORATION OF GEODETIC DATA OF OTHER ORGANIZATIONS
INTO THE NATIONAL GEODETIC SURVEY DATA BASE

The National Ocean Service (NOS), Coast and Geodetic Survey, National Geodetic Survey (NGS), has determined that the value to the National Spatial Reference System (NSRS) of geodetic observations obtained by other Federal, state, and local organizations compensates for the costs incurred by the Federal Government to provide quality assurance, archiving, and distribution functions for surveys contributing to the public good. Agencies submitting data must adhere to the following requirements. The final decision whether to accept data will be the responsibility of the Chief, NGS.

FORMAT

The survey data must be submitted in the automated formats specified in the Federal Geographic Data Committee (FGDC), Federal Geodetic Control Subcommittee (FGCS), publication Input Formats and Specifications of the National Geodetic Survey Data Base (September 1994), which describes the formats and procedures of submitting data for adjustment and assimilation into the NGS data base. Separate volumes of this publication refer to horizontal control data (volume I), vertical control data (volume II), and gravity control data (volume III). Guidelines for submitting three-dimensional Global Positioning System (GPS) relative positioning data are contained in Annex L of volume I.

ACCURACY

Standards of accuracy are given in Standards and Specifications for Geodetic Control Networks (1984) and Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques (May 1988).

The survey data must be properly formatted as set forth by FGCS and meet the minimum accuracy requirements of:

First-order horizontal accuracy standards for GPS or conventional horizontal surveys.

Second-order, class II vertical accuracy standards for conventional geodetic leveling.

Third-order gravity accuracy standards for gravity surveys.

In addition, these data standards and accuracies must be verified, using currently available NGS software, by the provider prior to submitting the survey project to NGS.

Please note: Effective September 1, 1995, survey project data must meet the above minimum accuracy standards to be accepted for inclusion in the NGS data base. Surveys that are of lower order than given above will be accepted only in exceptional cases approved by the Chief, NGS.

- MONUMENTATION** Monumentation must be uniquely identified and conform to minimum prescribed standards. Guidelines for control monuments are given in NOAA Manual NOS NGS 1 (1978), Coast and Geodetic Survey Special Publication 247 (1950), and in Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques, appendix H (May 1988). Monument descriptions must be submitted in the automated format specified in Input Formats and Specifications of the National Geodetic Survey Data Base (September 1994).
- FIELD RECORDS** Original field records (or acceptable copies) are requested with data submission. NGS will retain these records in the National Archives and Records Administration. This is necessary in the event that questions arise concerning the surveys upon which the adjusted data are based. Where digital records are required, e.g., GPS projects, such records will be submitted to NGS in a format specified by NGS at the time of submission. If field records are not submitted with the data, NGS reserves the right to inspect these records upon request. If field records are not submitted on request, NGS reserves the right to not accept and/or not publish the data, and if published, a disclaimer may be attached to the published data.
- PROJECT REPORT** A project report, including sketches, is required for geodetic control projects. It should be submitted with the data and adhere to the form outlined in annexes K and L (GPS) of Input Formats and Specifications of the National Geodetic Survey Data Base (September 1994).
- REVIEW** Reconnaissance reports describing proposed connections to the NSRS, along with the planned instrumentation and field procedures, must be submitted prior to beginning a project. This will enable NGS to comment on the proposed connections, using information available in the NGS data base concerning the accuracy and condition of these points, and to assure conformance with minimum accuracy standards and criteria. The project review could save the submitting agency the expense of placing data in computer-readable form that will fail accuracy or monumentation criteria. NGS work schedules and computer requirements can also be developed from this information. Upon receipt of the reconnaissance reports, NGS will respond within 10 working days.

**RETURNED
SUBMISSIONS**

With verbal concurrence of the submitting organization, a limited number of errors in the submitted data will be corrected by NGS. Beyond a reasonable limit of about 1 percent, the entire project will be returned to the sender.

**SUBMITTED
PROJECTS**

Projects must be submitted such that the unit of field work will compute independently of other projects. They must be connected to points already in the NGS data base. All data pertaining to a project (observations, descriptions, adjustments, reports, etc.) must be simultaneously received by NGS. Due to a limited capability to review, analyze, and edit survey data before they are loaded into the NGS data base, data contributed for inclusion into the data base should be processed and adjusted by the provider, using currently available NGS software, prior to submittal to NGS.

COST

There is no cost to submitters for NGS quality review, archiving, and distribution functions for survey data submitted according to the requirements discussed above. When NGS is requested to provide on-site instruction with respect to data formatting and/or data processing, the requesting organization will be charged for travel and per diem costs.

PUBLICATIONS

All the publications referenced in this statement are available from the National Geodetic Information Branch, N/CG174, NOAA, 1315 East-West Highway, Silver Spring, MD 20910-3282.

Telephone (301) 713-3242 Fax (301) 713-4172

PREFACE

"Input Formats and Specifications of the National Geodetic Survey (NGS) Data Base," commonly called the "Blue Book," is a user's guide for preparing and submitting geodetic data for incorporation into NGS' data base. Survey data that are entered into NGS' data base become part of the National Spatial Reference System (NSRS), formerly the National Geodetic Reference System. The guide comprises three volumes. Volume I covers classical horizontal geodetic and Global Positioning System (GPS) data, volume II covers vertical geodetic data, and volume III covers gravity data. Beginning with this edition, the three formerly separate volumes are distributed as a set, since a great deal of information is common to each volume. Because some of the chapters and annexes are identical in all three volumes, the original numbering design has been retained.

The formats and specifications are consistent with the aims of the Executive Office of the President, Office of Management and Budget's (OMB) Circular A-16, as revised in 1990. A major goal of the circular, which is titled "Coordination of Surveying, Mapping, and Related Spatial Data Activities," is to develop a national spatial data infrastructure with the involvement of Federal, state, and local governments, and the private sector. This multilevel national information resource, united by standards and criteria established by the Federal Geodetic Control Subcommittee (FGCS) of the Federal Geographic Data Committee (FGDC), will enable the sharing and efficient transfer of geospatial data between producers and users.

Survey data that are submitted to NGS for incorporation into NSRS should be properly formatted and supply minimum accuracies of:

First-order horizontal accuracy standards for GPS and conventional horizontal surveys;

Second-order, class II vertical accuracy standards for conventional leveling;

Third-order gravity standards for gravity surveys.

Effective September 1, 1995, survey project data must meet the above minimum accuracy standards to be accepted for inclusion into the NGS data base. Surveys that are of lower order than given above will be accepted only in exceptional cases approved by the Chief, NGS.

In addition, these data standards and accuracies should be verified and the survey data contributed for inclusion into the NGS data base should be processed and adjusted by the provider, using currently available NGS software, before submitting the survey project to NGS.

At this time, NGS provides review, archiving, and distribution functions free of charge for survey data submitted in the proper format. These surveys must contain connections to NSRS in accordance with FGCS Standards and Specifications and they must contribute to the public good.

The production of the Blue Book entailed significant contributions from a number of NGS employees. Notable among these are D. Sherrill Snellgrove for his revision of Volume I, originally prepared by then-Commander Ludvik Pfeifer, NOAA (Ret.); Nancy L. Morrison and Commander Pfeifer, for their contributions to preparing Volume II; and then-Lieutenant Warren T. Dewhurst, NOAA, for his preparation of Volume III.

This publication and most of the documents referenced herein may be obtained from:

NOAA, National Geodetic Survey, N/NGS12
1315 East-West Highway, Station 9202
Silver Spring, MD 20910-3282
Telephone: (301) 713-3242; Fax: (301) 713-4172
Monday through Friday, 7:00 a.m. - 4:30 p.m. Eastern Time.

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Note: Volume I (Chapters 1-3, Annexes A-I,K,L,N) contains input formats and specifications for horizontal control data, Volume II (Chapters 5-6, for Annexes A,C,D,E,F,H,I,K see Volume I) contains input formats and specifications for vertical control data. Chapter 3, Geodetic Control Descriptive (GEOD DESC) Data of Volume I contains the input formats and specifications which are used for Gravity Descriptive (GRAV DESC) Data in this volume.

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