APPENDIX A

Abbreviations and Units of Measure

1 carat (metric) (diamond)	= 200 milligrams
1 flask (fl)	= 76 pounds, avoirdupois
1 karat (gold)	= one twenty-fourth part
1 kilogram (kg)	= 2.2046 pounds, avoirdupois
1 long ton (lt)	= 2,240 pounds, avoirdupois
1 long ton unit (ltu)	= 1% of 1 long ton or 22.4 pounds avoirdupois
long calcined ton (lct)	= excludes water of hydration
long dry ton (ldt)	= excludes excess free moisture
Mcf	= 1,000 cubic feet
1 metric ton (t)	= 2,204.6 pounds, avoirdupois or 1,000 kilograms
1 metric ton (t)	= 1.1023 short ton
1 metric ton unit (mtu)	= 1% of 1 metric ton or 10 kilograms
1 pound (lb)	= 453.6 grams
1 short ton (st)	= 2,000 pounds, avoirdupois
1 short ton unit (stu)	= 1% of 1 short ton or 20 pounds, avoirdupois
1 short dry ton (sdt)	= 2,000 pounds, avoirdupois, excluding moisture content
1 troy ounce (tr oz)	= 1.09714 avoirdupois ounces or 31.103 grams
1 troy pound	= 12 troy ounces

APPENDIX B

Definitions of Selected Terms Used in This Report

Terms Used for Materials in the National Defense Stockpile and Helium Stockpile

Uncommitted inventory refers to the quantity of mineral materials held in the National Defense Stockpile. Nonstockpile-grade materials may be included in the table; where significant, the quantities of these stockpiled materials will be specified in the text accompanying the table.

Committed inventory refers to materials that have been sold or traded from the stockpile, either in the current fiscal year (FY 2004) or in prior years, but not yet removed from stockpile facilities as of September 30, 2004.

Authorized for disposal refers to quantities that are in excess of the stockpile goal for a material, and for which Congress has authorized disposal over the long term at rates designed to maximize revenue but avoid undue disruption of the usual markets and financial loss to the United States.

Disposal plan FY 2004 indicates the total amount of a material in the National Defense Stockpile that the U.S. Department of Defense is permitted to sell under the Annual Materials Plan approved by Congress for the fiscal year. Fiscal year 2004 is the period October 1, 2003, through September 30, 2004. For mineral commodities that have a disposal plan greater than the inventory, actual quantity will be limited to remaining disposal authority or inventory. Note that, unlike the National Defense Stockpile, helium stockpile sales by the Bureau of Land Management under the Helium Privatization Act of 1996 are permitted to exceed disposal plans.

Disposals FY 2004 refers to material sold or traded from the stockpile in fiscal year 2004.

Depletion Allowance

The depletion allowance is a business tax deduction analogous to depreciation, but applies to an ore reserve rather than equipment or production facilities. Federal tax law allows this deduction from taxable corporate income, recognizing that an ore deposit is a depletable asset that must eventually be replaced.

APPENDIX C

A Resource/Reserve Classification for Minerals[1]

INTRODUCTION

Through the years, geologists, mining engineers, and others operating in the minerals field have used various terms to describe and classify mineral resources, which as defined herein include energy materials. Some of these terms have gained wide use and acceptance, although they are not always used with precisely the same meaning.

The U.S. Geological Survey (USGS) collects information about the quantity and quality of all mineral resources. In 1976, the USGS and the U.S. Bureau of Mines developed a common classification and nomenclature, which was published as USGS Bulletin 1450-A—*"Principles of the Mineral Resource Classification System of the U.S. Bureau of Mines and U.S. Geological Survey."* Experience with this resource classification system showed that some changes were necessary in order to make it more workable in practice and more useful in long-term planning. Therefore, representatives of the USGS and the U.S. Bureau of Mines collaborated to revise Bulletin 1450-A. Their work was published in 1980 as USGS Circular 831—*"Principles of a Resource/Reserve Classification for Minerals."*

Long-term public and commercial planning must be based on the probability of discovering new deposits, on developing economic extraction processes for currently unworkable deposits, and on knowing which resources are immediately available. Thus, resources must be continuously reassessed in the light of new geologic knowledge, of progress in science and technology, and of shifts in economic and political conditions. To best serve these planning needs, known resources should be classified from two standpoints: (1) purely geologic or physical/chemical characteristics—such as grade, quality tonnage, thickness, and depth—of the material in place: and (2) profitability analyses based on costs of extracting and marketing the material in a given economy at a given time. The former constitutes important objective scientific information of the resource and a relatively unchanging foundation upon which the latter more valuable economic delineation can be based.

The revised classification system, designed generally for all mineral materials, is shown graphically in figures 1 and 2; its components and their usage are described in the text. The classification of mineral and energy resources is necessarily arbitrary, because definitional criteria do not always coincide with natural boundaries. The system can be used to report the status of mineral and energy-fuel resources for the Nation or for specific areas.

RESOURCE/RESERVE DEFINITIONS

A dictionary definition of resource, "something in reserve or ready if needed," has been adapted for mineral and energy resources to comprise all materials, including those only surmised to exist, that have present or anticipated future value.

Resource.—A concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible.

Original Resource.—The amount of a resource before production.

Identified Resources.—Resources whose location, grade, quality, and quantity are known or estimated from specific geologic evidence. Identified resources include economic, marginally economic, and sub-economic components. To reflect varying degrees of geologic certainty, these economic divisions can be subdivided into measured, indicated, and inferred.

Demonstrated.—A term for the sum of measured plus indicated.

Measured.—Quantity is computed from dimensions revealed in outcrops, trenches, workings, or drill holes; grade and(or) quality are computed from the results of detailed sampling. The sites for inspection, sampling, and measurements are spaced so closely and the geologic character is so well defined that size, shape, depth, and mineral content of the resource are well established.

Indicated.—Quantity and grade and(or) quality are computed from information similar to that used for measured resources, but the sites for inspection, sampling, measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for measured resources, is high enough to assume continuity between points of observation.

Inferred.—Estimates are based on an assumed continuity beyond measured and(or) indicated resources, for which there is geologic evidence. Inferred resources may or may not be supported by samples or measurements.

Reserve Base.—That part of an identified resource that meets specified minimum physical and chemical criteria related to current mining and production practices, including those for grade, quality, thickness, and depth. The reserve base is the in-place demonstrated (measured plus indicated) resource from which reserves are estimated. It may encompass those parts of the resources that have a reasonable potential for becoming economically available within planning horizons beyond those that assume proven technology and current economics. The reserve base includes those resources that are currently economic (reserves), marginally economic (marginal reserves), and some of those that are currently subeconomic (subeconomic resources). The term "geologic reserve" has been applied by others generally to the reserve-base category, but it

[1]Based on U.S. Geological Survey Circular 831, 1980.

also may include the inferred-reserve-base category; it is not a part of this classification system.

Inferred Reserve Base.—The in-place part of an identified resource from which inferred reserves are estimated. Quantitative estimates are based largely on knowledge of the geologic character of a deposit and for which there may be no samples or measurements. The estimates are based on an assumed continuity beyond the reserve base, for which there is geologic evidence.

Reserves.—That part of the reserve base which could be economically extracted or produced at the time of determination. The term reserves need not signify that extraction facilities are in place and operative. Reserves include only recoverable materials; thus, terms such as “extractable reserves” and “recoverable reserves” are redundant and are not a part of this classification system.

Marginal Reserves.—That part of the reserve base which, at the time of determination, borders on being economically producible. Its essential characteristic is economic uncertainty. Included are resources that would be producible, given postulated changes in economic or technological factors.

Economic.—This term implies that profitable extraction or production under defined investment assumptions has been established, analytically demonstrated, or assumed with reasonable certainty.

Subeconomic Resources.—The part of identified resources that does not meet the economic criteria of reserves and marginal reserves.

Undiscovered Resources.—Resources, the existence of which are only postulated, comprising deposits that are separate from identified resources. Undiscovered resources may be postulated in deposits of such grade and physical location as to render them economic, marginally economic, or subeconomic. To reflect varying degrees of geologic certainty, undiscovered resources may be divided into two parts:

Hypothetical Resources.—Undiscovered resources that are similar to known mineral bodies and that may be reasonably expected to exist in the same producing district or region under analogous geologic conditions. If exploration confirms their existence and reveals enough information about their quality, grade, and quantity, they will be reclassified as identified resources.

Speculative Resources.—Undiscovered resources that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their economic potential. If exploration confirms their existence and reveals enough information about their quantity, grade, and quality, they will be reclassified as identified resources.

Restricted Resources/Reserves.—That part of any resource/reserve category that is restricted from extraction by laws or regulations. For example, restricted reserves meet all the requirements of reserves except that they are restricted from extraction by laws or regulations.

Other Occurrences.—Materials that are too low grade or for other reasons are not considered potentially economic, in the same sense as the defined resource, may be recognized and their magnitude estimated, but they are not classified as resources. A separate category, labeled other occurrences, is included in figures 1 and 2. In figure 1, the boundary between subeconomic and other occurrences is limited by the concept of current or potential feasibility of economic production, which is required by the definition of a resource. The boundary is obviously uncertain, but limits may be specified in terms of grade, quality, thickness, depth, percent extractable, or other economic-feasibility variables.

Cumulative Production.—The amount of past cumulative production is not, by definition, a part of the resource. Nevertheless, a knowledge of what has been produced is important to an understanding of current resources, in terms of both the amount of past production and the amount of residual or remaining in-place resource. A separate space for cumulative production is shown in figures 1 and 2. Residual material left in the ground during current or future extraction should be recorded in the resource category appropriate to its economic-recovery potential.

FIGURE 1.—Major Elements of Mineral-Resource Classification, Excluding *Reserve Base* and *Inferred Reserve Base*

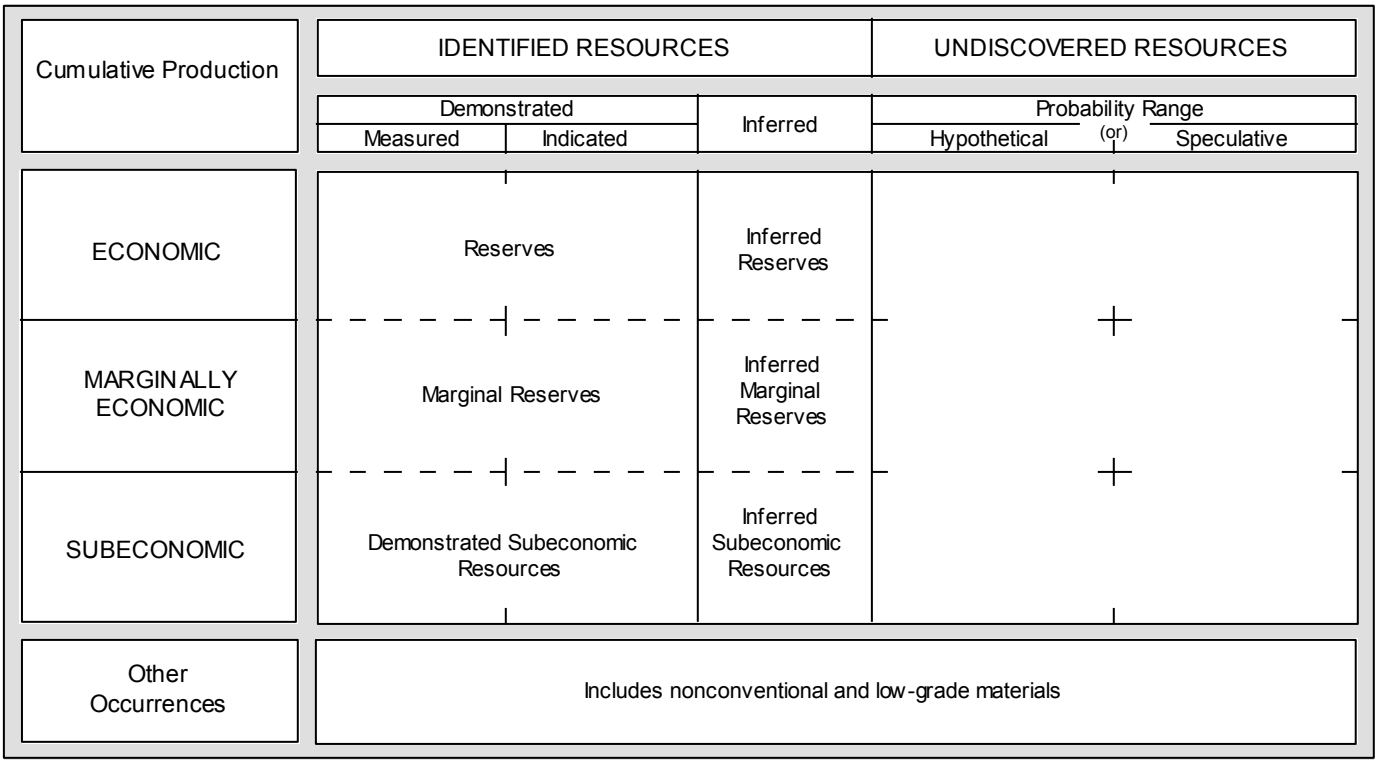
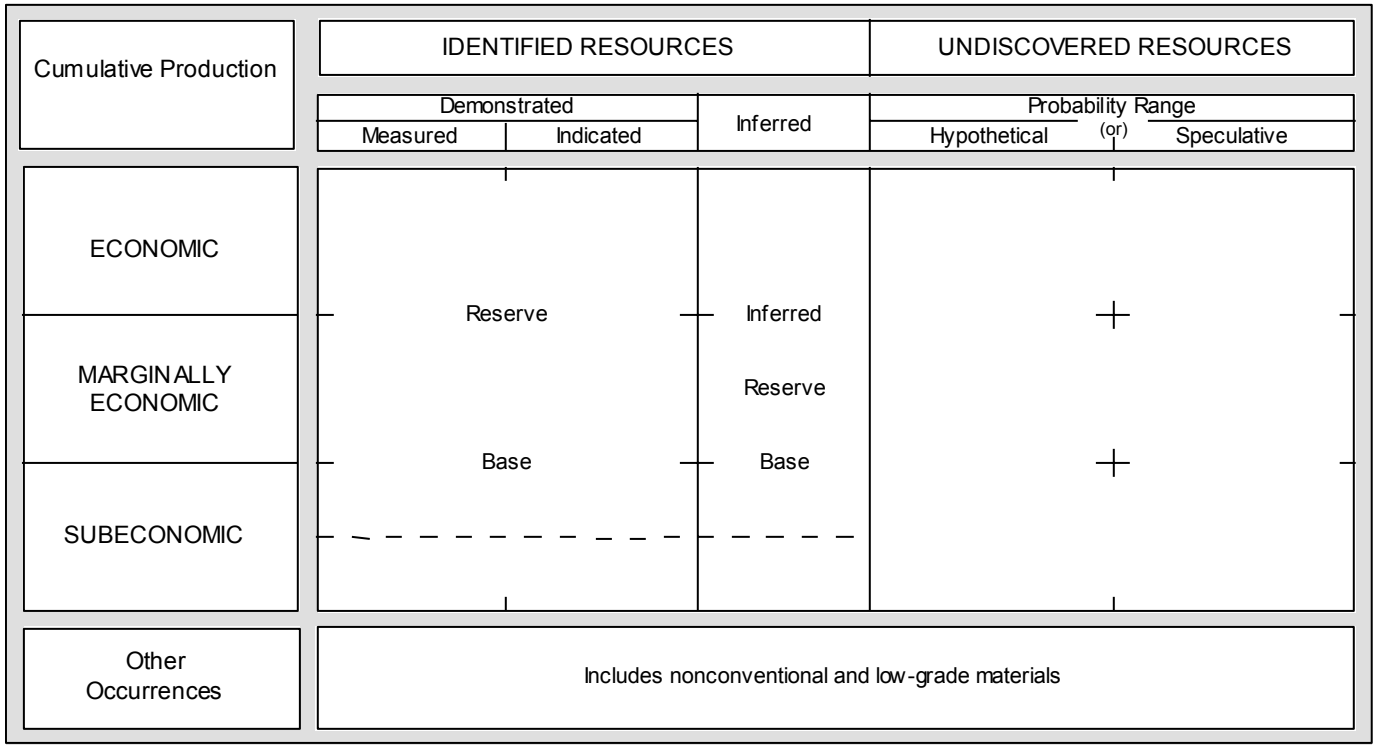


FIGURE 2.—*Reserve Base* and *Inferred Reserve Base* Classification Categories



APPENDIX D

Country Specialists Directory

Minerals information country specialists at the U.S. Geological Survey collect and analyze information on the mineral industries of more than 170 nations throughout the world. The specialists are available to answer minerals-related questions concerning individual countries.

Africa and the Middle East

Algeria	Philip M. Mobbs
Angola	George J. Coakley
Bahrain	Philip M. Mobbs
Benin	Omayra Bermúdez-Lugo
Botswana	George J. Coakley
Burkina Faso	Omayra Bermúdez-Lugo
Burundi	Thomas R. Yager
Cameroon	Omayra Bermúdez-Lugo
Cape Verde	Omayra Bermúdez-Lugo
Central African Republic	Omayra Bermúdez-Lugo
Chad	Philip M. Mobbs
Comoros	Thomas R. Yager
Congo (Brazzaville)	George J. Coakley
Congo (Kinshasa)	George J. Coakley
Côte d'Ivoire	Omayra Bermúdez-Lugo
Cyprus	Philip M. Mobbs
Djibouti	Thomas R. Yager
Egypt	Harold R. Newman
Equatorial Guinea	Philip M. Mobbs
Eritrea	Thomas R. Yager
Ethiopia	Thomas R. Yager
Gabon	Omayra Bermúdez-Lugo
The Gambia	Omayra Bermúdez-Lugo
Ghana	George J. Coakley
Guinea	Omayra Bermúdez-Lugo
Guinea-Bissau	Omayra Bermúdez-Lugo
Iran	Philip M. Mobbs
Iraq	Philip M. Mobbs
Israel	Thomas R. Yager
Jordan	Thomas R. Yager
Kenya	Thomas R. Yager
Kuwait	Philip M. Mobbs
Lebanon	Thomas R. Yager
Lesotho	George J. Coakley
Liberia	Omayra Bermúdez-Lugo
Libya	Philip M. Mobbs
Madagascar	Thomas R. Yager
Malawi	Thomas R. Yager
Mali	Omayra Bermúdez-Lugo
Mauritania	Omayra Bermúdez-Lugo
Mauritius	Thomas R. Yager
Morocco & Western Sahara	Omayra Bermúdez-Lugo
Mozambique	Thomas R. Yager
Namibia	George J. Coakley
Niger	Omayra Bermúdez-Lugo
Nigeria	Philip M. Mobbs
Oman	Philip M. Mobbs
Qatar	Philip M. Mobbs
Reunion	Thomas R. Yager
Rwanda	Thomas R. Yager
São Tomé & Principe	Omayra Bermúdez-Lugo
Saudi Arabia	Philip M. Mobbs
Senegal	Omayra Bermúdez-Lugo
Seychelles	Thomas R. Yager
Sierra Leone	Omayra Bermúdez-Lugo
Somalia	Thomas R. Yager
South Africa	George J. Coakley
Sudan	Thomas R. Yager
Swaziland	George J. Coakley
Syria	Thomas R. Yager
Tanzania	Thomas R. Yager
Togo	Omayra Bermúdez-Lugo
Tunisia	Philip M. Mobbs
Turkey	Philip M. Mobbs
Uganda	Thomas R. Yager
United Arab Emirates	Philip M. Mobbs
Yemen	Philip M. Mobbs
Zambia	George J. Coakley
Zimbabwe	George J. Coakley

Asia and the Pacific

Afghanistan	Travis Q. Lyday
Australia	Travis Q. Lyday
Bangladesh	Chin S. Kuo
Bhutan	Chin S. Kuo
Brunei	Pui-Kwan Tse
Burma	Yolanda Fong-Sam
Cambodia	John C. Wu
China	Pui-Kwan Tse
Christmas Island	Travis Q. Lyday
Fiji	Travis Q. Lyday
India	Chin S. Kuo
Indonesia	Pui-Kwan Tse
Japan	John C. Wu
Korea, North	John C. Wu
Korea, Republic of	John C. Wu
Laos	John C. Wu
Malaysia	Pui-Kwan Tse
Mongolia	Pui-Kwan Tse
Nepal	Chin S. Kuo
New Caledonia	Travis Q. Lyday
New Zealand	Travis Q. Lyday
Pakistan	Travis Q. Lyday
Papua New Guinea	Travis Q. Lyday
Philippines	Travis Q. Lyday
Singapore	Pui-Kwan Tse
Solomon Islands	Travis Q. Lyday
Sri Lanka	Chin S. Kuo
Taiwan	Pui-Kwan Tse
Thailand	John C. Wu
Timor, East	Pui-Kwan Tse
Tonga	Travis Q. Lyday
Vanuatu	Travis Q. Lyday
Vietnam	John C. Wu

Europe and Central Eurasia

Albania	Walter G. Steblez
Armenia	Richard M. Levine
Austria	Harold R. Newman
Azerbaijan	Richard M. Levine

Belarus	Richard M. Levine
Belgium	Harold R. Newman
Bosnia and Herzegovina	Walter G. Steblez
Bulgaria	Walter G. Steblez
Croatia	Walter G. Steblez
Czech Republic	Walter G. Steblez
Denmark, Faroe Island, and Greenland	Chin S. Kuo
Estonia	Chin S. Kuo
Finland	Chin S. Kuo
France	Harold R. Newman
Georgia	Richard M. Levine
Germany	Steven T. Anderson
Greece	Harold R. Newman
Hungary	Walter G. Steblez
Iceland	Chin S. Kuo
Ireland	Harold R. Newman
Italy	Harold R. Newman
Kazakhstan	Richard M. Levine
Kyrgyzstan	Richard M. Levine
Latvia	Chin S. Kuo
Lithuania	Chin S. Kuo
Luxembourg	Harold R. Newman
Macedonia	Walter G. Steblez
Malta	Harold R. Newman
Moldova	Richard M. Levine
Netherlands	Harold R. Newman
Norway	Chin S. Kuo
Poland	Walter G. Steblez
Portugal	Harold R. Newman
Romania	Walter G. Steblez
Russia	Richard M. Levine
Serbia and Montenegro	Walter G. Steblez
Slovakia	Walter G. Steblez
Slovenia	Walter G. Steblez
Spain	Harold R. Newman
Sweden	Chin S. Kuo
Switzerland	Harold R. Newman
Tajikistan	Richard M. Levine
Turkmenistan	Richard M. Levine
Ukraine	Richard M. Levine
United Kingdom	Harold R. Newman
Uzbekistan	Richard M. Levine

North America, Central America, and the Caribbean

Antigua and Barbuda	Omayra Bermúdez-Lugo
Aruba	Omayra Bermúdez-Lugo
The Bahamas	Omayra Bermúdez-Lugo
Barbados	Omayra Bermúdez-Lugo
Belize	Steven T. Anderson
Bermuda	Omayra Bermúdez-Lugo
Canada	Alfredo C. Gurmendi
Costa Rica	Steven T. Anderson
Cuba	Omayra Bermúdez-Lugo
Dominica	Omayra Bermúdez-Lugo
Dominican Republic	Omayra Bermúdez-Lugo
El Salvador	Steven T. Anderson
Grenada	Omayra Bermúdez-Lugo
Guadeloupe	Omayra Bermúdez-Lugo
Guatemala	Steven T. Anderson
Haiti	Omayra Bermúdez-Lugo
Honduras	Steven T. Anderson
Jamaica	Omayra Bermúdez-Lugo
Martinique	Omayra Bermúdez-Lugo
Mexico	Ivette E. Torres
Montserrat	Omayra Bermúdez-Lugo
Netherlands Antilles	Omayra Bermúdez-Lugo
Nicaragua	Steven T. Anderson
Panama	Steven T. Anderson
St. Kitts and Nevis	Omayra Bermúdez-Lugo
St. Lucia	Omayra Bermúdez-Lugo
St. Vincent & the Grenadines	Omayra Bermúdez-Lugo
Trinidad and Tobago	Omayra Bermúdez-Lugo

South America

Argentina	Ivette E. Torres
Bolivia	Steven T. Anderson
Brazil	Alfredo C. Gurmendi
Chile	Steven T. Anderson
Colombia	Ivette E. Torres
Ecuador	Steven T. Anderson
French Guiana	Yolanda Fong-Sam
Guyana	Yolanda Fong-Sam
Paraguay	Yolanda Fong-Sam
Peru	Alfredo C. Gurmendi
Suriname	Yolanda Fong-Sam
Uruguay	Yolanda Fong-Sam
Venezuela	Ivette E. Torres

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Thomas R. Yager	(703) 648-7739	tyager@usgs.gov