

Hanford Metric Implementation Plan



United States
Department of Energy

P.O. Box 550
Richland, Washington 99352

Approved for Public Release

LEGAL DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLM-2.CHP (1-91)

Hanford Metric Implementation Plan

Date Published
February 1996



United States
Department of Energy

P.O. Box 550
Richland, Washington 99352

Approved for Public Release

This page intentionally left blank.

CAUTION:

This document is subject to revision.

Please check the revision number and date of any hard copy
against the current version of the document
on Hanford Information (HLAN).

This page intentionally left blank.

CONTENTS

I.	PHILOSOPHY	1
II.	JUSTIFICATION	1
III.	MISSION AND VISION	2
IV.	DEFINITIONS	3
V.	POLICY	4
VI.	RESPONSIBILITIES	5
	A. RL MANAGER	5
	B. RL ASSISTANT MANAGERS	5
	C. RL METRIC COORDINATOR	5
	D. RL AND CONTRACTOR PROCUREMENT	5
	E. METRIC TRANSITION COMMITTEE	5
	F. CONTRACTORS	6
VII.	FOCUS	6
	A. CONSUMER PRODUCTS	6
	B. COMMERCIAL AND INDUSTRIAL PRODUCTS	6
	C. COMMUNICATIONS	6
	D. STANDARDS AND DIRECTIVES	7
	E. OUTREACH	7
	F. ELEMENTS	7
VIII.	SCHEDULE	7
IX.	EXCEPTIONS	8
X.	WAIVERS	8
XI.	REPORTING	9
	BIBLIOGRAPHY	11
	APPENDIX A. METRIC RESOURCES	A-1
	APPENDIX B. ELEMENTS	B-1
	APPENDIX C. EXCEPTION GUIDANCE	C-1

TABLES

1 Metrication Milestones 10
B-1 Elements to be Converted B-2

HANFORD METRIC IMPLEMENTATION PLAN

I. PHILOSOPHY

Transition to the metric system at the Hanford Site is part of a national metrication effort directed by Federal law and the Department of Energy (DOE) *Metric Transition Plan*. The purpose of this effort is to increase the competitiveness of U.S. industry in the world market. The Federal government, its employees, and contractors must serve as catalysts for this change to the metric system.

Because the Department of Energy Richland Operations Office (RL) and the Hanford contractors are key players in the Pacific Northwest business scene, we view this metrication process as an opportunity to become the leader for metric transition in the Northwest. By becoming the DOE showcase for the implementation of a metric culture, we will encourage the change of industrial standards, products, and services to the metric system. This change will enhance the nation's ability to integrate products and services into the global marketplace, thus ensuring the U.S. position as a world market leader.

An integral part of this metrication process is our commitment to use metric products and services and then to assist and encourage U.S. suppliers and manufacturers to support, enter into, or expand international market participation through increased use of the metric system. We will meet this commitment to assist through communication and education programs designed specifically to promote metrication.

II. JUSTIFICATION

As of September 1992, the United States was the only industrialized country in the world not officially using the metric system of measurement. Use of the metric system, with its inherent simplicity, provides important benefits to the United States and will eliminate measurement-related barriers in the international marketplace.

Use of metric measurement standards has been legally authorized in the United States since 1866. The United States is an original signatory to the 1875 International Treaty of the Meter.

On December 23, 1975, the President signed the *Metric Conversion Act of 1975* (Public Law 94-168), which was later amended and strengthened by Section 5164 of the **Omnibus Trade and Competitiveness Act of 1988** (Public Law 100-418). Under the amended law's direction, as amplified by Executive Order 12770 of July 25, 1991, **transition to the metric system is no longer voluntary for Executive Branch Agencies, it is MANDATORY.**

As authorized by Executive Order 12770, policy and guidelines for metric transition have been promulgated in 15 CFR Part 1170, Subpart B, *Metric Conversion Policy for Federal Agencies*. The DOE *Metric Transition Plan* expands upon that Federal policy and identifies specifics of implementation within the DOE. The DOE *Metric Transition Plan* states that it is the policy of the DOE to designate and use the metric system of measurement as the preferred system of weights and measures in all of its activities. In addition, it states that the DOE will comply with all provisions of Section 5164 of Public Law 100-418 and Executive Order 12770. The DOE *Metric Transition Plan* also stipulates that metric usage shall be required, except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to U.S. firms, that the DOE is unable to fulfill its responsibilities under the regulations and laws of the Federal government and the United States, or when international trade and commerce customarily deal in nonmetric units. The DOE *Metric Transition Plan* includes guidance from the Interagency Council on Metric Policy (ICMP) on the meaning of such terms as “impractical” and “significant inefficiencies.”

The use of the metric system by the DOE and other Federal Agencies is intended to give U.S. firms encouragement and an incentive to convert to the metric system, so that they and the U.S. economy can achieve economic benefits through increased competitiveness in world markets. By helping U.S. firms convert to the metric system, the DOE and other Federal Agencies are supporting the national goal to establish the metric system as the preferred system of weights and measurements for U.S. trade and commerce. As a Federal Agency, it is our responsibility to assist industry, especially small and small disadvantaged businesses, as they voluntarily convert to the metric system of measurement.

III. MISSION AND VISION

Hanford Metric Mission

Use of the **International System of Units (SI)**, also known as the **metric system**, has been mandated by law and Executive Order for all Federal Agencies. The mission of the Hanford Site is to earnestly support the Department of Energy policy to designate and use the metric system as the preferred system of weights and measures. In so doing, we will contribute to the welfare of the nation and have a significant effect on our country's global economic competitiveness. The Metric Transition Committee (MTC), as a committee of Hanford representatives, guides the strategies and plans for implementing the metric system Sitewide.

Hanford Metric Vision

We are the leader in the Pacific Northwest for metric usage.

We are the Department of Energy's showcase for the implementation of a metric culture.

We work closely with businesses and communities as they transition to metric usage.

We enhance the nation's ability to assure its position as a world leader in the global marketplace.

The measurement standard at Hanford is the metric system.

Goods and services provided by and to Hanford are easily integrated into the global marketplace with our use of the metric system.

IV. DEFINITIONS

black box. Within a system, a self-contained item (e.g., subsystem, component, device) that requires certain interfaces for installation and operation. Interfaces include such things as dimensions, weights, volumes, connections, and inputs/outputs. This could be a metric item in a nonmetric system or a nonmetric item in a metric system.

conversion, hard. The process of changing measurement language to nonequivalent metric units, usually necessitating changes in the actual physical size and configuration of the part, product, or process that exceed those permitted by established measurement tolerance. Hard conversion allows for simplification and rationalization of the size sequence. Also called size substitution, in which the product is an accepted standard metric size or is a rational whole number of metric units.

EXAMPLE: Change a 9- x 12-ft room to be 3 m x 4 m (different size).

conversion, soft. The process of changing measurement language from inch-pound measurement units to equivalent metric units within acceptable measurement tolerances without changing the actual physical size or configuration of the part, product, or process.

EXAMPLE: Describe a 9- x 12-ft room as 2.74 m x 3.66 m (same size).

customary, customary system, customary units. The system of measurement units (inch, pound, degree Fahrenheit, and units derived from these) commonly used in the United States. Also called "English system," "U.S. system," "inch-pound system," and "common units."

dual systems or dimensions. The process of using both the metric and the inch-pound system to quantify a measurement. The preferred metric unit is always listed first and the inch-pound equivalent is always shown in parentheses.

exception. An item excluded from the provisions of this Plan (i.e., need not be metricated and no waiver is required).

Interagency Council on Metric Policy (ICMP). A high-level Federal body established by Executive Order 12770 to assist the Secretary of Commerce in coordinating and implementing Federal policy on use of the metric system and to resolve conflicts and questions regarding implementation. The ICMP includes senior-level representatives of major Federal Departments and Agencies and is chaired by the Chairman of the U.S. Metric Board.

metrication. The conversion of an existent system of units, such as the inch-pound system, into the metric system. Metrication can be either hard or soft conversion.

metric system. The International System of Units (SI) established by the General Conference on Weights and Measures in 1960, as interpreted or modified from time to time by the Secretary of Commerce under the authority of the *Metric Conversion Act of 1975* and the *Metric Education Act of 1978*. Units approved for use by Federal Agencies are currently listed in 55 FR 245 (see Bibliography).

Metric Transition Committee (MTC). A representative body responsible for developing and overseeing the implementation of metric transition and all supporting tasks related thereto at the Hanford Site. MTC representatives may also serve as internal metric coordinators.

trade designation or trade size. A term used to identify or describe a product based on its “nominal” or approximate or closely related size. A trade size is not necessarily the same as a measurement. Trade sizes of products are usually assigned by the industry or trade that manufactures the products, and conversions to metric sizes, either hard or soft, will normally be made by that same industry.

EXAMPLES: A 2-inch NPS (“nominal pipe size”) pipe is designated a DN50 (“diameter nominal 50 mm”) pipe (soft conversion).

A 1-inch electrical conduit is identified as a 27-mm conduit (soft conversion).

Sheet metal of 16 gage is specified with a thickness of 1.6 mm (hard conversion).

waiver. An approved exemption from metrication for an item (anything from a project to a single component) and for a specific duration.

V. POLICY

It is the policy of RL and its contractors to designate and use the metric system of measurement as the preferred system of weights and measures in all activities.

RL shall fully comply with all of the provisions of Section 5164 of the *Omnibus Trade and Competitiveness Act of 1988* (Public Law 100-418), Executive Order 12770, and 15 CFR 1170. RL directs the implementation of the requirements as specified in this Plan to all of its contractors, including the flow-down of provisions in all procurement requests.

RL, along with its contractors, will adhere to the goal of the ICMP to use only metric units in the design and procurement of major systems acquisitions, major projects, and other line items begun after January 1, 1994. Metric units shall be used on general plant and other projects and on other activities as noted elsewhere in this Plan. RL and its contractors will handle metric transition costs as normal expenses rather than special one-time costs.

RL and its contractors shall inform those with whom they do business that the transition is real and necessary for the long-term economic health of our country. Contractor, trade, and industrial associations are examples of groups that will be made aware of the transition to the metric system.

RL and its contractors shall utilize the guidelines and standards for metric acquisitions, financial assistance programs, and metric usage that have been developed by the ICMP and the Metric Office at the National Institute of Standards and Technology (NIST).

VI. RESPONSIBILITIES

A. RL MANAGER

Controls and ensures the implementation of this Plan and related RL documents, approves waivers to the Plan as authorized by the DOE Program Manager, and designates the RL Metric Coordinator.

B. RL ASSISTANT MANAGERS

Ensure adherence to this Plan within their respective divisions and issue implementation procedures if required.

C. RL METRIC COORDINATOR

Acts as RL's central point of contact for metrication matters and chairs the Hanford MTC. The RL Metric Coordinator tasks each contractor to provide representation on the MTC.

D. RL AND CONTRACTOR PROCUREMENT

Perform metric transition activities consistent with this Plan and in accordance with contracts and applicable acquisition regulations. RL and contractor procurement organizations and others who deal with suppliers, vendors, and subcontractors, are active participants in awareness and information campaigns and assist businesses in their metrication efforts.

E. METRIC TRANSITION COMMITTEE

Is composed of representatives from RL and Hanford contractors. The MTC maintains this Plan, acts as individual contractor points of contact, and provides guidance on metrication matters. The MTC provides recommendations to the RL Manager on matters of metrication policy, questions, concerns, and interpretations.

F. CONTRACTORS

Perform metric transition activities consistent with the direction and guidance contained in this Plan and develop and maintain supplemental implementation documents, as required, to guide their metric transition activities and to maintain their implementation schedules. Common and interface activities are coordinated through the MTC. Contractors shall provide representation to the MTC as tasked by RL. All managers within contractor organizations are responsible for ensuring that their employees implement this Plan. Contractors shall include metric information as part of their existing outreach programs.

VII. FOCUS

Metriation must become an integral part of every activity and function performed. Such a cultural change is often easier to accomplish when specific functions and activities are addressed. Guidance and direction for conversion are provided in the following six groups.

A. CONSUMER PRODUCTS

With few exceptions, labels on consumer products are now required by law to list measurements (size, weight, volume, capacities, etc.) in both customary units and metric units. In specifications, purchase orders, other documents, and all communications, reference to the measurements of these products shall be in metric units.

A tolerance of $\pm 5\%$ on label measurements is acceptable for variations resulting from a manufacturer's soft conversion, unless form, fit, or function is affected or technical specifications or directives require otherwise.

EXAMPLE: Assume that we want a 55-gallon drum of material and that it is ordered as 208 liters. The supplier, as the result of conversion, may deliver a 55-gallon drum labeled 200 liters, 208 liters, 208.2 liters, or 210 liters. All of these would be acceptable. Any labeled volume between 197.6 (95% of 208) and 218.4 (105% of 208) liters would be acceptable.

B. COMMERCIAL AND INDUSTRIAL PRODUCTS

Commercial and industrial products made to hard metric sizes, dimensions, or characteristics shall be specified, purchased, and used to the extent possible within established guidelines. Products that are not marketed in metric sizes, but can be produced or measured in metric units, shall be specified in metric units. Dual dimensions shall be used where necessary to avoid potential problems in receiving, inspection, and other control activities. Bulk products shall be ordered and measured in metric units unless it is not feasible to do so. Conversion tolerances for the labels on these products shall be treated the same as tolerances for consumer product labels.

C. COMMUNICATIONS

The metric system shall be used in all communications (e.g., new publications, solicitations, grants, reports, guides, brochures, presentations, press releases) that contain measurements.

D. STANDARDS AND DIRECTIVES

The metric system shall be used when developing new specifications and standards for the procurement of equipment, supplies, and services. Existing directives, manuals, standards, handbooks, instructions, procedures, specifications, etc., shall be converted to metric during the next revision cycle and as new documents are created, except when such manuals, procedures, etc. relate to items that are considered exempt. Standards and directives derived from higher tier documents that do not contain the appropriate metric measurements shall include soft conversions, using conversion factors and rounding conventions specified in Federal Standard 376B. To show the connection to the governing document, the governing document unit measurement may be shown in parentheses following the metric equivalent.

It shall be permissible to include mixed measurements (metric and customary) on drawings, plans, and specifications. Dual dimensions may be used as an interim measure.

E. OUTREACH

The successful transition of the Hanford Site to metric units of measurement requires open communication among RL, its contractors, site personnel, industry, the community, and state agencies. The Hanford contractors must communicate to U.S. industry that they are serious and sincere in undertaking the transition and in assisting companies to develop world-class metric products.

RL and its contractors will provide information on metric transition to labor unions, vendors, offsite contractors, trade/industrial associations, professional societies, educational institutions, and the general public. Special effort will be made to provide transition information and assistance to small and small disadvantaged businesses. Contractor procurement organizations shall identify distributors and manufacturers of metric supplies and products. This information will be shared among the Hanford contractors. Outreach communication will be accomplished by means of an information/awareness campaign (see Appendix A, Metric Resources).

F. ELEMENTS

The focus group, Elements, is divided into eleven categories of related tasks, activities, and items (i.e., elements), whose metrication must be dealt with on an individual basis. The detailed "how," "timing," and "risks" of metricating each of these elements is included in Appendix B. The information provided in this appendix is not all-inclusive, but rather is provided as a reference and as general guidance for metricating specific elements.

VIII. SCHEDULE

This Plan became effective August 1, 1994. Table 1 lists key milestones for metrication and related activities and their required achievement dates. Further guidance is contained in Appendix B. If implementation as described is not deemed possible, a waiver request or an alternate implementation schedule must be submitted to RL for approval.

IX. EXCEPTIONS

Federal law and implementing regulations allow for exceptions to metric conversion within certain constraints. The criteria and guidelines for exceptions are included as Appendix C.

X. WAIVERS

The metric system will be used in all new work funded by DOE. Waivers or partial waivers to all Plan requirements shall be approved by the RL Manager or metric waiver designee. Waivers shall be specific and limited in duration (e.g., time period, remaining useable life, or elimination of restriction).

Waiver requests will not be considered without the submission of documentation demonstrating the economic or technical infeasibility of metrification. The evaluation criteria for waiver requests will include initial life-cycle costs or loss of markets to U.S. firms, unavailability of industry-accepted metric standards, and safety-related factors. Copies of all waivers shall be submitted to the Department Metric Executive (Associate Deputy Secretary for Field Management, FM-1) to ensure consistency across the DOE Complex.

1. Waiver requests shall be submitted to RL by contractor management through the responsible RL Division. The processing of waivers within RL is described in RLP 5900.2B.
2. Members of the MTC or other technical resources may be tasked by RL with assisting in the review of waiver requests that have been submitted.
3. All metrification waivers approved before August 1, 1994 shall remain in effect.

Any activity (such as in a project, procurement, communications, maintenance, or engineering) that does not have an approved waiver, or that does not meet a criterion for an exception, shall follow this Plan for implementation of the metric system. Implementation shall be in accordance with the schedules shown elsewhere in this Plan. Except as noted, activities for which other Federal Agencies have lead responsibility for regulation, policy, or guidance (e.g., Department of Transportation for packaging, labeling, and shipping of materials), shall be in accordance with the Metric Transition Plans of those Agencies. Metric implementation earlier than scheduled milestone and target dates is encouraged.

XI. REPORTING

The Metric Conversion Act (Public Law 94-168 as amended by Public Law 100-418) requires annual reports "...on the actions ... taken during the previous fiscal year, as well as the actions ... for the fiscal year involved, to implement fully the metric system of measurement..." To meet this requirement, RL provides an annual progress report on metric transition, or more often if major accomplishments occur, to the Department Metric Executive.

Hanford contractors shall provide annual reports through their MTC representatives to the RL Metric Coordinator on a schedule established by RL to meet its reporting obligations.

Table 1. Metrication Milestones

DATE	ACTIVITY	SOURCE
1 Jan 94	Metricate new significant projects (Major System Acquisitions, Major Projects, Line Items)	DOE Metric Transition Plan (HQ Plan)
30 Jun 94	RL submits Plan to Headquarters (HQ)	RL commitment to HQ
1 Aug 94	Effective Date of RL Plan	HQ Plan
1 Oct 94	Metricate all Cooperative Research and Development Agreements (CRADAs)	HQ Plan
1 Oct 94	Metricate all newsletters	HQ Plan
1 Oct 94	Metricate reports for internal use	HQ Plan
1 Oct 94	Adopt public affairs guidance from National Institute of Standards and Technology (NIST)	HQ Plan
1 Oct 94	Communicate transition and its purpose to the media	HQ Plan
1 Nov 94	Metricate all new work funded by DOE	RL Plan
1 Nov 94	RL develops and approves a procedure for the waiver process	RL Plan
1 Jan 95	Disseminate metrication information and guidance to small and small disadvantaged businesses	HQ Plan
1 Jan 95	Implement flow-down of provisions in all procurement request packages	HQ Plan
1 Feb 95	Submit waiver requests and alternative schedules	RL Plan
1 Oct 95	Complete development of Quality Training and Resource Center (QTRC) metric training courses	RL Plan
1 Oct 95	Metricate reports for the public	HQ Plan
1 Jan 96	Write all RL implementation directives using metric measurements (dual dimensions are permissible if necessary)	HQ Plan
1999	Complete revision of all training curricula	HQ Plan

BIBLIOGRAPHY

- ANSI, 1992, *American National Standard for Metric Practice*, ANSI/IEEE 268-1992, American National Standards Institute/Institute of Electrical and Electronics Engineers. Gives guidance for application of the modernized system of measurements to private sector activities. This standard forms the authoritative basis for Federal Standard 376B.
- ASTM, 1993, *Standard Practice for Use of the International System of Units (SI) (the Modernized Metric System)*, ASTM E 380-93, American Society for Testing and Materials. Gives guidance for application of the modernized system of measurements to private sector activities. A joint ASTM-IEEE effort is currently under way to consolidate ANSI/IEEE 268 and ASTM E 380 into a single ANSI standard.
- DOE, 1994, *Metric Transition Plan (DRAFT)*, U.S. Department of Energy, May 26, 1994. Describes the metric objectives of the U.S. Department of Energy. Distributed by memorandum, dated July 12, 1994, from Donald W. Pearman, Jr., DOE Metric Executive.
- DOE, 1994, *Use of the Metric System of Measurement*, DOE 5900.2B, U.S. Department of Energy, April 13, 1994. (Note: In June 1994, DOE 5900.2B was cancelled as part of an order reduction effort. According to memorandum of July 12, 1994 from the DOE Metric Executive, this cancelled Order should continue to be used as "guidance" for metric transition.)
- Executive Order 12770, *Metric Usage in Federal Government Programs*, July 25, 1991. Requires each Federal Agency to develop a metric transition plan.
- GAO, 1994, *Metric Conversion: Future Progress Depends Upon Private Sector and Public Support*, GAO/RCED-94-23, U.S. General Accounting Office, January 1994. Reviews Federal metric conversion activities and contains recommendations to the Secretary of Commerce and the Chair, Interagency Council on Metric Policy. Concludes that Federal conversion is a partnership endeavor and cannot be completed without industry support. Recommends that government, the private sector, and the public engage in a broad national dialogue to encourage higher visibility for metric usage by government, the private sector, and consumers. Further recommends a subsystem approach in which, when total conversion is unfeasible, parts of a system are converted rather than the metric requirements being waived for the whole system. Recommends that a detailed metric conversion plan be developed.
- ICMP, *Federal Agency Guidance on the Use of the Metric System in Acquisitions*, approved by the Interagency Council on Metric Policy, July 1993. Provides information and recommendations for Federal Agencies to implement metric-usage requirements in acquisitions.

- ICMP, *Federal Agency Guidance on the Use of the Metric System in Financial Assistance*, approved by the Interagency Council on Metric Policy, October 1993. Provides information and recommendations for Federal Agencies to implement metric-usage requirements in grants, cooperative agreements, loans, loan guarantees, and subsidies.
- ISO, 1992, *SI Units and Recommendations for the Use of Their Multiples and of Certain Other Units*, ISO 1000:1992, International Organization for Standardization. Provides basic guidance on the use and organization of the International System of Units.
- Metric Conversion Act of 1975*, Public Law 94-168, as amended by the *Omnibus Trade and Competitiveness Act of 1988*, Public Law 100-418 Section 5164. Identifies the metric system as the preferred system of weights and measures for U.S. trade and commerce and requires Federal Agencies to use the metric system.
- Metric Education Act of 1978*, Public Law 89-10 as added to by Public Law 95-561. Authorizes grants and contracts to encourage education agencies and institutions, as a part of the regular education program, to prepare students to use the metric system of measurement.
- NIST, 1992, *Style Guide for the News Media*, LC 1132, National Institute of Standards and Technology. Provides a metric style guide for Federal Public Affairs officials.
- NIST, 1995, *Guide for the Use of the International System of Units (SI)*, NIST Special Publication 811, National Institute of Standards and Technology, April 1995. Provides guidance to members of NIST staff and other writers on SI rules and style conventions.
- Preferred Metric Units for General Use by the Federal Government*, Federal Standard 376B. Lists metric units recommended for use throughout the Federal Government and provides guidance on conversions and rounding conventions.
- OMB, 1993, *Federal Participation in the Development and Use of Voluntary Standards*, OMB Circular A-119, Office of Management and Budget, November 2, 1993. Is intended to foster greater Agency use of nongovernmental standards, metric standards, and international standards.
- OMB, 1993, *Preparation and Submission of Budget Estimates*, OMB Circular A-11, Office of Management and Budget, August 4, 1993. Requires that a progress report be provided with the annual budget estimate submission.
- 15 CFR 1170, *Metric Conversion Policy for Federal Agencies*, originally published in the *Federal Register*, Vol. 56, No. 1, p. 160, January 2, 1991 as 15 CFR Part 19, but was redesignated 15 CFR 1170 by a *Federal Register* notice of August 20, 1991 (56 FR 41281-41283). Provides guidance for use of the metric system of measurement by Federal Agencies of the United States.

48 CFR, *Federal Acquisition Regulation System (FAR)*, Subparts 7.103 and 10.002. Subpart 7.103 directs that Agency heads will ensure that Agency planners include use of the metric system of measurement in proposed acquisitions in accordance with 15 USC 205(b) and Agency metric plans and guidelines. Subpart 10.002 provides policy on using metric measurements in preparing specifications.

55 FR 245, *Metric System of Measurement: Interpretation of the International System of Units for the United States*, published in the *Federal Register*, Vol. 55, No. 245, p. 52242, December 20, 1990 (55 FR 52242-52245). Provides the list of allowable units for use within the Federal government.

This page intentionally left blank.

APPENDIX A. METRIC RESOURCES

The Metric Conversion Act and Executive Order 12770 require all Agencies to increase understanding of the metric system through educational information and guidance. In support of that requirement, the Hanford Metric Transition Committee (MTC) is responsible for developing a metric awareness strategy and for coordinating and assisting with the dissemination of metric information and guidance.

RL and contractors will disseminate information on the metric system and enhance awareness through information/awareness campaigns. Outreach activities should encompass both Hanford workers (i.e., internal) and businesses, community groups, professional organizations, and educational institutions (i.e., external). RL and contractors may form internal metric transition councils to advise their organizations on metrication matters and may establish metric transition points of contact to whom employees may address their questions, concerns, and comments. The Hanford MTC representatives may serve as local metric council members or as the internal points of contact for their companies or organizations.

The following are tools and resources that are currently available to RL and contractors to help implement the metrication program.

1. The MTC has established a cc:Mailbox on the Hanford Local Area Network (HLAN), to which all metric transition questions, concerns, and comments may be addressed. The cc:Mail address is ^Metric Transition. The Internet E-mail address for this mailbox is *metric_transition@rl.gov*.
2. A metric conversion program, Metric-X,¹ has been licensed and made available on HLAN. The program is accessible from any computer connected to HLAN in one of several ways.
 - a. At any DOS prompt, enter the command **MX** to start the program.
 - b. Information on how to install the program in Windows is available through HLAN User Help-n-Hints (HUH).
 - c. Installation of the Windows file/icon to access the Metric-X program can be made through the ESOE software distribution program, under the "Utilities" menu.
 - d. For those RL and contractor personnel who do not have routine access to HLAN, a copy of the software program may be obtained from the MTC upon request through the Metric Transition mailbox or by written request sent to Mailstop A5-18 (U.S. postal address: Metric Coordinator, P.O. Box 550, M/S A5-18, Richland, WA 99352-0550).

¹ Metric-X is a trademark of Orion Development Corporation, Merrifield, VA.

3. Assistance with metric conversions and technical metric information is available. Telephone numbers for contact are listed in the Organizations and Functions listing of the Hanford Phone Directory on HLAN (press F2 and scroll to or type METRIC CONVERSIONS).
4. A variety of information products is available through the Hanford Information program on HLAN. These products include documents, in WordPerfect 5.1 format, that can be viewed on the screen or printed for reference. In Hanford Information, these documents can be selected from the "Metric Transition" menu or one of its submenus. Additional documents will be added as the need is identified. Those documents currently available include the following.
 - a. This Plan is available at the "Metric Transition" menu, and several other reference documents are available in the "Federal Documents" submenu.
 - b. Technical information about the metric system, its prefixes, and guidance for their use are available at the "Metric Transition" menu.
 - c. Information about construction products and construction industry practices is available from the "Newsletters" submenu.
 - d. Lists of conversion factors, tables of conversions, guidance on conversion and rounding, and related topics are available at the "Conversions" submenu.

The following tools, activities, and resources can be made available upon request to the Metric Transition mailbox.

1. A DOS-based metric conversion program, titled CONVERT, is available. This program, developed under the auspices of the MTC, contains all the factors for conversion to SI units that appear in ASTM E 380, carried to the number of decimal places in the ASTM standard, and displayed in scientific notation. This program is recommended for use where technical conversions require more precision than is provided in the HLAN Hanford Information documents.
2. Speakers trained to make presentations on the metric system will be available for staff meetings and public gatherings.
3. Several articles about the metric system have appeared in the local Hanford newspaper, the *Hanford Reach*. Most of these articles have appeared under a caption entitled "Metric Corner." Reprints of the "Metric Corner" articles from the *Hanford Reach* may be available.
4. Posters, signs, and related materials have been created and may be distributed around the Site (and possibly to businesses, schools, and colleges) to promote the use of the metric system.
5. Other metric materials and items are available through the MTC at cost, or reproduction masters, where available, may be provided.

6. Most standards and codes exist in metric form or include metric units. Contact the Metric Transition mailbox for information regarding their usage.

The following tools, activities, and resources should be considered for incorporation into awareness and information campaigns in the future.

1. The MTC will coordinate with appropriate organizations to establish a Web Home Page on the Internet for metric information and assistance.
2. The MTC can provide assistance with presentations, demonstrations, and displays at business and professional conferences, seminars, and workshops.
3. Training opportunities include the use of videotape training and computer-assisted training programs. The MTC can provide information about pre-packaged training programs and may assist in the preparation of specialized classroom training sessions.

This page intentionally left blank.

APPENDIX B. ELEMENTS

Eleven categories of related elements are listed below.

1. Communications
2. Construction
3. Earth Sciences
4. Engineering
5. Environmental, Safety, Health, and Quality
6. Fabrication and Support Services
7. Facility Operations
8. Infrastructure
9. Procurement
10. Training and Education
11. Transportation

Elements to be converted have been identified under each category. Each element has been evaluated and a brief statement has been written on how and when the conversion might take place and risks involved with the metrication of that element. That information is provided in the following table.

Table B-1. Elements to be Converted (sheet 1 of 16)

GROUP 1: COMMUNICATIONS			
How	Timing	Risk(s)	Remarks
<i>Area to be converted:</i> COPIERS, AUTOMATED DATA PROCESSING HARDWARE & SOFTWARE, AND DUPLICATING EQUIPMENT			
<ol style="list-style-type: none"> 1. Phased approach - replace equipment as needed. Ensure that all new equipment, bought or leased, has the ability to accommodate metric paper, either built in or through available conversion kit. 2. Purchase additional equipment as needed. 3. Procure only new software that has the capability to manipulate or display data in metric units, where measurements are applicable. 	<ol style="list-style-type: none"> 1. As needed (buying/leasing new or replacing old equipment). All equipment purchased after 1 January 1996 must have metric capability. 2. When to the advantage of the Hanford Site (negotiate with suppliers). 3. All acquisitions beginning 1 August 1994. 	<ol style="list-style-type: none"> 1. Phased approach: <ul style="list-style-type: none"> • Incompatibility (copiers, printers, paper). • Users not trained with equipment. 2. Duplication of equipment to accommodate varying needs. 3. Users unfamiliar with new or replacement programs. 4. Vendors not aware of metric requirements. 	<ol style="list-style-type: none"> 1. None identified.
<i>Area to be converted:</i> HANFORD REACH - ALSO ELECTRONIC NEWS BULLETINS AND LOCAL MEDIA			
<ol style="list-style-type: none"> 1. Inform staff in the use of the metric system. 2. Enhance staff awareness of the need for transition to and use of the metric system. 3. Publish articles on metric subjects. 4. Publicize metric success stories. 	<ol style="list-style-type: none"> 1. Inform staff by end of FY 94. 2. First article by end of June 1994; additional articles quarterly. 3. All articles use metric units by end of FY 94. 	<ol style="list-style-type: none"> 1. Training not readily available. 2. Lack of support. 3. Need article authors (metric cognizant). 4. Need to identify success stories. 	<ol style="list-style-type: none"> 1. None identified.
<i>Area to be converted:</i> COMMUNITY OUTREACH AND PUBLIC AFFAIRS			
<ol style="list-style-type: none"> 1. Distribute informative documents to businesses, schools, and colleges. 2. Promote metrication of Sagebrush games and events. 3. Public Relations: <ul style="list-style-type: none"> • Inform public about our metrication program. • Get external communications to include metric units in all releases. • Use metric units in all communications. • Establish points of contact for public questions, comments, and feedback. 	<ol style="list-style-type: none"> 1. By 30 September 1994: <ul style="list-style-type: none"> • Procurement of information documents. • Science education staffs for schools and colleges. 2. Begin metrication with the 1995 Sagebrush games. 3. Begin community outreach upon approval of the Plan. 4. External communications to include metric units by 1 October 1995. 	<ol style="list-style-type: none"> 1. Failure of public acceptance could dampen public enthusiasm. 	<ol style="list-style-type: none"> 1. Also see PROCUREMENT, Vendor Outreach.
<i>Area to be converted:</i> PUBLICATIONS AND OTHER DOCUMENTS			
<ol style="list-style-type: none"> 1. Train editors, authors, illustrators, and word processors. 2. Develop information and awareness campaign for authors (sitewide). 	<ol style="list-style-type: none"> 1. Start training immediately. 2. Develop information plan by 1 October 1994; ongoing. 	<ol style="list-style-type: none"> 1. Training staff and materials not available. 	<ol style="list-style-type: none"> 1. Also see TRAINING AND EDUCATION and FACILITY OPERATIONS, Reports, Plans, and Other Documents.

Table B-1. Elements to be Converted (sheet 2 of 16)

GROUP 1: COMMUNICATIONS			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: HANFORD LOCAL AREA NETWORK (HLAN)</i>			
<ol style="list-style-type: none"> 1. Inform every process owner that next update must contain metric units. 2. Make metric information and conversions available on HLAN. 3. Assign administrator/coordinator for metric information. 4. Accept new measurement-sensitive information only if metric units are included, unless exempt. 	<ol style="list-style-type: none"> 1. As required to meet Plan activities and schedule. 2. Before 1 November 1994. 3. As recommended by MTC. 4. After 1 June 1996. 	<ol style="list-style-type: none"> 1. Slight increase in revision time of files. 2. Process owners not familiar with metric usage. 3. Inappropriate or unnecessary conversions. 4. HLAN administrators provide policing function. 	<ol style="list-style-type: none"> 1. None identified.
<i>Area to be converted: STANDARD FORM ADMINISTRATION</i>			
<ol style="list-style-type: none"> 1. Reformat all forms to fit metric paper. 2. Inform every process owner that next update is to contain metric units. 	<ol style="list-style-type: none"> 1. Upon availability of codependent items. 2. As required to meet Plan schedule. 	<ol style="list-style-type: none"> 1. Increase in revision time, depending on the complexity of the form. 	<ol style="list-style-type: none"> 1. None identified.

Table B-1. Elements to be Converted (sheet 3 of 16)

GROUP 2: CONSTRUCTION			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: TOOLS, DIES, AND GAUGES</i>			
<ol style="list-style-type: none"> 1. Buy new, use conversion kits, or convert to dual measurement. 2. Consider tolerances to allow use of nonmetric tools, dies, and gauges. 3. Buy immediately using expense funds, or consider rent or lease options. 4. Procure or subcontract for goods and services when not available onsite. 	<ol style="list-style-type: none"> 1. When required to support a metric job, otherwise budget according to Plan schedule. 	<ol style="list-style-type: none"> 1. Equipment not readily available. 2. Spare parts not readily available. 3. May require metric support equipment, e.g., calibration equipment, metric sized drives, etc. 4. Space limitations for storage of tools and spares. 	<ol style="list-style-type: none"> 1. Convert tools and equipment where possible, use alternate devices, or buy new when necessary. 2. Outsourcing is preferred to large investments for costly or limited-use equipment. 3. See FABRICATION AND SUPPORT SERVICES, Fabrication Planning.
<i>Area to be converted: SKILLS DEVELOPMENT</i>			
<ol style="list-style-type: none"> 1. Encourage metric addition to the apprentice programs, trade and vocational schools. 2. Provide additional onsite training: <ul style="list-style-type: none"> • Classroom training • "Just-in-time" toolbox training • Computer network resources (e.g., HLAN, etc.) 3. HGET training encouraged to convert. 4. Publications, flyers, and articles. 5. "Mentors" on the job. 6. Publicity and shared successes. 	<ol style="list-style-type: none"> 1. "Soft" skills development should start immediately; for example items 1, 4, 5, and 6, plus toolbox training when metric training materials become available. 2. As required to meet Plan schedule. 	<ol style="list-style-type: none"> 1. Inconsistencies in the skills development approach will cause incompatible results. 2. Possible bargaining unit concern. 	<ol style="list-style-type: none"> 1. Also see TRAINING AND EDUCATION.
<i>Area to be converted: MATERIALS AND PRODUCTS</i>			
<ol style="list-style-type: none"> 1. Acquire metric catalogs. 2. Designate metric coordinator for each procurement organization. 3. Increase Hanford attendance at small business conferences. 4. Publicize M-2 guide. 5. Advise suppliers and distributors of metric sizes and metric "trade sizes" for materials and products needed. 	<ol style="list-style-type: none"> 1. Ongoing activity. 	<ol style="list-style-type: none"> 1. Not all suppliers listed in the M-2 offer U.S. products. 2. Potential loss of form, fit, or function. 3. Local suppliers unaware of metric designations for their products. 4. Standard stock items not always metric. 	<ol style="list-style-type: none"> 1. This is a key determining factor in the metrication effort. 2. Also see PROCUREMENT, Vendor Outreach.

Table B-1. Elements to be Converted (sheet 4 of 16)

GROUP 2: CONSTRUCTION			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: SOURCES FOR CODES AND STANDARDS</i>			
1. Most codes and standards already include metric units or will add in next revision. Existing standards will be updated as part of the normal subscription process.	1. Ongoing activity.	1. Users may not have current standards. 2. Conflicts between standards of different nations. 3. Local ordinances may require different codes or standards.	1. Information sharing is the key to the success of standards; there are no technical obstacles. 2. OMB Circular A-119 encourages use of metric and international standards.
<i>Area to be converted: TESTING PROCEDURES</i>			
1. Testing procedures will be converted based on the system and/or facility being tested. 2. Rent equipment or contract for testing services if metric test equipment is required but not locally available.	1. As required to support Plan activities. 2. As required by specifications and other contract documents.	1. May not have all the necessary equipment to test metric systems. 2. Subcontracting Plan may not include requirements for testing.	1. This strategy will minimize safety problems that might be caused by conflicting measurement systems.
<i>Area to be converted: BLACK BOXES</i>			
1. Use adapters when necessary. 2. Interfaces with black boxes should be measured in units consistent with system being installed.	1. For new designs and considered for maintenance replacements.	1. Interface problems. 2. Spare parts. 3. Drawing updates. 4. Vendor data. 5. Maintenance procedures.	1. The black box concept will allow a safe use of metric components in existing facilities, and allow nonmetric equipment to be used in new facilities when metric equivalents are not available.
<i>Area to be converted: PERMITS</i>			
1. Use metric units unless nonmetric units are specified by regulation, then use dual.	1. Immediately, or as forms are revised.	1. Confusion on when regulation might require nonmetric units. 2. Conversion errors may cause impacts.	1. Most situations will have minimal impacts. Use dual measurements if unsure.
<i>Area to be converted: SUBCONTRACTORS</i>			
1. Contracts will specify metric use unless nonmetric required by design or regulations. 2. For basic ordering agreement (BOA) contracts, require metric use for subcontractors using the same standards used by the Hanford contractors. 3. Contracts will require flow-down of metric requirements to all subcontracts and purchases.	1. As required to meet Plan schedule. 2. Flow-down provision required after 1 January 1995.	1. Some confusion for contractors unfamiliar with the metric system. 2. May lead to higher bids, or no bids at all. 3. Foreign contractors seen as gaining favor over U.S. contractors. 4. Provisions of contract may limit amount of work to be subcontracted.	1. Will be a learning curve for contractors. 2. Use dual dimensioning when nonmetric items are specified.

Table B-1. Elements to be Converted (sheet 5 of 16)

GROUP 2: CONSTRUCTION			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: WELL DRILLING</i>			
1. Equipment will remain the same with the designs and reporting being soft converted.	1. Will be guided by industry progress.	1. None anticipated.	1. The change in this special area will need to be coordinated with industry.
<i>Area to be converted: INSTALLATION AND FABRICATION PROCEDURES</i>			
1. Follow the design (e.g., if the design is in metric, procedures will be metric).	1. For existing procedures, conversion will follow the revision cycle, unless metric is required for specific job(s) earlier.	1. None anticipated.	1. None identified.

Table B-1. Elements to be Converted (sheet 6 of 16)

GROUP 3: EARTH SCIENCES			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: MAPPING AND SURVEYING</i>			
<ol style="list-style-type: none"> Being done for new maps and surveys (official Washington State coordinate system is metric). Use Hanford global positioning database and computer resources to cross-reference other Hanford grid systems with new surveys. 	<ol style="list-style-type: none"> Currently being done. Continue conversion activities as necessary to support projects and Plan schedule. 	<ol style="list-style-type: none"> Minimal. Duplication of effort possible if new information not shared. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: METEOROLOGY</i>			
<ol style="list-style-type: none"> Follow guidance of National Oceanographic and Atmospheric Administration (NOAA) for weather data collection and reporting. Use SI units or SI-allowed units when providing weather information to the public; use dual units when necessary to assist with the transition. 	<ol style="list-style-type: none"> When Plan becomes effective. Official transition will follow Metric Transition Plan of Department of Commerce/ NOAA. 	<ol style="list-style-type: none"> Possible confusion if NOAA transition falls behind pace of other Hanford transition efforts. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: GEOLOGY, HYDROLOGY, TOPOGRAPHY, AND OCEANOGRAPHY</i>			
<ol style="list-style-type: none"> Current use/practiced. Switch to SI units if non-SI metric units are currently used. May use dual system if common units reporting is required. 	<ol style="list-style-type: none"> When Plan goes into effect. Use guidance from Metric Transition Plans of other Agencies (e.g., Agriculture, Interior, NOAA). 	<ol style="list-style-type: none"> Lack of coordination among Federal Agencies in plan development. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: INSTRUMENTATION</i>			
<ol style="list-style-type: none"> Replace non-SI measuring devices with SI devices, or install conversion kits. 	<ol style="list-style-type: none"> As required to meet Plan schedule. As new or replacement equipment is purchased. 	<ol style="list-style-type: none"> Misinterpretation. Possible safety impacts. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: WILDLIFE SAMPLING, PLANT LIFE SAMPLING, AND ARCHEOLOGY</i>			
<ol style="list-style-type: none"> As currently being done. Switch to SI units if non-SI metric units are currently used. 	<ol style="list-style-type: none"> When Plan becomes effective. 	<ol style="list-style-type: none"> None anticipated. 	<ol style="list-style-type: none"> None identified.

B - 7

DOE/RL-94-0070
Revision 1, 02-01-96

Table B-1. Elements to be Converted (sheet 7 of 16)

GROUP 4: ENGINEERING			
How	Timing	Risk(s)	Remarks
<i>Area to be converted:</i> DESIGN CRITERIA			
<ol style="list-style-type: none"> Existing criteria – no change. New criteria will use metric units throughout – may use soft metric conversion if needed to match existing systems or to conform to existing nonmetric standards and directives (may use dual dimensions if needed to avoid confusion). Use hard metric in other cases. 	<ol style="list-style-type: none"> As required to meet Plan schedule. 	<ol style="list-style-type: none"> Reference document guidance may not be sufficiently clear or specific as to what to metricate or how to metricate. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted:</i> DRAFTING			
<ol style="list-style-type: none"> Revise Hanford Plant Standard SDC 1.3 to include procedures for metric drawings. Pilot projects are being evaluated. Metric drawing standards solicited from international divisions of Westinghouse, ICF Kaiser International, and Bechtel, as well as BPA. Use ISO-size drawing sheets (e.g., size A1) for all new drawings. 	<ol style="list-style-type: none"> In general, use metric drafting practices when design is metric (hard or soft), and U.S. standards for design in inch-pound units. Make new drawings to ISO sizes after January 1997. 	<ol style="list-style-type: none"> Errors resulting from conversion could affect form, fit, or function. Additional labor (e.g., trimming of prints) may be expended if ISO-size print paper is not used. Additional drawings may be required to show same details as on ANSI-size drawings. (ISO A1 sheet is smaller in area than ANSI F-size sheet.) 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted:</i> ENGINEERING DESIGN, INCLUDING CALCULATIONS AND CHECKING			
<ol style="list-style-type: none"> New design to be in system of units required by criteria and baseline documents. Modifications to existing design – use metric where feasible, black box where necessary. 	<ol style="list-style-type: none"> As required to meet Plan schedule. 	<ol style="list-style-type: none"> Unfamiliarity with metric system. Reference material may not be available. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted:</i> COMPUTER SOFTWARE			
<ol style="list-style-type: none"> All new software shall have the capability to compute and/or display data in metric units. Unique cases may be approved on a waiver basis. Every process owner is to revise Site software as required. 	<ol style="list-style-type: none"> As items are replaced or revised. As required to support Plan activities. 	<ol style="list-style-type: none"> Errors introduced during software revision. 	<ol style="list-style-type: none"> None identified.

Table B-1. Elements to be Converted (sheet 8 of 16)

GROUP 4: ENGINEERING			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: THREADS AND FASTENERS</i>			
<ol style="list-style-type: none"> When converting from common fasteners to metric fasteners there is no direct conversion. Calculations must be done to determine the correct size of metric fastener. Perform additional testing if required to allow use of metric fasteners in safety class applications. 	<ol style="list-style-type: none"> As required to support Plan activities. 	<ol style="list-style-type: none"> Suspect/counterfeit problem for fasteners. Funding for testing of fasteners may be an issue. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: ESTIMATING</i>			
<ol style="list-style-type: none"> Follow design's lead. Work with vendors to collect unit pricing data in metric units. 	<ol style="list-style-type: none"> As required to support Plan activities. 	<ol style="list-style-type: none"> Trending may be made more difficult when dual measurements are used. Turnaround for estimates may increase. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: ENERGY CONSERVATION</i>			
<ol style="list-style-type: none"> Perform calculations in SI units if tools are available; otherwise, calculate in appropriate measurement system and convert output data to SI units. Issue reports in SI units; use dual measurements if necessary. 	<ol style="list-style-type: none"> As required to meet Plan schedule. 	<ol style="list-style-type: none"> Reports may be more cumbersome when dual dimensions are used. Analysis and reporting efforts may temporarily increase. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: SPECIFICATIONS</i>			
<ol style="list-style-type: none"> All new specifications must be written in metric units. Use dual system where necessary as an interim measure. 	<ol style="list-style-type: none"> See Plan, Section VIII, SCHEDULE. 	<ol style="list-style-type: none"> Lack of familiarity with the metric culture. Lack of resources. 	<ol style="list-style-type: none"> None identified.

B - 9

Table B-1. Elements to be Converted (sheet 9 of 16)

GROUP 5: ENVIRONMENTAL, SAFETY, HEALTH, AND QUALITY			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: INSPECTION AND QUALITY ASSURANCE (QA)</i>			
<ol style="list-style-type: none"> Train people. Acquire measuring and testing equipment. 	<ol style="list-style-type: none"> As each project and facility goes metric. As each project and facility demands. 	<ol style="list-style-type: none"> Training not available. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: HEALTH PHYSICS AND RADIATION PROTECTION</i>			
<ol style="list-style-type: none"> 10 CFR 835 requires use of non-SI units of curie, rad, and rem in radiation protection records. All other measures (e.g., distance, area, volume, weight) will be in SI units. Convert to metric units whenever required by regulation and in all other cases where conversion would not compromise safety. 	<ol style="list-style-type: none"> As required to support Plan activities and to meet Plan schedule. 	<ol style="list-style-type: none"> Errors in conversion of nonmetric measurements to SI units could lead to potential safety concerns. Lack of understanding of SI radiation units, if used alone, could lead to worker concerns and public relations problems. Department of Transportation (DOT) regulations may require SI labeling on packages before other applications. 	<ol style="list-style-type: none"> Federal Government interagency group has recommended cessation of units of curie, rad, and rem by year 2000. See TRANSPORTATION, Packaging.
<i>Area to be converted: ENVIRONMENTAL</i>			
<ol style="list-style-type: none"> Collect data in metric units whenever feasible. Report in metric units unless nonmetric required by regulation, then use dual. 	<ol style="list-style-type: none"> As required to support Plan activities and to meet Plan schedule. 	<ol style="list-style-type: none"> Errors in conversion could lead to potential regulatory or safety concerns. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: MEDICAL SERVICES</i>			
<ol style="list-style-type: none"> Buy metric measurement equipment. Use conversion charts with existing nonmetric equipment. Use dual dimensions where nonmetric required by regulation. 	<ol style="list-style-type: none"> As required to meet Plan schedule. 	<ol style="list-style-type: none"> Minimal. 	<ol style="list-style-type: none"> None identified.

Table B-1. Elements to be Converted (sheet 10 of 16)

GROUP 6: FABRICATION AND SUPPORT SERVICES			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: METRIC THREADS</i>			
1. Use metric threads if component allows metric units. Avoid using metric and nonmetric threads on same fabrication unless required for black box interface.	1. As dictated by designs.	1. Dual spare parts required. 2. Incompatibility during maintenance or assembly.	1. Also see ENGINEERING.
<i>Area to be converted: FABRICATION PLANNING</i>			
1. Cost of metric tooling and designs should be considered in "make or buy" decisions.	1. As required to meet Plan schedule.	1. Present bargaining agreements may affect decisions.	1. Outsourcing is preferred to costly investment in equipment. 2. See CONSTRUCTION, Tools, Dies, and Gauges.
<i>Area to be converted: SAMPLING AND LABORATORY ANALYSES</i>			
1. Already metric unless nonmetric units are required by regulation or reporting.	1. As required to meet Plan schedule.	1. None anticipated.	1. None identified.
<i>Area to be converted: MEASURING AND TEST EQUIPMENT – CALIBRATION</i>			
1. See CONSTRUCTION: Tools, Dies, and Gauges for equipment strategy. 2. Change procedures and acquire new equipment.	1. See CONSTRUCTION: Tools, Dies, and Gauges, except dual capability may be required during transition of the Site. 2. As required to support Plan activities.	1. Calibration capability lagging field needs.	1. None identified.

Table B-1. Elements to be Converted (sheet 11 of 16)

GROUP 7: FACILITY OPERATIONS			
How	Timing	Risk(s)	Remarks
<i>Area to be converted:</i> PLANT EXPANSION, CHANGE IN MISSION, OR MODIFICATIONS			
<ol style="list-style-type: none"> All new plant or facility expansion shall be done in metric unless it jeopardizes safety or cannot be obtained. Black box design for internal modification work when hard metric is not possible. 	<ol style="list-style-type: none"> As required to meet Plan schedule. 	<ol style="list-style-type: none"> Safety systems. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted:</i> DECONTAMINATION AND DECOMMISSION (D&D) OPERATIONS			
<ol style="list-style-type: none"> Design and work plans in metric, unless dual dimensions are required. Document reports and all paper work. 	<ol style="list-style-type: none"> As required to support Plan activities. 	<ol style="list-style-type: none"> None anticipated. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted:</i> DATA COLLECTION			
<ol style="list-style-type: none"> Measurement data (e.g., liquid level, temperature, weight) should be collected and recorded in the units of the permanently installed readout instruments. Dual dimensions are optional, if useful for further data processing. Temporary or portable instruments should be metric, unless incompatible. 	<ol style="list-style-type: none"> As required to meet Plan schedule. 	<ol style="list-style-type: none"> None anticipated. (These requirements may clear up some confusion in operations at Tank Farms and elsewhere.) 	<ol style="list-style-type: none"> Recording nonmetric data from existing nonmetric instruments does not adversely affect metric transition effort.
<i>Area to be converted:</i> REPORTS, PLANS, AND OTHER DOCUMENTS			
<ol style="list-style-type: none"> Historical data will normally be reported in the same measurement system and units in which the data were originally collected or recorded. To aid readers who are familiar with metric measurements, footnotes or tables of conversion factors should be provided. Convert the data to metric units whenever the original data are used in new calculations or computations, or when making new operating or design decisions based on that data, where appropriate. 	<ol style="list-style-type: none"> As required to meet Plan schedule. 	<ol style="list-style-type: none"> This may clear up some confusion in requirements for documents used and generated at various facilities. Potential slowdown in pace of metric conversion. 	<ol style="list-style-type: none"> Clarification of requirements deemed to outweigh potential adverse effect on metric transition progress. See Appendix C for exceptions.
<i>Area to be converted:</i> OPERATIONAL TEST PROCEDURES (OTPs)			
<ol style="list-style-type: none"> Use where new or existing system is metric. 	<ol style="list-style-type: none"> As required to support Plan activities. 	<ol style="list-style-type: none"> Nonavailability of metric measurement and test equipment. 	<ol style="list-style-type: none"> None identified.

Table B-1. Elements to be Converted (sheet 12 of 16)

GROUP 7: FACILITY OPERATIONS			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: THERMOSTATS</i>			
1. Use metric or dual controls on new systems and complete retrofit projects.	1. On all new systems. 2. Facility upgrades.	1. None anticipated.	1. None identified.
<i>Area to be converted: INSTRUMENTATION AND ALARMS</i>			
1. Adjust set-points and trip-points of controls and alarms and calibrate in metric units.	1. As each project and facility goes metric.	1. None anticipated.	1. None identified.
<i>Area to be converted: ENVIRONMENTAL/REGULATORY MONITORING</i>			
1. Convert procedures and equipment. 2. Train personnel. 3. Follow regulations.	1. As items are replaced or revised. 2. As required to support Plan activities.	1. Human factors. 2. Public sensitivity to environmental reports.	1. Regulatory monitoring shall be collected in metric unless it goes against a regulation. Most monitoring is already done and reported in metric.

Table B-1. Elements to be Converted (sheet 13 of 16)

GROUP 8: INFRASTRUCTURE			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: ELECTRIC POWER, STEAM, WATER, AND OTHER UTILITIES</i>			
1. New projects and other modifications use metric components. 2. Use metric units in reports and other documents.	1. As required to meet Plan schedule. 2. Upon availability of codependent items.	1. Incompatibility/safety concerns.	1. Also see ENGINEERING.
<i>Area to be converted: TELECOMMUNICATIONS</i>			
1. New projects and other modifications use metric components. 2. Use metric units in reports and other documents.	1. As required to meet Plan schedule. 2. Upon availability of codependent items.	1. Incompatibility.	1. Also see ENGINEERING and CONSTRUCTION.
<i>Area to be converted: ROADS, BRIDGES, AND RAILROADS</i>			
1. New projects and other modifications use metric components. 2. Use metric units in reports and other documents.	1. As required to meet Plan schedule. 2. Upon availability of codependent items. 3. Follow Department of Transportation regulations.	1. None anticipated.	1. Also see ENGINEERING and CONSTRUCTION.
<i>Area to be converted: GARBAGE, SALVAGE, AND RECYCLING</i>			
1. Report measurements in metric units.	1. As required to meet Plan schedule.	1. None anticipated.	1. None identified.

Table B-1. Elements to be Converted (sheet 14 of 16)

GROUP 9: PROCUREMENT			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: CONTRACTS</i>			
<ol style="list-style-type: none"> Require metric usage based on specified criteria in proposals (RFPs). Require flow-down of metric provisions in all contracts, subcontracts, and purchases. 	<ol style="list-style-type: none"> Driven by specifications. As required to meet Plan schedule. 	<ol style="list-style-type: none"> Difficulty in obtaining products. Reduced bidding from local suppliers. 	<ol style="list-style-type: none"> See CONSTRUCTION, Subcontractors.
<i>Area to be converted: SUPPLIES</i>			
Form an intercontractor committee/team to: <ol style="list-style-type: none"> Identify suppliers (procurement): <ul style="list-style-type: none"> Other agencies (prior source identification activities). Surveys of suppliers and manufacturers. Outreach programs. Distribute supplier list to Hanford contractor buyers. Form information-sharing committee. 	<ol style="list-style-type: none"> Upon availability of codependent items. Publish list of sources quarterly. 	<ol style="list-style-type: none"> Delays. Incompatibility. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: PAPER PRODUCTS</i>			
<ol style="list-style-type: none"> Buy paper products to metric specifications. 	<ol style="list-style-type: none"> Non-hardware-dependent paper products – immediately. Hardware-dependent paper products – with the acquisition of hardware. 	<ol style="list-style-type: none"> Supplier availability. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: BID ADVERTISEMENTS</i>			
<ol style="list-style-type: none"> Include clauses that all bid quotes must be per metric unit quantity. Utilize Hanford Bid Board. 	<ol style="list-style-type: none"> Beginning 1 August 1994. 	<ol style="list-style-type: none"> Supplier availability or reduced competition. Supplier understanding. 	<ol style="list-style-type: none"> None identified.
<i>Area to be converted: VENDOR OUTREACH</i>			
Sell the idea of going metric: <ol style="list-style-type: none"> Place articles in newspapers. Participate in tradeshow. Participate in school science fairs. Publicize the benefits – potential for exports. 	<ol style="list-style-type: none"> As required to meet Plan schedule. 	<ol style="list-style-type: none"> None anticipated. 	<ol style="list-style-type: none"> See COMMUNICATIONS, Community Outreach.

Table B-1. Elements to be Converted (sheet 15 of 16)

GROUP 10: TRAINING AND EDUCATION			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: SPECIFIC CLASSES</i>			
<ol style="list-style-type: none"> 1. Ensure that all training materials are in metric units; provide training aids in metric units. 2. Metric units will be included in the next update of general employee training, both in a new unit on the metric system and in the modules on other subjects. 3. Sequence classes. 	<ol style="list-style-type: none"> 1. As required to meet Plan schedule. 	<ol style="list-style-type: none"> 1. None anticipated. 	<ol style="list-style-type: none"> 1. None identified.
<i>Area to be converted: ALL EMPLOYEES</i>			
<ol style="list-style-type: none"> 1. Use general employee training as vehicle for metric training (e.g., HGET). 2. Establish metric resources in each organization. 	<ol style="list-style-type: none"> 1. As required to meet Plan schedule. 	<ol style="list-style-type: none"> 1. None anticipated. 	<ol style="list-style-type: none"> 1. See Appendix A, Metric Resources.

Table B-1. Elements to be Converted (sheet 16 of 16)

GROUP 11: TRANSPORTATION			
How	Timing	Risk(s)	Remarks
<i>Area to be converted: PACKAGING</i>			
1. Department of Transportation (DOT) driven.	1. Follow DOT requirements.	1. DOT labels on casks and other shipping containers arriving at Hanford may be in metric units before workers fully trained.	1. None identified.
<i>Area to be converted: TRAFFIC SIGNS</i>			
1. Change speed limit to include both metric and English. 2. Replace milepost signs.	1. Coordinate schedule with county and state officials.	1. None anticipated.	1. None identified.
<i>Area to be converted: VEHICLES AND HEAVY EQUIPMENT</i>			
1. Specify new equipment to be metric. 2. Treat vehicles as black boxes.	1. As required to meet Plan schedule.	1. None anticipated.	1. None identified.
<i>Area to be converted: GASOLINE, OIL, AND LUBRICANTS</i>			
1. Specify and report in metric. 2. Petroleum products to be dispensed in metric units. 3. New and replacement pumps to be metric.	1. As required to meet Plan schedule. 2. Upon availability of codependent items.	1. Errors in soft conversion. 2. Potential overfills and spills.	1. None identified.

This page intentionally left blank.

APPENDIX C. EXCEPTION GUIDANCE

Federal law and implementing regulations allow for exceptions to metric conversion within certain constraints. Guideline criteria for exceptions have been extracted from the DOE *Metric Transition Plan*. The criteria/guidelines, listed below, are provided to enable the responsible individual to decide if specific items may be excepted from metrication.

According to law, Federal guidance, and DOE policy, metrication is not required if any of the following conditions or circumstances exist:

1. A significant project has a Key Decision 0 (KD-0) or its equivalent prior to January 1, 1994
2. Metric use causes an inability of the DOE to fulfill its responsibilities under the laws of the Federal government and the United States
3. Metric use is impractical or is likely to cause significant inefficiencies to or loss of markets to U.S. firms (according to ICMP guidance to Federal Agencies)
4. Design dimensions for existing facilities, systems, and equipment are not converted to metric unless it is determined to be necessary or advantageous, or to facilitate modifications
5. Facilities that have little remaining useful life, will not be renovated, or are awaiting transfer to the Environmental Restoration Program are not converted to metric
6. Conversion will precipitate a costly revision of the facility's Safety Analysis Report or process management
7. Prevailing international standards for a product are nonmetric, or a U.S. industry sector is predominately nonmetric and cannot easily supply a product to metric specifications, which could give an unintended competitive advantage to foreign-owned firms.

In addition, RL has added the following item:

8. Metric use would compromise safety, as determined by the responsible authority.

This metrication transition effort should not be used as sole justification for 1) early replacement of useful materials/equipment (e.g., excessing all the current stock of copy paper and replacing it with A4-size paper), 2) purchase of new materials/equipment (e.g., stocking a tool box with a full set of metric tools, when there will be no metric equipment to support), or 3) authorization of new or modification work.

All metrication efforts must make common sense. Convenience is not an excuse to avoid metrication, and the exception guidance provided herein is not to be used for that purpose.

Within these guidelines RL has identified the following examples that would be excepted from metrication.

- Existing/approved drawings and specifications (Criterion 4)

This example illustrates that we are not going to go back and retrofit existing design media, just for the sake of metrication. This does not restrict the use of mixed measurements on modifications to existing documents (e.g., Engineering Change Notices (ECNs) or revisions to existing drawings) when it makes good sense and would not create a unit identification problem.

- Maintenance or modification of abandoned, standby, and shutdown facilities (Criterion 5)

We do not want to metricate facilities where the metrication will provide no appreciable benefit (e.g., unoccupied facilities at old reactors in the outer areas). This does not preclude the use of the metric system for activities and documentation in these facilities.

- Black box items and interface points (Criteria 3, 4, 7)

Use of nonmetric systems or components that “plug into” a metric system is allowed. This allows a predominantly metric facility to buy nonmetric equipment when a metric-equivalent item is not available (e.g., the procurement of a nonmetric compressor to be installed in a metric system when a metric equivalent is not available). Each black box would have nonmetric-to-metric interfaces at attachments and/or interfaces. The main concern would be the compatibility of interfaces.

- A state law that requires reporting in nonmetric units (Criterion 2)

We are required to comply with a law or regulation that specifically requires reporting in nonmetric units. Note the distinction between governing documents being written in nonmetric units and those requiring the use of nonmetric units. For example, a regulation may specify certain action to be taken for packages that weigh over 110 pounds. That action can also be specified for packages that are over 50 kilograms (equivalent to 110 pounds). However, if a state law requires reporting discharge rates in pounds per hour, the report cannot be issued in kilograms per hour.

- Items that affect emergency response procedures/programs (Criteria 3, 6, 8)

Metrication must not create safety problems. This applies to procedures as well as to human factors issues (e.g., confusion caused by having a control panel with both nonmetric and metric indicators on an engineered safeguards system).

- A U.S. industry sector is predominantly nonmetric and cannot easily supply a product in metric measurements or to metric specifications. (Criterion 3)

Some specialized products, such as concrete masonry block and electrical power pole hardware, are made by U.S. firms in inch sizes and are not readily converted to metric. In such cases, insisting on products made to metric specifications could give unintended competitive advantage to foreign firms. Hence, such U.S. products may be used without prejudice and will be treated as black box items for interface purposes. Note that there is a difference between a “foreign firm” and a U.S. firm producing nonmetric products for domestic sales and equivalent metric products for international sales. In other words, if a U.S. company produces a metric product for international sales, but the product cannot be obtained through their “domestic sales” division, then the product might be ordered from their “international sales” division.

This page intentionally left blank.