

BSR/ASHRAE 90.2P

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ASHRAE STANDARD

ENERGY EFFICIENT DESIGN OF NEW LOW-RISE RESIDENTIAL BUILDINGS

PROPOSED AMERICAN NATIONAL STANDARD

SECOND PUBLIC REVIEW DRAFT

May 1990

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AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

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2. Section or Paragraph:_____

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ASHRAE STANDARD 90.2P

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ENERGY EFFICIENT DESIGN OF NEW LOW-RISE RESIDENTIAL BUILDINGS

1 PURPOSE: to provide design requirements for energy efficient new residential buildings.

2 SCOPE: new residential dwelling units for human occupancy.

2.1 For the purposes of this standard, "residential dwelling units" includes: single family houses, multi-family structures (of three stories or fewer above grade), manufactured (mobile) housing, and manufactured (modular) housing. This standard does not include "transient" housing such as hotels, motels, nursing homes, jails, and barracks.

2.2 This standard covers building envelope, heating equipment and systems, air-conditioning equipment and systems, domestic water heating equipment and systems, and provisions for overall building design alternatives and trade-offs.

2.3 Two paths are provided for compliance: the prescriptive requirements method and the annual energy cost method (systems analysis approach).

2.4 This standard does not cover:

(a) specific procedures for the operation, maintenance and use of residential buildings,

(b) portable products such as appliances and heaters, and

(c) residential electric service or lighting requirements.

2.5 This standard shall not be used to abridge any safety, health or environmental requirements.

3 DEFINITIONS, ABBREVIATIONS, ACRONYMS AND SYMBOLS

3.1 Purpose

The purpose of this section is to define all terms, abbreviations, acronyms, and symbols unique to the standard.

3.2 Scope

These terms, abbreviations, acronyms, and symbols are applicable to all sections of this standard. Definitions as contained in the ASHRAE publication "Terminology of Heating, Ventilation, Air Conditioning, and Refrigeration," 1986 (Ref 1), shall apply to all terms in this standard unless specifically listed here.

3.3 Definitions

air films: the interior and exterior air surface film coefficients for winter design conditions.

air infiltration barrier (AIB): a fabric of film material or system designed and installed primarily to reduce the movement of air through a wall or into thermal insulation.

annual fuel utilization efficiency (AFUE): the ratio of annual output energy to annual input energy which includes any non-heating season pilot input loss, and for gas or oil-fired furnaces or boilers does not include electrical energy.

area of all exterior walls (gross): exterior surface area of the following assemblies that enclose conditioned space; opaque wall assemblies including between floor spandrels and peripheral edges of flooring; fenestration assemblies including all glazed surfaces, sash, and framing elements; and door assemblies. Areas of vents, grills, and pipes are excluded.

area of all fenestration assemblies: interior surface area of such assemblies including all glazed surfaces (such as windows, skylights, and sliding glass doors), sash, curbing, or framing elements that enclose conditioned space.

area of all floor assemblies: interior surface area of such assemblies that enclose conditioned space.

area of all opaque wall assemblies: the gross area of exterior walls measured on the exterior consisting of all opaque wall area (including foundation walls, between floor spandrels, peripheral edges of floors, etc.) that enclose conditioned space (including interstitial areas).

area of all ceiling assemblies: interior surface area of such assemblies that enclose conditioned space.

assembly: a portion of an envelope component represented by an arrangement and connection of building construction materials with a specific thermal transmittance or thermal conductance.

band joist: the peripheral edges of frame floors.

cardinal orientation: the four primary compass orientations North, East, South, and West. North is 0 degrees true, East is 90 degrees, South is 180 degrees, and West is 270 degrees.

conditioned space: space within a building which is provided with heated air or cooled air, or both and where required, with humidification or dehumidification means so as to maintain conditions for an acceptable thermal environment as set forth in ANSI/ASHRAE Standard 55-1981 (Ref 2).

cooled space: space within a residential building that is cooled by a cooling system whose sensible capacity exceeds 5 Btu/h•ft² or is capable of maintaining a space dry-bulb temperature of 90°F or less at design cooling conditions.

cooling degree hours: a unit, based upon temperature difference and time, used in estimating cooling loads of residences in summer. For any hour, when the dry-bulb temperature is greater than a reference temperature, base 74°F for this standard, there are as many cooling degree hours as degrees Fahrenheit difference in temperature between the average hourly temperature and the reference temperature.

design cooling conditions: summer outdoor design conditions listed for selected locations in Chapter 24, Table 1, column 6 (2.5% values), from the ASHRAE Handbook, 1989 Fundamentals Volume, (Ref 3).

design heating conditions: winter outdoor design conditions listed for selected locations in Chapter 24, Table 1, column 5 (97.5% values) from the ASHRAE Handbook, 1989 Fundamentals Volume, (Ref 3).

envelope component: a major section of the entire envelope such as the opaque walls above-grade, ceilings, slabs, floors, glazings, doors, or walls below-grade.

fenestration: all light transmitting envelope component assemblies in a building wall or ceiling used for light transmittance, ventilation, entry or exit where such component assemblies enclose conditioned space.

heated slab: a concrete slab-on-grade floor containing wires, cables, pipes or ducts that transfers heat to the conditioned space.

heated space: space within a residential building that is heated by a heating system whose output capacity exceeds 10 Btu/h•ft² or is capable of maintaining a space drybulb temperature of 50°F or more at design heating conditions.

heating system performance factor (HSPF): the total heating output of a heat pump during its normal annual usage period for heating, in Btu, divided by the total electric energy input during the same period, in watt-hours, as determined by Region 4 conditions specified in Reference 4.

hot humid climate: a climate in which the following conditions occur:

- (a) 67°F or higher wet-bulb outdoor ambient temperature for 3500 or more hours during the warmest six consecutive months of the year
- (b) 73°F or higher wet-bulb outdoor ambient temperature for 1750 or more hours during the warmest six consecutive months of the year.

instantaneous water heater: one that contains no more than one gallon of water per 4000 Btu/h of input.

integrated part load value (IPLV): a single number, figure of merit, based on partload EER or COP expressing part-load efficiency for air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for the equipment.

length of manufactured (mobile) house: the largest overall length in the traveling mode, including cabinets, and other projections which contain interior space. Length does not include bay windows, roof projections, overhangs, or eaves under which there is no interior space, nor does it include drawbars, couplings or hitches.

living unit: one or more rooms designed or used as living quarters providing complete, independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking, and sanitation.

manufactured (mobile) house: a structure, transportable in one or more sections, which in the traveling mode, is 8 ft or more in width or 40 ft or more in length, or, when erected on site, is 320 ft² or more, and which is built on a permanent chassis and designed to be used as a living unit with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air-conditioning, and electrical systems contained therein. Calculations used to determine the number of square feet in a structure shall be based on the structure's exterior dimensions measured at the largest horizontal projections when erected on site. These dimensions shall include all expandable rooms, cabinets, and other projections containing interior space, but do not include bay windows.

multi-family structure: a building of three stories (above-grade) or fewer containing three or more living units other than townhouses.

packaged terminal air-conditioner (PTAC): a factory-selected combination of heating and cooling components, assemblies or sections, intended for application in an individual room or zone (Ref 5).

packaged terminal heat pump: a PTAC capable of using the refrigeration system in a reverse cycle or heat pump mode to provide heat (Ref 6).

prescriptive design: the design of the living unit or building of the same size and occupancy type as the proposed design which complies with the prescriptive requirements of this standard. The prescriptive design includes specified assumptions concerning shape, orientation, HVAC, and other system design features. The prescriptive design is used to generate the compliance requirement for the annual energy cost method.

prescriptive requirements: specified values or rules representing the requirements that must be met in order to achieve compliance with the standard.

proposed design: the design of the living unit or building to be constructed. The design takes into account all qualities, details, and characteristics of the building which significantly affect the use of energy such as construction, geometry, orientation, exposure, materials, equipment, and renewable energy source.

recommend: see should.

sash crack: the sum of all perimeters of all ventilators, sash, or doors based on overall dimensions of such parts expressed in feet (counting two adjacent lengths of perimeter as one).

seasonal energy efficiency ratio (SEER): the total cooling output of an air conditioner during its normal annual usage period for cooling, in Btu, divided by the total electric energy input during the same period, in watt-hours, as determined by conditions specified in Reference 4.

service water heating: supply of hot water for purposes other than comfort heating.

shall: term used to indicate provisions which are mandatory if compliance with the standard is claimed.

should: term used to indicate provisions which are not mandatory but which are desirable as good practice.

single family house: a building containing one or two living units or a townhouse.

system analysis: a method to evaluate tradeoffs among envelope components and heating, ventilating, and air-conditioning equipment such that the building annual energy cost does not exceed a value specified by a building that meets the prescriptive requirements of the standard.

thermal mass: materials with significant heat capacity and surface area which affect building loads by absorbing or releasing heat, or both, due to the fluctuation of any of the following:

- (a) interior temperature
- (b) interior radiant conditions
- (c) exterior temperature
- (d) exterior radiant conditions.

thermal mass wall insulation position:

exterior insulation position: walls having mass thermally coupled to the room air and having the entire effective mass layer interior to an insulation layer.

integral insulation position: walls having mass thermally coupled to room air and having either insulation and mass materials well mixed as in wood (logs); or substantially equal amounts of mass material on the interior and exterior of insulation as in concrete blocks with insulated cores.

interior insulation position: mass walls with the heat storing material located exterior to the insulating material(s) or otherwise not meeting either of the above definitions for exterior or integral positions.

townhouse: a living unit, in which one or more walls are partition, lot line, or common walls but not containing common floor and ceiling combinations.

unconditioned space: space within a building that is not conditioned space (see conditioned space).

unheated space: space within a building that is not heated space (see heated space).

unitary cooling and heating equipment: one or more factory-made units which normally include an evaporator or cooling coil, or compressor and condenser combination, and may include a heating function as well. Where such equipment is provided in more than one assembly, the separate assemblies shall be designed to be used together.

unitary heat pump: one or more factory-made units which normally include an indoor conditioning coil, compressor(s) and outdoor coil or refrigerant-to-water heat exchanger, including means to provide both heating and cooling functions. When such equipment is provided in more than one assembly, the separate assemblies shall be designed to be used together (Ref 7 and 8).

vapor retarder: see water vapor retarder.

wall heat capacity: the effective wall heat capacity $(Btu/ft^2 \cdot F)$, for purposes of calculating thermal mass performance for exterior walls. It is the sum of the products of the mass of each individual material in the wall per unit area of wall surface times its individual specific heat.

walls: those portions of building envelope enclosing conditioned space which are vertical or tilted at an angle of 60 degrees from horizontal or greater.

above-grade: all the exterior walls of any given story if 50% or greater of the gross exterior wall area of the story is exposed to outside air.

below-grade: all the exterior walls of any given story if greater than 50% of the gross exterior wall area of the story is below grade.

water vapor retarder: a material or construction that adequately impedes the transmission of water vapor under specified conditions. Water vapor retarders have a water vapor permeance less than 1.0 perm when tested in accordance with ASTM E 96-80 (Ref 9).

width of manufactured (mobile) house: the largest overall width in the traveling mode, including cabinets and other projections which contain interior space. Width does not include bay windows, roof projections, overhangs, or eaves under which there is no interior space.

3.4 Abbreviations,	Acronyms	and	Symbols
Symbol 1	leaning		

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Awall, roof, etc.	area of a specific building component	
ACCA	Air Conditioning Contractors of America	
ACH	air changes per hour	
AEC	annual energy cost	
AFUE	annual fuel utilization efficiency	
AHAM	Association of Home Appliance Manufacturers	
AIB	air infiltration barrier	
ANSI	American National Standards Institute	
ARI	Air-Conditioning and Refrigeration Institute	
ASME	American Society of Mechanical Engineers	
ASTM	American Society for Testing and Materials	
BECOP	break even coefficient of performance	
BPCDH74	break point cooling degree hours base 74°F	
BPHDD65	break point heating degree days base 65°F	
С	thermal conductance	
CDH74	cooling degree hours base 74°F	
CFR	Code of Federal Regulations	
CLF	cooling load factor	
COP	coefficient of performance	
DOE	U.S. Department of Energy	
Ec	combustion efficiency	
EER	energy efficiency ratio	
EFF _{ss}	efficiency, steady state	
ELA	effective leakage area	
EXP STA	experimental station	
FAA AP	Federal Aviation Administration (airport)	
HDD65	heating degree days base 65°F	
HI	Hydronics Institute	
HLF	heating load factor	

HSPF	heating seasonal performance factor
HVAC	heating, ventilating, and air conditioning
IBR	Institute of Boiler and Radiator Manufacturers, predecessor of
	Hydronics Institute
ICDH74	cooling intercept of a specific requirement line from Table 4-2
IHDD65	heating intercept of a specific requirement line from Table 4-2
IPLV	integrated part load value
LC	load change
NAHB	National Association of Home Builders
NEMA	National Electrical Manufacturers Association
NR	no requirement
R	thermal resistance
RCR	relative climate ratio
SEER	seasonal energy efficiency ratio
SC	shading coefficient
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
TAVG	average annual dry-bulb temperature
TIMA	Thermal Insulation Manufacturers Association
TLC	total load change
U	thermal transmittance
Uo	overall thermal transmittance
W	watts
WSFO	weather service forecast office
WSO AP	weather service office (airport)

4 Compliance

4.1 Purpose. The purpose of this section is to present the two distinct paths by which compliance with this standard can be demonstrated.

4.2 Scope. This section applies to all buildings for which compliance with this standard is claimed.

4.3 General. This standard provides two different paths by which compliance can be determined, a prescriptive path (4.4.1) and an annual energy cost method (4.4.2). The prescriptive path may be used when the minimum amount of effort to achieve compliance is desired. The annual energy cost method should be used when more innovative design concepts are being considered or when the proposed design fails to meet the prescriptive criteria.

4.4 Compliance Paths

4.4.1 Prescriptive Criteria. Specific prescriptive criteria are presented for the exterior envelope, HVAC systems and equipment and service water heating. Compliance is achieved when all criteria have been met.

4.4.1.1 Exterior Envelope Requirements

4.4.1.1.1 Compliance for single family houses is achieved when the requirements of 5.3 are met. Each envelope component must meet the requirements specified. Two options exist for the envelope compliance depending upon the location of the air distribution system. Option A applies when the ducts are located within the conditioned space. Option B applies when the ducts are located outside the conditioned space and results in more stringent requirements for the envelope.

4.4.1.1.2 Compliance for manufactured houses is achieved when the requirements of 5.4 are met. These requirements consist of an overall U-value for the entire envelope.

4.4.1.1.3 Compliance for multi-family structures is achieved when the requirements of 5.5 are met. Each envelope component must meet the requirements specified.

4.4.1.1.4 Air leakage requirements for all buildings are presented in 5.6 and must be met to achieve compliance.

4.4.1.1.5 Requirements for moisture vapor retarders are presented in 5.7 and must be met to achieve compliance.

4.4.1.1.6 Requirements for ventilation are presented in 5.8 and must be met to achieve compliance.

4.4.1.1.7 An envelope trade-off procedure is presented in 5.9. Compliance is achieved provided the combined heating and cooling loads imposed are compensated for by the load savings from other envelope components which exceed the prescriptive requirements.

4.4.1.1.8 Demonstrating compliance to this standard requires knowledge of both heating and cooling weather variables to characterize each building location. Since a new cooling weather variable has been introduced, all the necessary weather data needed to demonstrate compliance are presented in Section 9.

4.4.1.2 HVAC Systems and Equipment

4.4.1.2.1 Compliance for systems is achieved when the requirements of 6.3 are met.

4.4.1.2.2 Compliance for equipment is achieved when the requirements of 6.4 are met. These requirements, when applicable, conform to the National Appliance Energy Conservation Act of 1987, Public Law 100-12, 42 U.S.C. 6295 (Ref 10).

4.4.1.2.3 Requirements for controls are presented in 6.5 and must be met to achieve compliance.

4.4.1.3 Service Water Heating. Compliance for service water heating is achieved when the requirements of Section 7 are met.

4.4.2 Annual Energy Cost Method. The annual energy cost method is not required for designs that comply with the prescriptive requirements of this standard. The annual energy cost method provides a compliance path for new, different, or innovative designs that are not covered or addressed in the prescriptive path. Compliance is achieved when all the requirements in Section 8 have been met.

4.4.2.1 Prescriptive Design. Calculations are required to determine the total annual energy costs for the prescriptive design.

4.4.2.2 Proposed Design. Calculations are required to determine the total annual energy costs for the proposed design.

4.4.2.3 Compliance. Compliance is achieved when the total annual energy costs of the proposed design are less than or equal to those of the prescriptive design.

4.4.2.4 Total Annual Energy Costs. The total annual energy costs includes domestic hot water, cooking, lighting, and appliances but these variables can not be changed between the prescriptive and proposed designs to achieve compliance.

4.4.2.5 Calculation Procedure. Compliance is demonstrated by using the calculation procedures that meet the requirements for space conditioning in 8.7, the requirements for domestic water heating in 8.8, and the requirements for occupant energy use in 8.9.

5 BUILDING ENVELOPE REQUIREMENTS

5.1 Scope

The requirements in this section for the exterior envelope of new residential buildings are the thermal requirements needed when using the minimum equipment efficiencies specified in Section 6. The equations, figures, and tables in this section are intended for use in defining these requirements. The prescriptive requirements of 5.3 and 5.5 for items such as insulation levels or fenestration areas may be varied in accordance with the tradeoffs of 5.9. In cases where a systems analysis method to building design is desired, the requirements of Section 8 of this standard shall apply.

5.2 General

5.2.1 The intent of this section is to provide thermal performance requirements for the construction of residential building envelopes. These requirements are based on a consumer-oriented economic cost benefit methodology. For a given city or climate location, this methodology does not produce requirements that ensure equivalent energy performance for alternate constructions.

In general, ceilings with attics will transmit less energy than ceilings without attics. Above-grade frame walls will transmit less energy than above-grade concrete, masonry or log walls. Above-grade concrete, masonry or log walls with exterior and integral insulation will transmit less energy than those with interior insulation.

The specific requirements are based on national average cost data and as such, are not intended nor should they be construed as the optimization of energy-conserving practices in all geographic locations.

5.2.1.1 In addition to the requirements set forth in this section, the proposed design should consider energy conservation in determining the orientation of the building on its site; the geometric shape of the building; the building aspect (ratio of length to width); the number of stories for a given floor area requirement; the interior thermal mass of the building; the exterior surface color; shading and reflections from adjacent structures, surrounding surfaces or vegetation; opportunities for natural ventilation and the effects of passive solar design; and, wind direction and speed. For a national standard, the above considerations are difficult if not impossible to quantify. However, particularly on a local basis, many of these items including the effects of interior mass and passive solar design can be quantified, and therefore should be considered in energy efficient design (see Ref 11).

5.2.1.2 To comply with the requirements of Section 5, calculation procedures and information contained in Chapters 19-26 of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3), shall be used.

To comply with the requirements set forth in this section, other available measured thermal performance data for envelope sections, either from laboratory or field data or from engineering analyses, should be considered.

If laboratory or field test measurements are used for envelope heat transmission, they shall be obtained using one of the following test methods:

- (a) guarded hot plate: ASTM C177-85 (Ref 12)
- (b) heat flow meter: ASTM C518-85 (Ref 13)
- (c) guarded hot box: ASTM C236-87 (Ref 14)
- (d) calibrated hot box: ASTM C976-82 (Ref 15)

5.2.2 Envelope Construction Requirements. Compliance to this standard is achieved when the envelope components meet or exceed the requirements. The specific requirements depend upon the envelope component being evaluated.

5.2.2.1 Single Family Houses and Multi-Family Structures Including Manufactured (Modular) Structures

5.2.2.1.1 Thermal Transmittance. The design thermal transmittance (U) of all envelope components above-grade is the variable used to specify the requirements and demonstrate compliance. All design U-values are air-to-air, including interior and exterior air films. Calculation of design U-values shall be done in accordance with the procedures in Chapters 20, 22, and 27 of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3) and account for thermal bridges and anomalies. For example:

(a) wood framing members and webs in masonry construction, see Chapter 20

- (b) metal framing members, see Chapter 22, Zone Method of Calculation
- (c) fenestration, see Chapter 27.

When more than one assembly is used in an envelope component the design U-value for that envelope component shall be calculated using Eq 5-1.

$$U = \frac{U_1 \times A_1 + U_2 \times A_2 + \ldots + U_n \times A_n}{A}$$
(5-1)

where

U = thermal transmittance of the envelope component, Btu/h.ft².°F

A = area of the envelope component, ft^2

U_{1-n} = thermal transmittance of the individual component assemblies, Btu/h•ft²•°F

 A_{1-n} = area of the individual component assemblies, ft²

5.2.2.1.2 Thermal Conductance. The thermal conductance (C) of all below-grade envelope components is the variable used to set the requirements and demonstrate compliance. All C-values are surface to surface, excluding air films and the adjacent ground. Calculation of C-values shall be done in accordance with the procedures in Chapters 20 and 22 of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3) and account for thermal bridges and anomalies. For example:

(a) wood framing members and webs in masonry construction, see Chapter 20

(b) metal framing members, see Chapter 22, Zone Method of Calculation.

When more than one assembly is used in an envelope component the C-value for that envelope component shall be calculated using Eq 5-2.

$$C = \frac{C_1 \times A_1 + C_2 \times A_2 + \ldots + C_n \times A_n}{A}$$
(5-2)

where

C = thermal conductance of the envelope component, Btu/h•ft²•°F

A = area of the envelope component, ft^2

C_{1-n} = thermal conductance of the individual component assemblies, Btu/h•ft²•°F

 A_{1-n} = area of the individual component assemblies, ft²

5.2.2.1.3 Thermal resistance. The thermal resistance (R) is the variable used to set the requirements and demonstrate compliance for slab-on-grade floors. All R-values ($F \cdot ft^2 \cdot h/Btu$) refer only to insulation.

5.2.2.1.4 Shading Coefficient. The shading coefficient (SC) for solar gains through fenestration is the variable used to set the requirements and demonstrate compliance.

5.2.2.2 Manufactured (Mobile) Houses

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5.2.2.2.1 Overall Thermal Transmittance. The overall thermal transmittance (U_o) of the entire envelope is the variable used to set the requirements and demonstrate compliance. Acceptable combinations of envelope components that meet the U_o requirements shall be calculated using Eq 5-3.

5.2.2.2 Envelope Component U x A Term. When more than one assembly of ceilings, walls, fenestration, doors, or floors are used, the (U x A) term for that envelope component shall be calculated using Eq 5-4. All U-values are air-to-air, including interior and exterior air films. Calculation of U-values shall be done in accordance with the procedures in Chapters 20, 22, and 27 of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3) and shall account for thermal bridges and anomalies. For example:

(a) wood framing members and webs in masonry construction, see Chapter 20

(b) fenestration, see Chapter 27.

$$U \times A = (U_1 \times A_1) + (U_2 \times A_2) + \dots + (U_n \times A_n)$$
(5-4)

where

- U x A = sum of the products of the thermal transmittances of the individual assemblies multiplied by the areas of the individual assemblies, Btu/h.°F
- U_{1-n} = thermal transmittances of the individual assemblies for an envelope component, Btu/h•ft²•°F
- A_{1-n} = areas of the individual assemblies for an envelope component based on exterior dimensions, ft^2

5.2.3 Thermal Protection. All buildings that are heated and cooled or only heated or only cooled, shall be constructed to meet the thermal requirements for specified envelope components contained in the standard.

5.2.3.1 The requirements shall apply to the envelope of the conditioned space including the ceilings, walls, floors over unconditioned spaces, foundations and slabs, doors, fenestration (glazings), partitions between conditioned and unconditioned spaces, and air infiltration control.

5.2.3.2 The requirements shall apply to fenestration systems integrated into the envelope of the conditioned space and shall include windows, glass doors, skylights and other light transmitting materials such as glass blocks. The areas of fenestration systems to be considered are those areas which penetrate the envelope of the conditioned space. Fenestration bounding unconditioned spaces is not governed by this standard.

5.2.3.3 The design of buildings for energy conservation may increase the water vapor pressure differentials between the interior and exterior environments. Vapor retarders, permeable air barriers, ventilation, air infiltration, and operating interior relative humidity should be considered to maintain the thermal and moisture integrity of the envelope.

5.2.3.4 This standard contains information and requirements on the control of air-leakage in 5.6.

5.2.3.5 Indoor air quality for health and comfort shall not be compromised by attempts to control air-leakage. See ASHRAE Standard 62-1989 (Ref 16).

5.2.4 Climate Data Variables. For heating, the Heating Degree Days base 65°F (HDD65) shall be used. For cooling, the Cooling Degree Hours base 74°F (CDH74) shall be used. These climate data are contained in Section 9. For cities not listed in Section 9, designers shall select the nearest city that best represents the climatic conditions for the site being analyzed. In the case of cities or urban regions with several climate data entries, the designer shall select the location within the region or city that best represents the climate of the construction site.

5.2.5 Presentation Formats of Requirements. Prescriptive requirements of the standard are presented as figures and tables. Determination of the requirements using the figures requires locating a specific city on the figure. When the city falls clearly between the requirement lines, compliance is easily determined. When the city falls near or on the line, compliance can be best determined by calculations using the data presented in the tables.

5.2.5.1 Figures. The figures (5-1 through 5-16 and 5-18 through 5-36) are entered using the climatic data of Section 9 representative for the location of interest. The heating axis is Heating Degree Day to base 65°F (HDD65). The cooling axis is Cooling Degree Hours to base 74°F (CDH74). The diagonal lines identify the prescriptive requirements as distinct bands. The requirement is uniform within a specific band and only changes in adjacent bands.

5.2.5.2 Tables. The tables (5-2 and 5-5) contain heating and cooling intercepts for each component. Intercepts refer to the points on the figures where the diagonal lines cross or intersect the HDD65 axis and CDH74 axis. A calculational procedure is given in 5.3.11 which allows a specific city to be evaluated for compliance.

5.3 Requirements for Single Family Houses Including Manufactured (Modular) Houses

Prescriptive requirements for each envelope component depend on whether the air distribution system is contained within the conditioned space or located outside the conditioned space. This distinction is made in the standard because losses or gains or both from the distribution systems have different impacts on the building energy performance depending on whether they are located within the conditioned space or not. For more information, see Chapter 24, Table 9, of the ASHRAE Handbook, 1988 Equipment Volume (Ref 17). For houses designed with the air distribution system located within the conditioned space, the requirements presented in the top half of each figure, identified as Part A, shall be used. For houses designed with the air distribution system located outside the conditioned space, the requirements presented in the bottom half of each figure, identified as Part B, shall be used.

Buildings that do not have air distribution systems such as hydronic systems, electric radiant panel, electric baseboard heat, and through-the-wall or window units shall use the Part A requirements.

To clarify the requirements the following shall apply:

(a) If a ducted supply or return, or both, is located entirely within the conditioned space but connected to the central equipment located outside the conditioned space, such as a garage or carport, the Part A requirements shall be used.

(b) If a ducted supply or return, or both, is located entirely outside the conditioned space the Part B requirements shall be used.

(c) If an air distribution system design has the supply or return ducts, or both, located outside the conditioned space such that the total combined length located outside the conditioned space is less than eight feet, the Part A requirements shall be used.

(d) If ducts are buried within a slab, the Part B requirements shall be used.

(e) If a basement with insulated walls contains ducts, the Part A requirements shall be used provided (c) above applies for all other ducts and all assemblies in the basement envelope meet the prescriptive requirements in Section 5. If a basement under an insulated floor contains ducts, the Part B requirements shall be used except when (c) above applies.

(f) If a crawl space contains ducts or serves as a plenum for air distribution, the Part B requirements shall be used except when (c) above applies.

5.3.1 Ceilings. The requirements for ceilings are for the opaque ceiling assemblies excluding fenestration.

5.3.1.1 All ceilings with attics (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-1-A/B. The U-value includes the top air film, framing members, insulation, ceiling, and the air film below the ceiling.

5.3.1.2 All ceilings without attics such as cathedral or flat ceilings (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-2-A/B. The U-value includes the roof elements (i.e., shingles, felt paper, roof deck, and air space in addition to the ceiling elements listed in 5.3.1.1).

5.3.2 Above-Grade Walls. The requirements for above-grade walls are for the opaque wall assemblies excluding fenestration and doors. The requirements in 5.3.2 shall apply to all the exterior walls of any given story if 50% or greater of the gross exterior wall area of the story is exposed to outside air.

5.3.2.1 All structural above-grade frame walls and band joists (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-3-A/B.

Note: Brick veneer is non-structural and must meet these requirements.

5.3.2.2 All structural above-grade concrete, masonry, or log walls with exterior or integral insulation, or both (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-4-A/B.

5.3.2.3 All structural above-grade concrete, masonry, or log walls with interior insulation (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-5-A/B.

5.3.3 Walls Adjacent to Unconditioned Space.

5.3.3.1 All wood frame walls adjacent to unconditioned space such as unconditioned basements and mechanical equipment rooms shall meet the thermal transmittance requirements shown in Fig. 5-6-A/B.

5.3.3.2 All concrete or masonry walls adjacent to unconditioned space such as unconditioned basements and mechanical equipment rooms shall meet the thermal transmittance requirements shown in Fig. 5-7-A/B.

5.3.4 Floors

5.3.4.1 All wood frame floors over exterior ambient conditions such as overhangs, car ports, and porches (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-8-A/B.

5.3.4.2 All wood framed floors over unconditioned space such as crawl spaces beneath insulated floors, basements, enclosed garages or porches (that separate heated or mechanically cooled spaces, or both, from unconditioned space) shall meet the thermal transmittance requirements shown in Fig. 5-9-A/B.

Note: In cold climates pipes located in unconditioned space may freeze and this should be evaluated separately. Floors over basements are not required to be insulated when basement walls are insulated. Floors over crawl spaces are not required to be insulated when crawl space walls are insulated.

5.3.5 Below-Grade Basement Walls. The requirements for below-grade basement walls below uninsulated floors are for the opaque wall assemblies excluding fenestration and doors. The requirements in 5.3.5 shall apply to all the exterior walls of any given story if greater than 50% of the gross exterior wall area of the story is below grade.

Note: Basement walls are not required to be insulated when floors over basements are insulated.

5.3.5.1 Exterior or Integral Insulation. All below-grade basement walls below uninsulated floors with exterior or integral insulation (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal conductance requirements shown in Fig. 5-10-A/B. The C-value requirement only refers to the wall assembly and does not include air films or the adjacent ground.

5.3.5.2 Interior Insulation. All below-grade basement walls below uninsulated floors with interior insulation (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal conductance requirements shown in Fig. 5-11-A/B. The C-value requirement only refers to the wall assembly and does not include air films or the adjacent ground.

5.3.6 Slab-on-Grade Floors. All R-values (°F•ft²•h/Btu) refer only to the insulation, excluding the wall constructions and all other elements such as interior finish materials, the floor slab, exterior finish materials, air films, and the adjacent ground. Perimeter insulation begins at the top surface of the slab. The insulation length requirement may be satisfied by a combination of vertical and horizontal sections provided they are continuous.

5.3.6.1 The perimeter of unheated slabs (that separates heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal resistance requirements shown in Fig. 5-12-A/B.

5.3.6.2 The perimeter of heated slabs (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal resistance requirements shown in Fig. 5-12-A/B plus an additional R-2.

5.3.7 Crawl Space Walls. All crawl space walls (that support uninsulated floors of heated or mechanically cooled spaces, or both) shall meet the thermal conductance requirements shown in Fig. 5-13-A/B. Insulation shall extend from the top of the wall to the established frost depth. The length requirement may be satisfied by a combination of vertical and horizontal sections provided they are continuous. The C-value requirement only refers to the wall assembly and does not include air films or the adjacent ground.

Note: Crawl space walls are not required to be insulated when floors over crawl spaces are insulated.

5.3.8 Door Assemblies. The requirements shall apply to all door assemblies which permit entry or exit from a heated or mechanically cooled spaces, or both.

5.3.8.1 The opaque portion of a wood door assembly shall provide a thermal transmittance of 0.40 up to 7000 HDD65 and 0.30 from 7000 HDD65 to 10,000 HDD65.

5.3.8.2 The opaque portion of a non-wood door assembly shall meet the thermal transmittance requirements shown in Fig. 5-14-A/B.

5.3.8.3 The glazed portion of any door assembly shall meet the requirements contained in 5.3.9.1 and 5.3.9.2.

5.3.9 Fenestration. The requirements shall apply to all operable or fixed glazed assemblies including windows, skylights, and glass doors.

Note: Fenestration that can be thermally separated from the conditioned space (such as sun rooms, solariums, greenhouses, and Florida rooms) shall be excluded from the prescriptive U-value, SC and area requirements provided it is separated by envelope components that meet this standard.

5.3.9.1 Fenestration shall meet the thermal transmittance requirements shown in Fig. 5-15-A/B.

5.3.9.2 The shading coefficient (SC) of the fenestration shall be less than or equal to the requirements shown in Fig. 5-16-A/B.

Note: A shading coefficient of 0.7 is achieved by standard window treatments of drapes, blinds, sheers or some combination. A shading coefficient of 0.5 is achieved by treatments applied to or in the glass in addition to standard window treatments. Other shading coefficients can be utilized provided they conform to the tradeoffs in 5.9.

5.3.9.3 The combined fenestration area, fixed or operable, shall not exceed 15% of the conditioned space floor area or 125 ft^2 whichever is greater.

5.3.9.4 Notwithstanding the requirements of 5.3.9 above, fenestration areas exceeding those specified in 5.3.9.3 and U-values and SCs different from those in 5.3.9.1 and 5.3.9.2 may be used if the envelope meets the requirements in 5.9 or Section 8.

5.3.10 Single Family House Requirements Above 10,000 HDD65. The requirements in Table 5-1 shall be used for locations with HDD65 greater than 10,000.

5.3.11 Heating and Cooling Intercepts Procedure. When a city is located clearly between the requirement lines, compliance is easily determined and the procedure presented in this paragraph is not needed. However, when a city lies close to a requirement line, it may be difficult to determine the requirement. Compliance can be determined by the following procedure.

This procedure applies to all requirement lines including fenestration shading coefficients.

Step 1: Use Section 9 Climatic Data to find HDD65_c and CDH74_c for the city.

 $HDD65_c$ = Heating Degree Days base 65°F of the city being evaluated.

 $CDH74_{c}$ = Cooling Degree Hours base 74°F of the city being evaluated. Step 2: Calculate the Relative Climate Ratio (RCR) using Eq 5-5.

$$RCR = \frac{HDD65_{c}}{IHDD65} + \frac{CDH74_{c}}{ICDH74}$$
(5-5)

Where

IHDD65 = heating intercept of a specific requirement line from Table 5-2. ICDH74 = cooling intercept of a specific requirement line from Table 5-2.

Step 3: Determine which requirement the city shall meet.

(a) If RCR > 1.0, then the city is above the line.

(b) If RCR < 1.0, then the city is below the line.

(c) If RCR = 1.0, then the city is on the line and must meet the more stringent requirement.

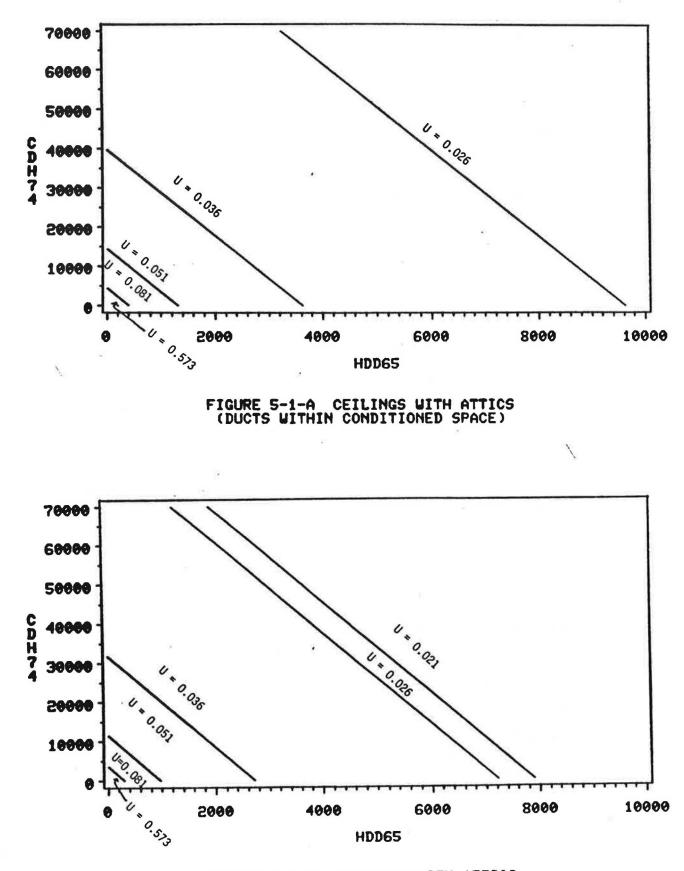


FIGURE 5-1-B CEILINGS WITH ATTICS (DUCTS OUTSIDE CONDITIONED SPACE)

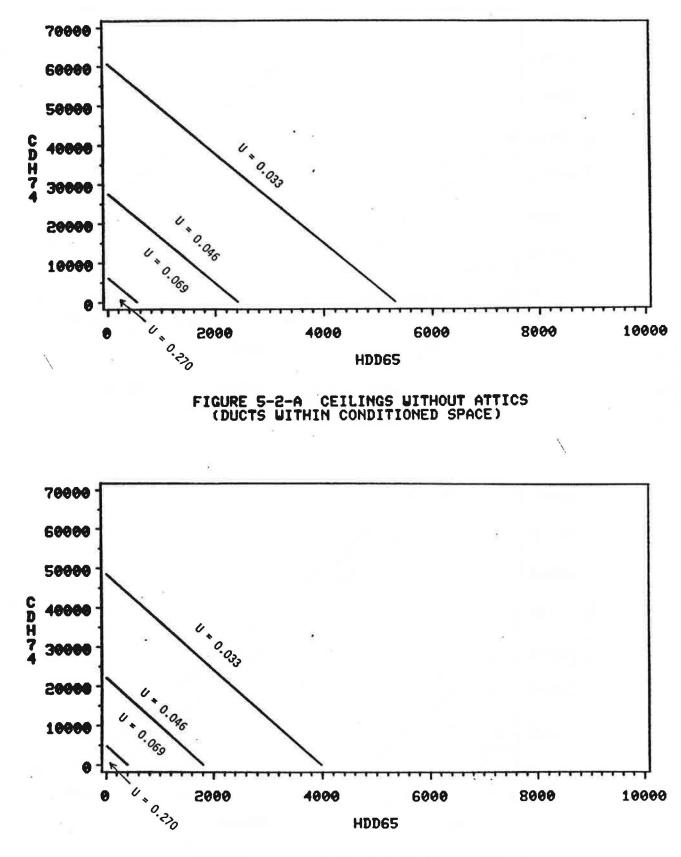
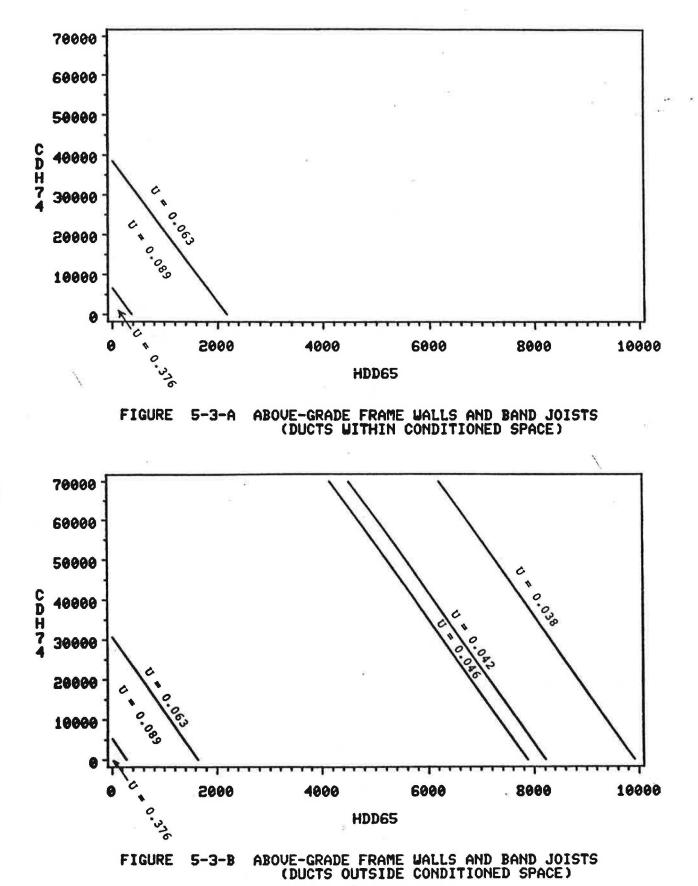


FIGURE 5-2-B CEILINGS WITHOUT ATTICS (DUCTS OUTSIDE CONDITIONED SPACE)



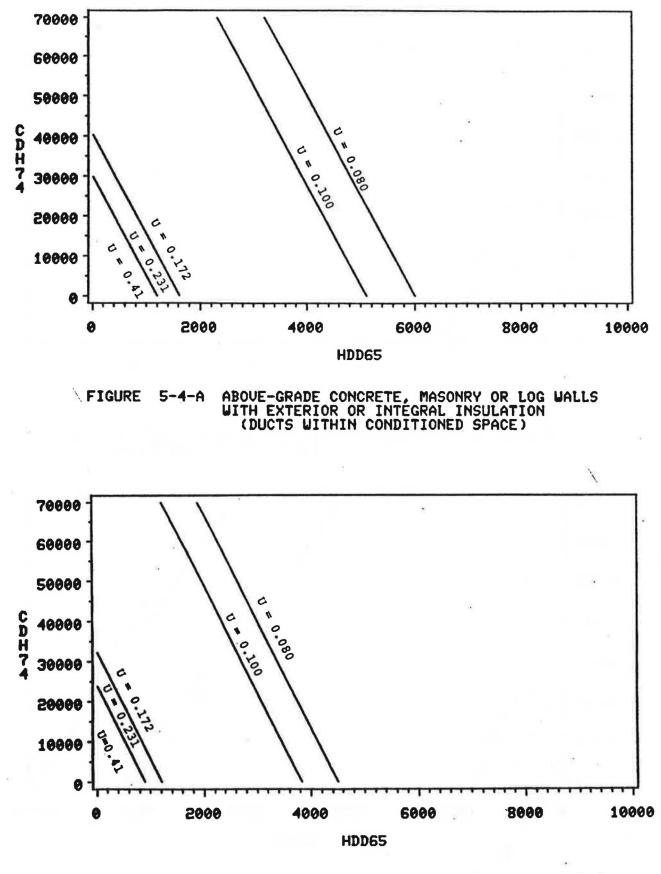


FIGURE 5-4-B ABOVE-GRADE CONCRETE, MASONRY OR LOG WALLS WITH EXTERIOR OR INTEGRAL INSULATION (DUCTS OUTSIDE CONDITIONED SPACE)

BSR/ASHRAE Proposed Standard 90.2P

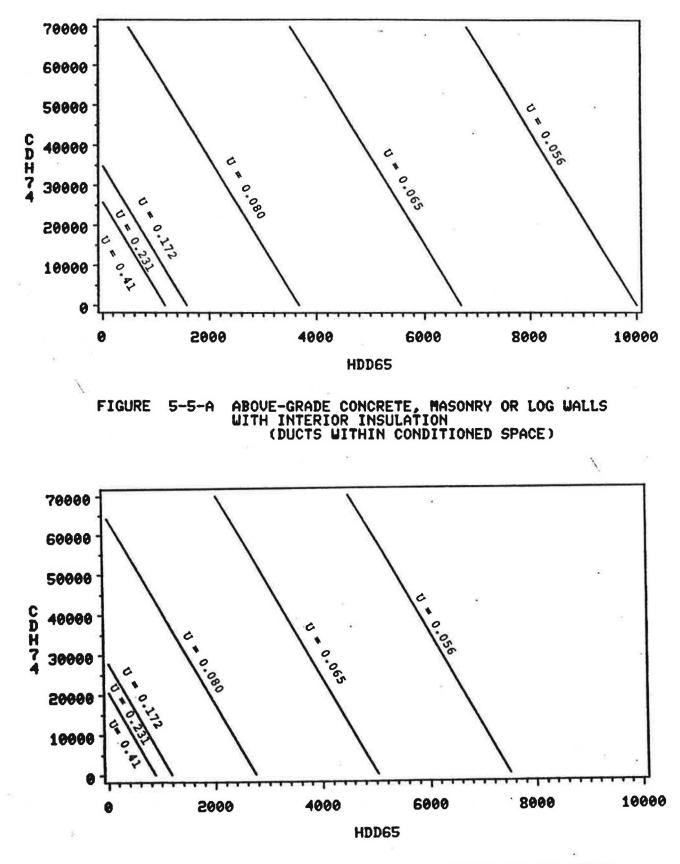
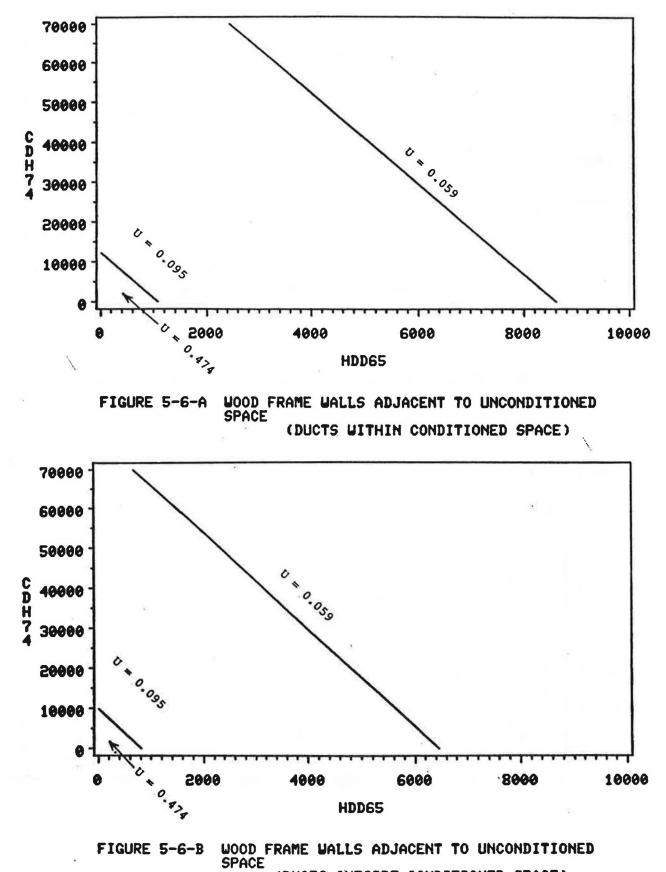
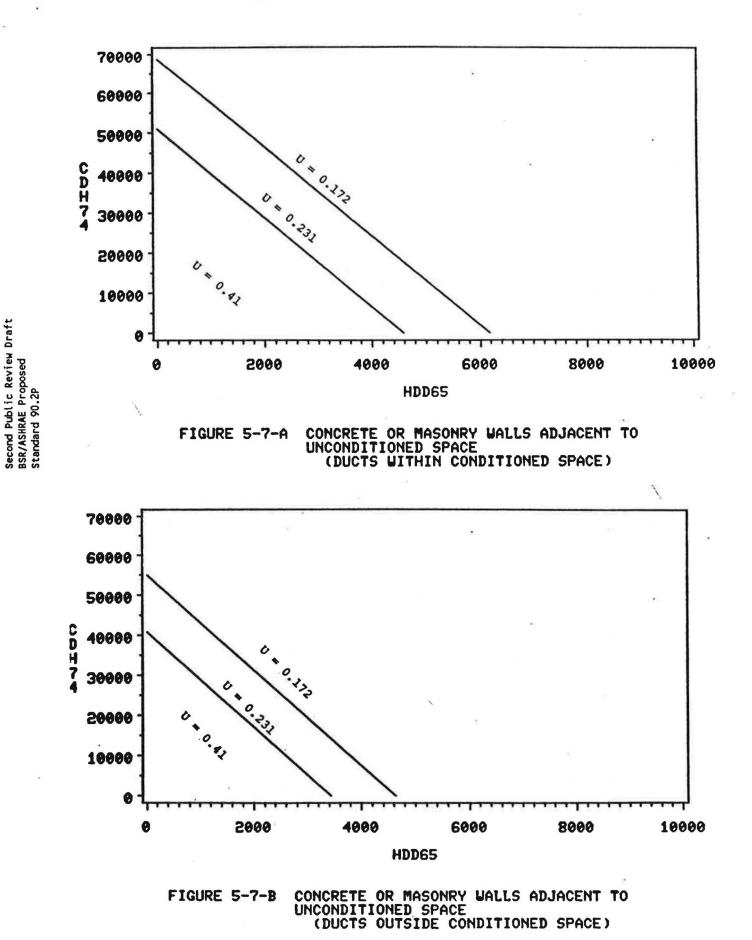
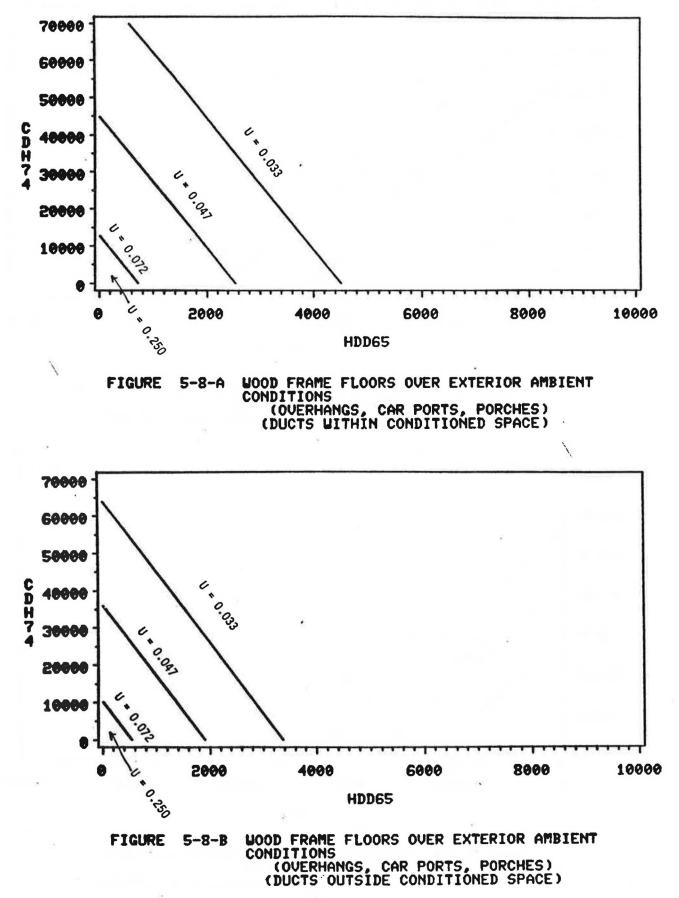


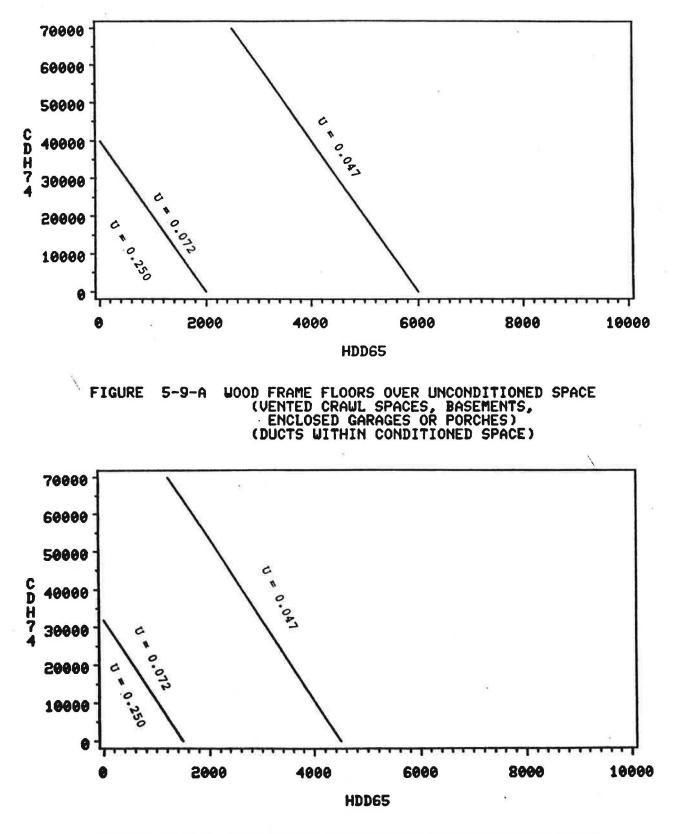
FIGURE 5-5-B ABOVE-GRADE CONCRETE, MASONRY OR LOG WALLS WITH INTERIOR INSULATION (DUCTS OUTSIDE CONDITIONED SPACE)



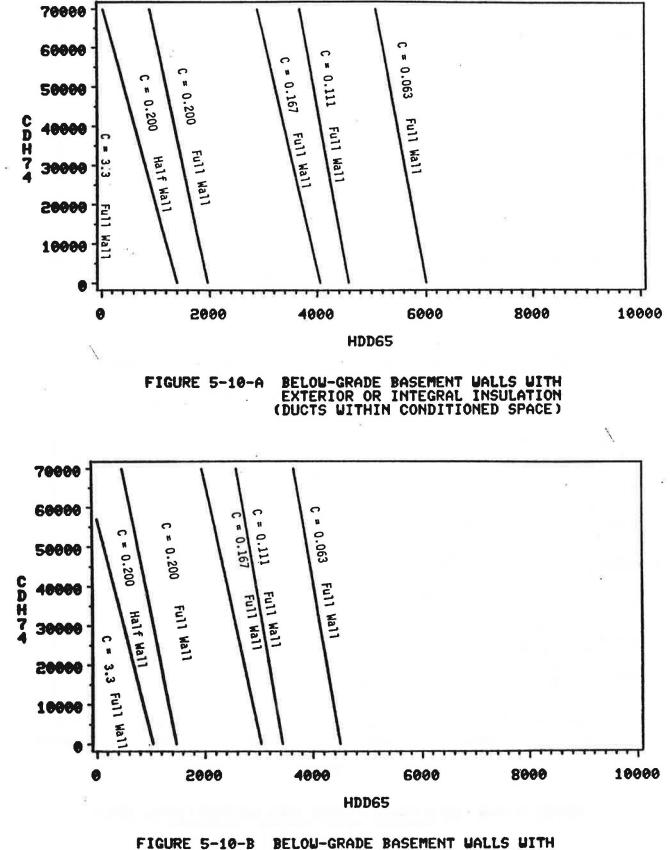
(DUCTS OUTSIDE CONDITIONED SPACE)





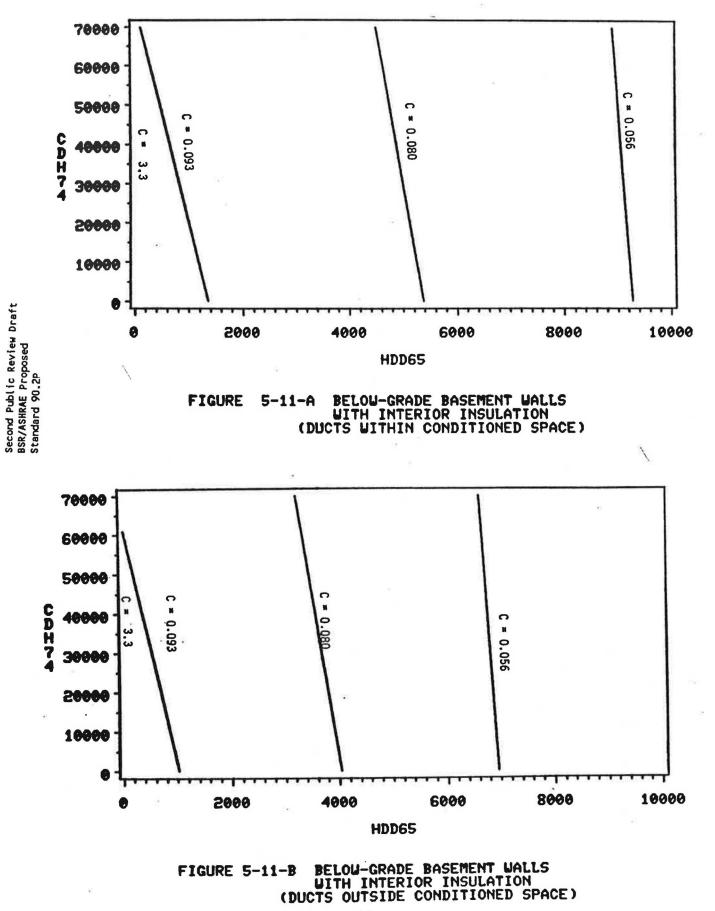


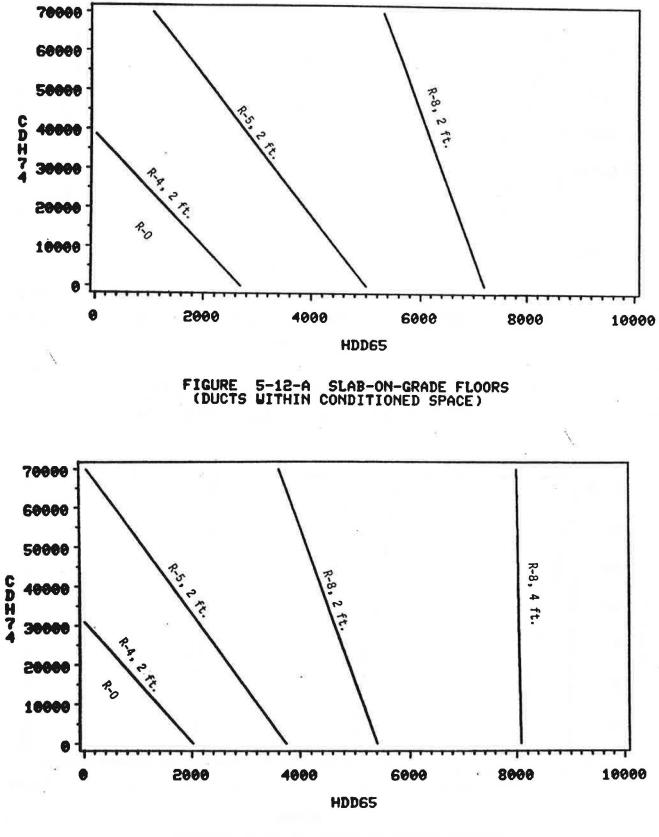




BSR/ASHRAE Proposed Standard 90.2P

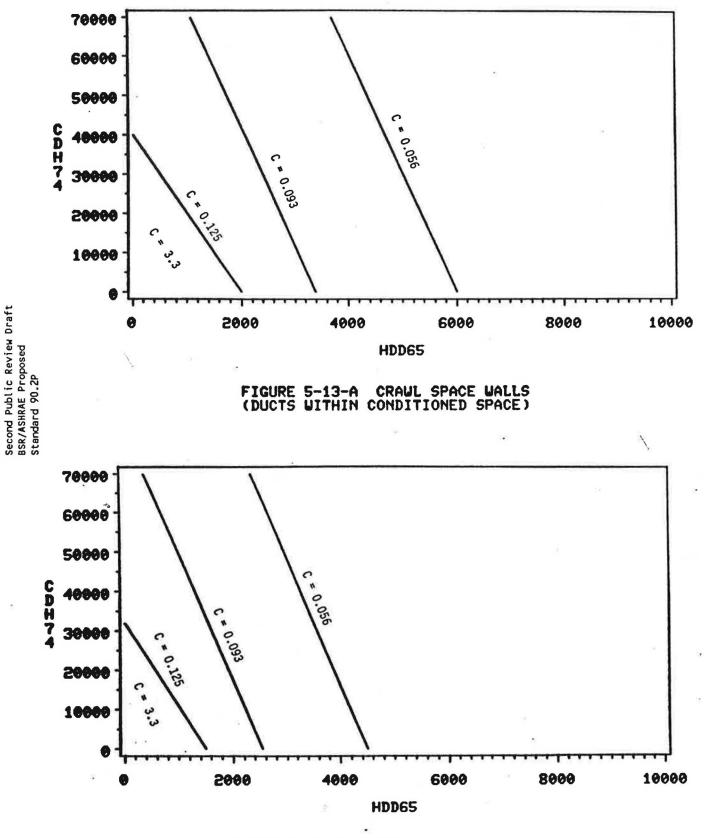
> 5-10-B BELOW-GRADE BASEMENT WALLS WITH EXTERIOR OR INTEGRAL INSULATION (DUCTS OUTSIDE CONDITIONED SPACE)





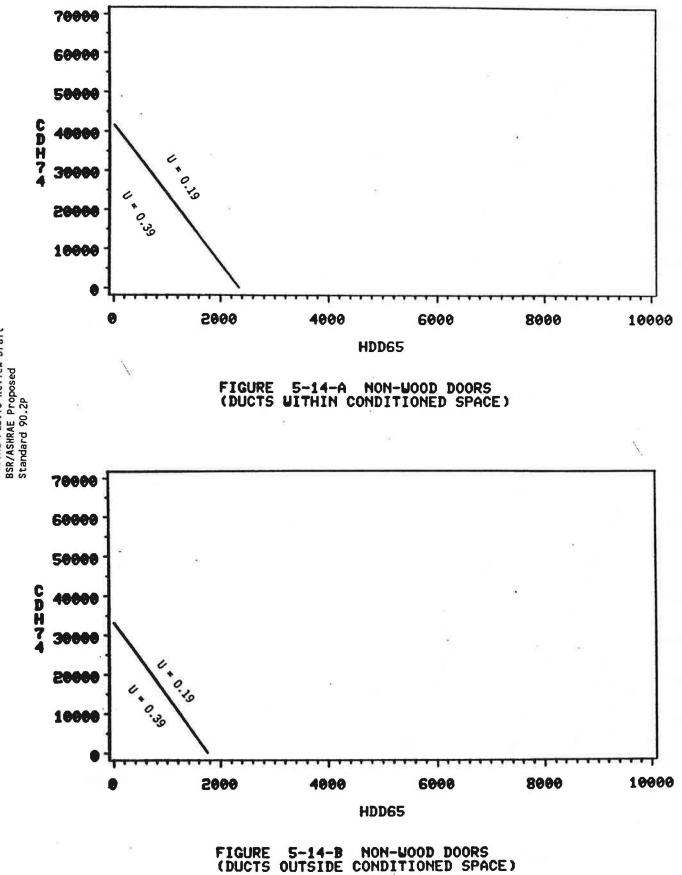


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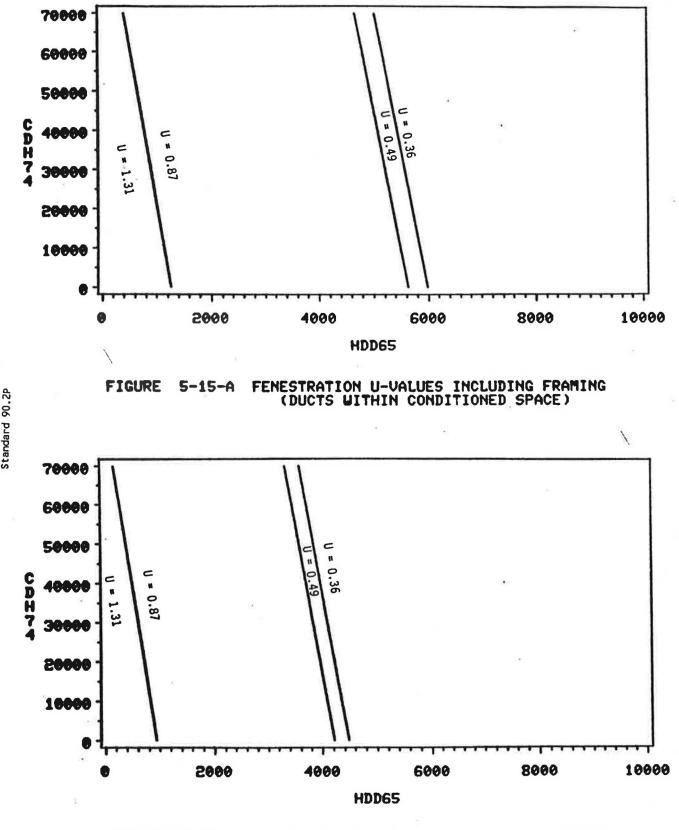
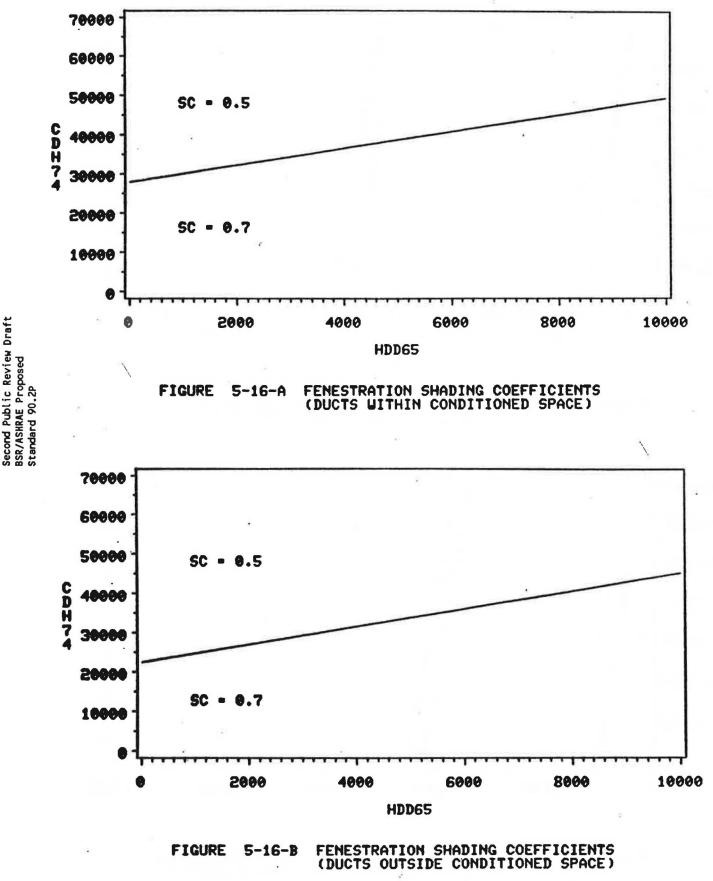


FIGURE 5-15-B FENESTRATION U-VALUES INCLUDING FRAMING (DUCTS OUTSIDE CONDITIONED SPACE)



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Table 5-1Single Family Housing Requirementsabove 10,000 HDD65

	Ceilings		Walls					Floors					
HDD65	With Attic	With Out Attic		Below Grade			Mass Adj. Uncon		Over Amb.	Over Uncon Space	Doors	Fen	es.
65°F	U	U	U	С	С	U	U	R	U	U	U	U	sc
10001 to 12000	0.021	0.033	0.042	0.063	0.056	0.059	0.172	8	0.033	0.033	0.19	0.36	0.7
12001 to 15000	0.021	0.033	0.042	0.063	0.056	0.059	0.172	10	0.033	0.033	0.19	0.36	0.7
15001 to 18000	0.018	0.033	0.038	0.063	0.056	0.059	0.080	12	0.033	0.033	0.19	0.36	0.7
18001 to 21000	0.018	0.033	0.038	0.063	0.056	0.059	0.080	14	0.033	0.033	0.19	0.36	0.7

TABLE 5-2	HEATING AND COOLING INTERCEPTS FOR	SINGLE FAMILY HOUSES
	DUCTS WITHIN CONDITIONED SPACE	DUCTS OUTSIDE CONDITIONED SPACE
FIG. 5-1	CEILINGS WITH ATTICS	
	U=0.573 IHDD65 ICDH74	IHDD65 ICDH74
	U=0.081 403 4417 U=0.051 1305 14302	302 3534
	U=0.051 1305 14302	979 11442
	U=0.036 3625 39730 U=0.026 9615 105372	2719 31784
	U=0.026 9615 105372 U=0.021	7211 84298
	0=0.021	7898 92326
FIG. 5-2	CEILINGS WITHOUT ATTICS	
	U=0.270 IHDD65 ICDH74	IHDD65 ICDH74
	U=0.069 539 6152	404 4922
	U=0.069 539 6152 U=0.046 2418 27623	1814 22098
	U=0.033 5311 60665	3983 48532
FIG. 5-3	ABOVE-GRADE FRAME WALLS AND BAND JO	
	U=0.376 IHDD65 ICDH74	IHDD65 ICDH74
	U=0.099 378 6678	284 5342
	U=0.063 2184 38618	1638 30894
	U=0.046	7868 148406
	U=0.042	8222 155091
	U=0.038	9920 187121
FIG. 5-4	ABOVE-GRADE CONCRETE, MASONRY OR LO	OG WALLS WITH EXT. OR INTG. INS.
	U=0.410 IHDD65 ICDH74	IHDD65 ICDH74
	U=0.231 1199 29889	899 23911
	U=0.172 1617 40302	1213 32242
	U=0.100 5111 127383	3833 101906
	U=0.080 6000 149540	4500 119632
_		
FIG. 5-5	ABOVE-GRADE CONCRETE, MASONRY OR LO	
	U=0.410 IHDD65 ICDH74	IHDD65 ICDH74
	U=0.231 1177 25829	883 20663
	U=0.172 1588 34827	1191 27861
	U=0.080 3672 80565	2754 64452
	U=0.065 6700 147000	5025 117600
	U=0.056 10000 219404	7500 175523
FIG. 5-6	WOOD FRAME WALLS ADJACENT TO UNCONI	DITIONED SPACE
110. 5 0	U=0.474 IHDD65 ICDH74	IHDD65 ICDH74
	U=0.095 1083 12268	812 9814
	U=0.059 8617 97577	6463 78062
FIG. 5-7	CONCRETE OR MASONRY WALLS ADJACENT	
	U=0.410 IHDD65 ICDH74	IHDD65 ICDH74
	U=0.231 4577 51012 FULL WA	
	U=0.172 6176 68783 FULL W	ALL 4632 55027

TABLE 5-2 HEATING AND COOLING INTERCEPTS FOR SINGLE FAMILY HOUSES

	DUCTS WITHIN CONDITIONED SPACE	
FIG. 5-8	WOOD FRAME FLOORSOVER EXTERIORU=0.250IHDD65ICDH74U=0.07272012764U=0.047253544943U=0.033450779899	AMBIENT CONDITIONS IHDD65 ICDH74 540 10211 1901 35954 3380 63919
FIG. 5-9	WOOD FRAME FLOORSOVER UNCONDITIU-0.250IHDD65ICDH74U=0.072200040000U=0.0476000120000	ONED SPACE IHDD65 ICDH74 1500 32000 4500 96000
FIG. 5-10	C=3.33IHDD65ICDH74INSULC=0.200139971395HALFC=0.2001963129784FULLC=0.1674057243345FULLC=0.1114584352500FULL	ATION IHDD65 ICDH74 WALL 1049 57116
FIG. 5-11	C=3.33 IHDD65 ICDH74 INSUL C=0.093 1355 76344 FULL C=0.080 5372 432614 FULL	ATION IHDD65 ICDH74 WALL 1016 61075
FIG. 5-12	R=0IHDD65ICDH74DEBR=42693386642 FBR=55000887712 FB	ET 2020 30931 ET 3750 71017 ET 5405 211500
FIG. 5-13	CRAWL SPACE WALLS C=3.33 IHDD65 ICDH74 C=0.125 2000 40000 C=0.093 3382 102145 C=0.056 6000 181215	IHDD65 ICDH74 1500 32000 2537 81716 4500 144972
FIG. 5-14	NON-WOOD DOORS U=0.39 IHDD65 ICDH74 U=0.19 2349 41626	IHDD65 ICDH74 1762 33301
FIG. 5-15	FENESTRATION U-VALUES INCLUDING U=1.31 IHDD65 ICDH74 U=0.87 1258 103172 U=0.49 5620 408054 U=0.36 5981 433279	FRAME IHDD65 ICDH74 935 85121 4207 329026 4478 349207
FIG. 5-16	FENESTRATION SHADING COEFFICIEN SC=0.7 IHDD65 ICDH74 SC=0.5 -13046 27980	CS IHDD65 ICDH74 -9785 22384

5.4 Requirements for Manufactured (Mobile) Houses

5.4.1 Zones. The requirement for manufactured (mobile) houses is an overall U_o -value for the entire envelope that changes with zones defined by state boundaries, see Fig. 5-17. Hawaii and other U.S. possessions are included in Zone I, Alaska is Zone III.

5.4.2 U_o Requirement. The U_o requirement applies to both single- and double-wide units, and is presented in Table 5-3. See 5.2.2.2 for U_o calculations.

Table 5-3 Manufactured (Mobile) Housing Requirements

Zone	Uo-value		
I	0.1005		
II	0.0767		
III	0.0596		

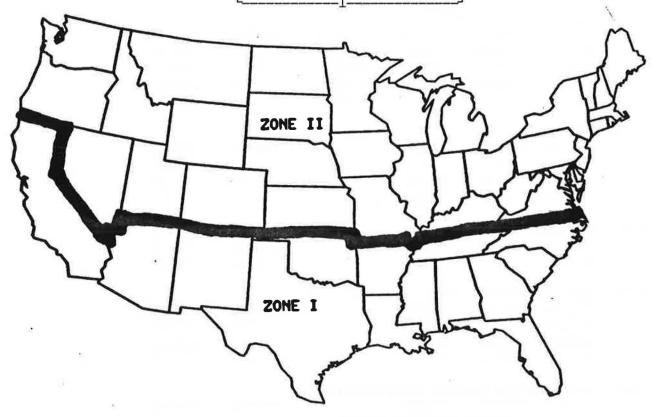


FIGURE 5-17 MANUFACTURED HOUSING ZONES

5.5 Requirements for Multi-Family Structures Including Manufactured (Modular) Structures

5.5.1 Ceilings. The requirements for ceilings are for the opaque ceiling assemblies excluding fenestration.

5.5.1.1 All ceilings with attics (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-18. The U-value includes the top air film, framing members, insulation, ceiling, and the air film below the ceiling.

5.5.1.2 All ceilings without attics such as cathedral or flat ceilings (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-19. The U-value includes the roof elements (i.e., shingles, felt paper, roof deck, and air space in addition to the ceiling elements listed in 5.5.1.1).

5.5.2 Above-Grade Walls. The requirements for above-grade walls are for the opaque wall assemblies excluding fenestration and doors. The requirements in 5.5.2 shall apply to all the exterior walls of any given story if 50% or greater of the gross exterior wall area of the story is exposed to outside air.

5.5.2.1 All structural above-grade wood frame walls and band joists (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-20.

Note: Brick veneer is non-structural and must meet these requirements.

5.5.2.2 All above-grade metal frame walls (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-21.

5.5.2.3 All structural above-grade concrete, masonry or log walls with exterior or integral insulation, or both (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-22.

5.5.2.4 All structural above-grade concrete, masonry, or log walls with interior insulation (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-23.

5.5.3 Walls Adjacent to Unconditioned Space

5.5.3.1 All wood frame walls adjacent to unconditioned space such as unconditioned basements and mechanical equipment rooms, shall meet the thermal transmittance requirements in Fig. 5-24.

5.5.3.2 All metal frame walls adjacent to unconditioned space such as unconditioned basements and mechanical equipment rooms shall meet the thermal transmittance requirements shown in Fig. 5-25.

5.5.3.3 All concrete or masonry walls adjacent to unconditioned space such as unconditioned basements and mechanical equipment rooms shall meet the thermal transmittance requirements shown in Fig. 5-26.

5.5.4 Floors

5.5.4.1 All wood frame floors over exterior ambient conditions such as overhangs, car ports, and porches (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-27.

5.5.4.2 All wood frame floors over unconditioned space such as crawl spaces beneath insulated floors, basements, enclosed garages or porches (that separate heated or mechanically cooled spaces, or both, from unconditioned space) shall meet the thermal transmittance requirements shown in Fig. 5-28.

Note: In cold climates, pipes located in unconditioned space may freeze and this should be evaluated separately. Floors over basements are not required to be insulated when basement walls are insulated. Floors over crawl spaces are not required to be insulated when crawl space walls are insulated.

5.5.4.3 All concrete floors over exterior ambient conditions such as parking garages (that separate heated or mechanically cooled spaces, or both from the outdoor environment) shall meet the thermal transmittance requirements shown in Fig. 5-29.

5.5.5 Below-Grade Basement Walls. The requirements for below-grade basement walls below uninsulated floors are for the opaque wall assemblies excluding fenestration and doors. The requirements in 5.5.5 shall apply to all the exterior walls of any given story if greater than 50% of the gross exterior wall area of the story is below grade.

Note: Basement walls are not required to be insulated when floors over basements are insulated.

5.5.5.1 Exterior or Integral Insulation. All below-grade basement walls below uninsulated floors with exterior or integral insulation (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal conductance requirements shown in Fig. 5-30. The C-value requirement only refers to the wall assembly and does not include air films or the adjacent ground.

5.5.5.2 Interior Insulation. All below-grade basement walls below uninsulated floors with interior insulation (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal conductance requirements

shown in Fig. 5-31. The C-value requirement only refers to the wall assembly and does not include air films or the adjacent ground.

5.5.6 Slab-on-Grade Floors. All R-values (°F•ft²•h/Btu) refer only to the insulation, excluding the wall constructions and all other elements such as interior finish materials, the floor slab, exterior finish materials, air films, and the adjacent ground. Perimeter insulation begins at the top surface of the slab. The insulation length requirement may be satisfied by a combination of vertical and horizontal sections provided they are continuous.

5.5.6.1 The perimeter of unheated slabs (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal resistance requirements shown in Fig. 5-32.

5.5.6.2 The perimeter of heated slabs (that separate heated or mechanically cooled spaces, or both, from the outdoor environment) shall meet the thermal resistance requirements shown in Fig. 5-32 plus an additional R-2.

5.5.7 Crawl Space Walls. All crawl space walls (that support uninsulated floors of heated or mechanically cooled spaces, or both) shall meet the thermal conductance requirements shown in Fig. 5-33. Insulation shall extend from the top of the wall to the established frost depth. The length requirement may be satisfied by a combination of vertical and horizontal sections provided they are continuous. The C-value requirement only refers to the wall assembly and does not include the air films or the adjacent ground.

Note: Crawl space walls are not required to be insulated when floors over crawl spaces are insulated.

5.5.8 Door Assemblies. The requirements shall apply to all door assemblies which permit entry or exit from a heated or mechanically cooled spaces, or both.

5.5.9.4 Notwithstanding the requirements of 5.5.9 above, fenestration areas exceeding those specified in 5.5.9.3 and U-values and SCs different from those in 5.5.9.1 and 5.5.9.2 may be used if the envelope meets the requirements in 5.9 or Section 8.

5.5.10 Multi-Family Structure Requirements Above 10,000 HDD65. The requirements in Table 5-4 shall be used for locations with HDD65 greater than 10,000.

5.5.11 Heating and Cooling Intercept Procedure. When a city is located clearly between the requirement lines, compliance is easily determined and the procedure presented in this section is not needed. However, when a city lies close to a requirement line, it may be difficult to determine the requirement correctly. Compliance can be determined by the following procedure.

This procedure applies to all requirement lines including fenestration shading coefficients.

Step 1: Use Section 9 Climatic Data to find HDD65, and CDH74, for the city.

 $HDD65_c$ = Heating Degree Days base 65°F of the city being evaluated. CDH74_c = Cooling Degree Hours base 74°F of the city being evaluated.

Step 2: Calculate the Relative Climate Ratio (RCR) using Eq 5-6.

$$RCR = \frac{HDD65_{c}}{IHDD65} + \frac{CDH74_{c}}{ICDH74}$$

(5-6)

Where

IHDD65 - heating intercept of a specific requirement line from Table 5-5. ICDH74 - cooling intercept of a specific requirement line from Table 5-5.

5.5.8.1 The opaque portion of a wood door assembly shall provide a thermal transmittance of 0.40 up to 7000 HDD65 and 0.30 from 7000 HDD65 to 10,000 HDD65.

5.5.8.2 The opaque portion of a non-wood door assembly shall meet the thermal transmittance requirements shown in Fig. 5-34.

5.5.8.3 The glazed portion of any door assembly shall meet the requirements contained in 5.5.9.1 and 5.5.9.2.

5.5.9 Fenestration. The requirements shall apply to all operable or fixed glazed assemblies including windows, skylights, and glass doors.

Note: Fenestration that can be thermally separated from the conditioned space (such as sun rooms, solariums, greenhouses, and Florida rooms) shall be excluded from the prescriptive U-value, SC, and area requirements provided it is separated by envelope components that meet this standard.

5.5.9.1 Fenestration shall meet the thermal transmittance requirements shown in Fig. 5-35.

5.5.9.2 The shading coefficient (SC) of the fenestration shall be less than or equal to the requirements shown in Fig. 5-36.

Note: A shading coefficient of 0.7 is achieved by standard window treatments of drapes, blinds, sheers or some combination. A shading coefficient of 0.5 is achieved by treatments applied to or in the glass in addition to standard window treatments. Other shading coefficients can be utilized provided they conform to the trade-offs in 5.9.

5.5.9.3 The combined fenestration area, fixed or operable, shall not exceed 15% of the conditioned space floor area or 125 ft^2 whichever is greater.

Step 3: Determine which requirement the city shall meet.

(a) If RCR > 1.0, then the city is above the line.

(b) If RCR < 1.0 and $CDH74_c > BPCDH74$, then the city is above the line.

(c) If RCR < 1.0 and CDH74_c < BPCDH74, then the city is below the line.

(d) If RCR - 1.0, then the city is on the line and must meet the more stringent requirement.

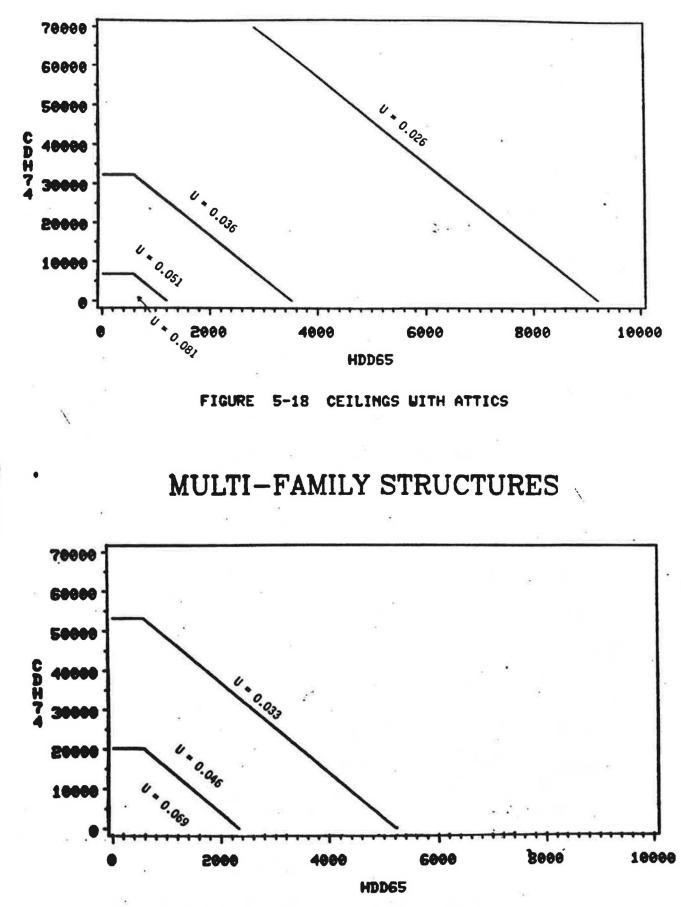


FIGURE 5-19 CEILINGS WITHOUT ATTICS

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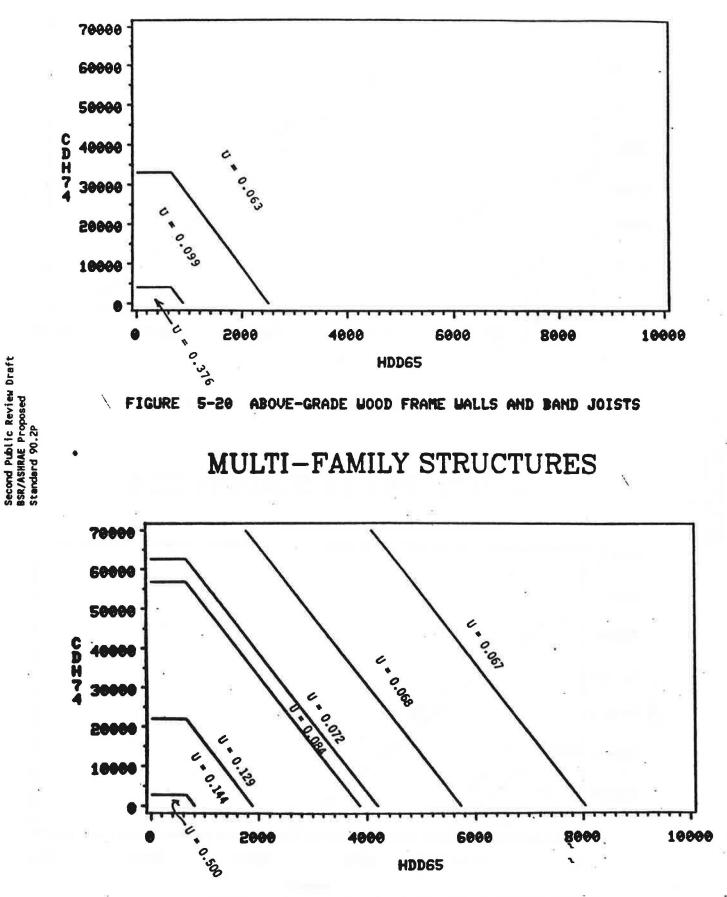
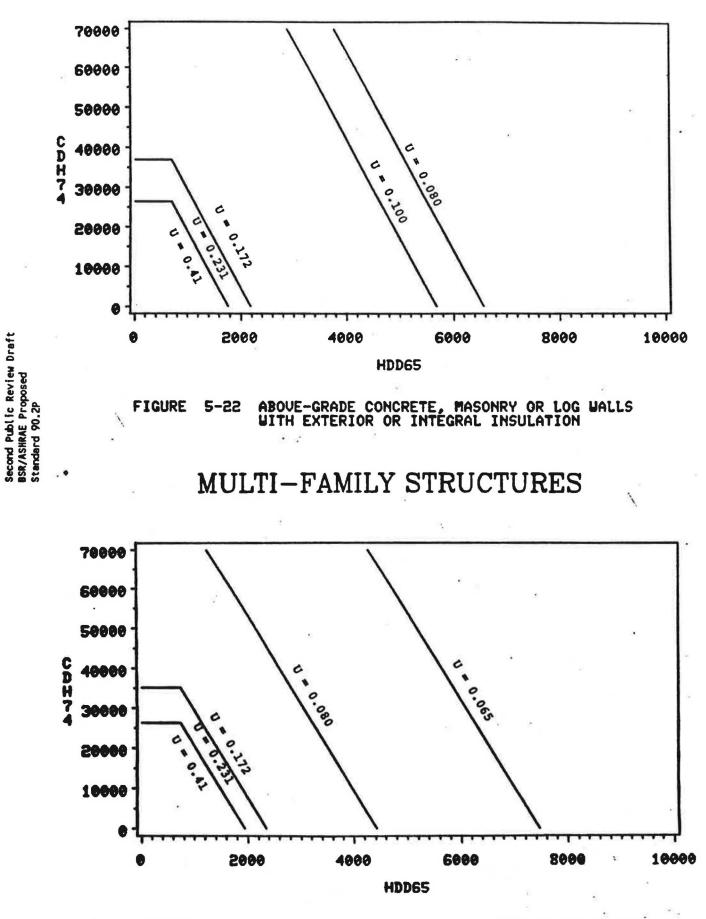
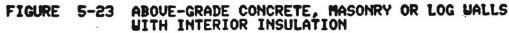


FIGURE 5-21 ABOVE-GRADE METAL FRAME WALLS





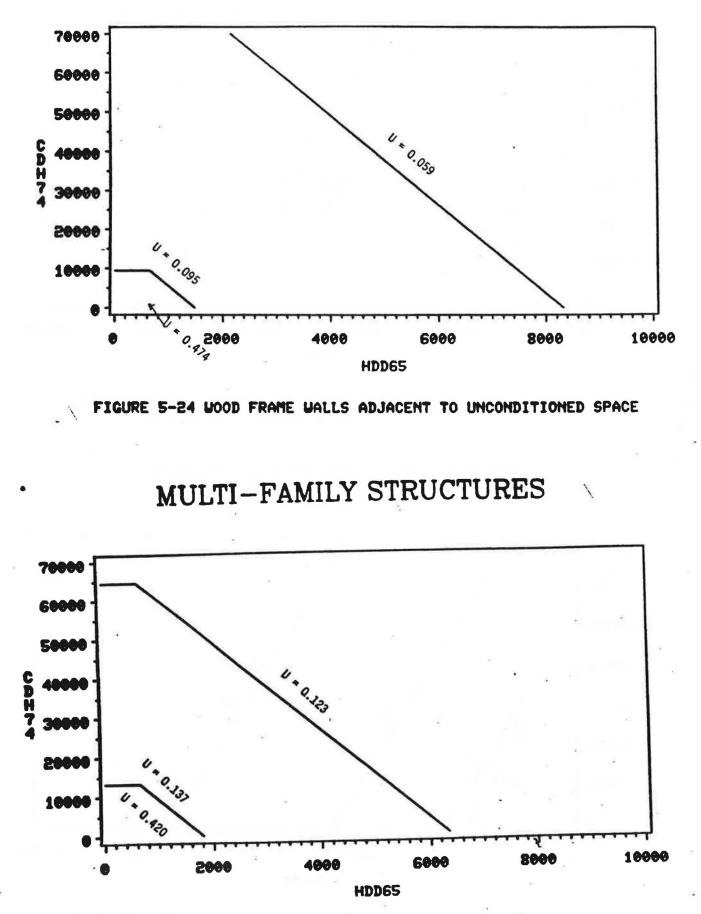
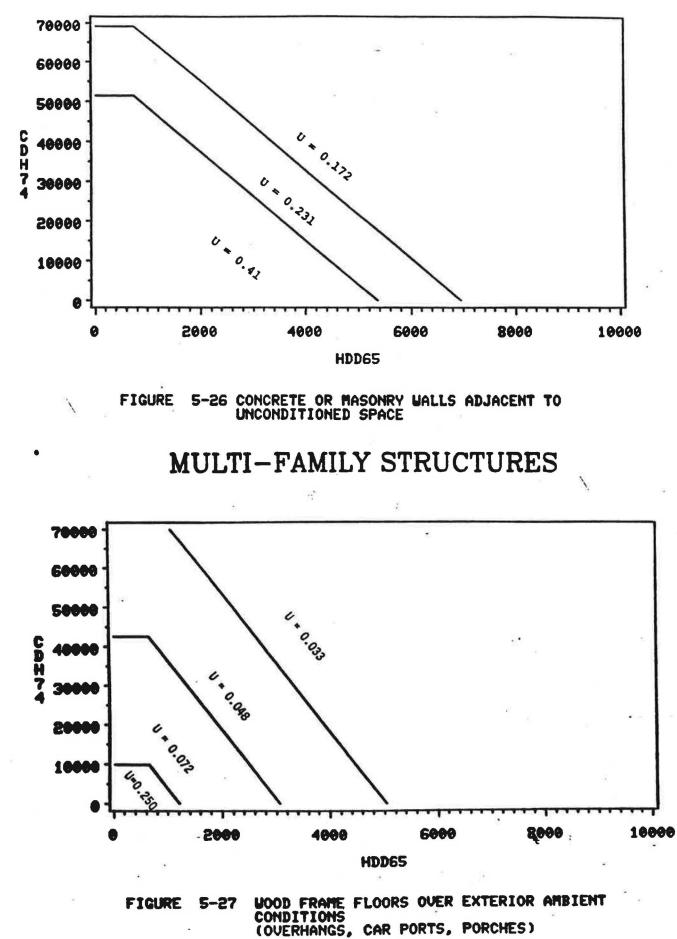
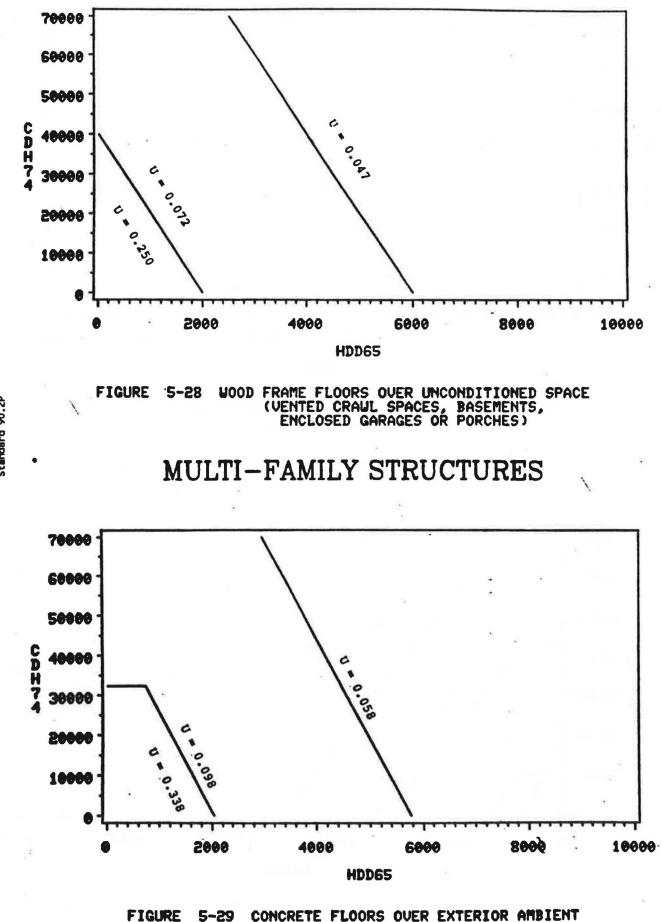


FIGURE 5-25 METAL FRAME WALLS ADJACENT TO UNCONDITIONED



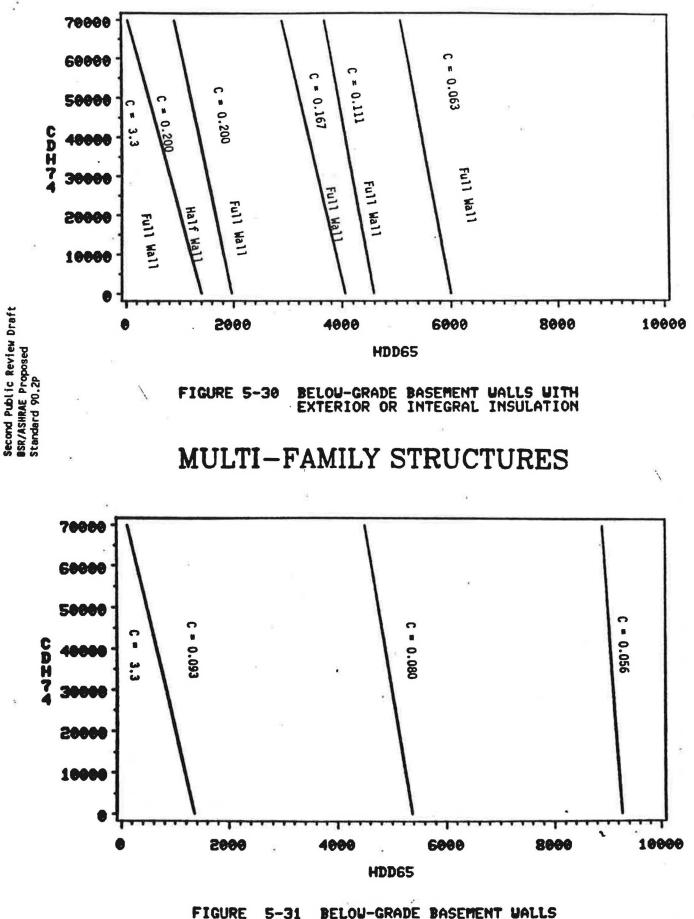
Second Public Review Draft BSR/ASHRAE Proposed Standard 90.2P



E 5-29 CONCRETE FLOORS OVER EXTERIOR AMBIENT CONDITIONS (GARAGES) 63

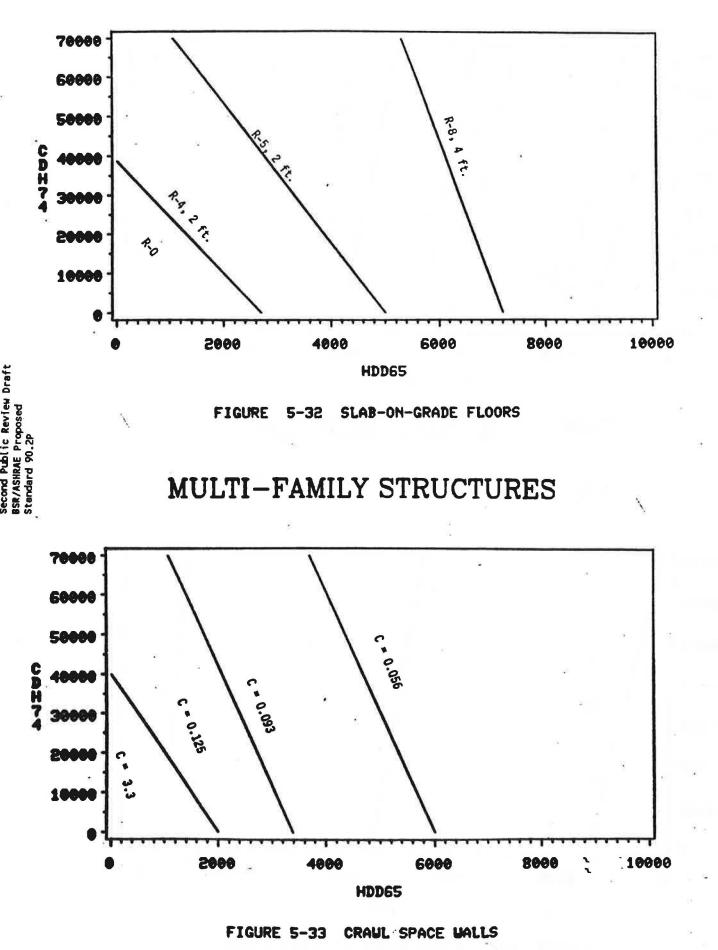
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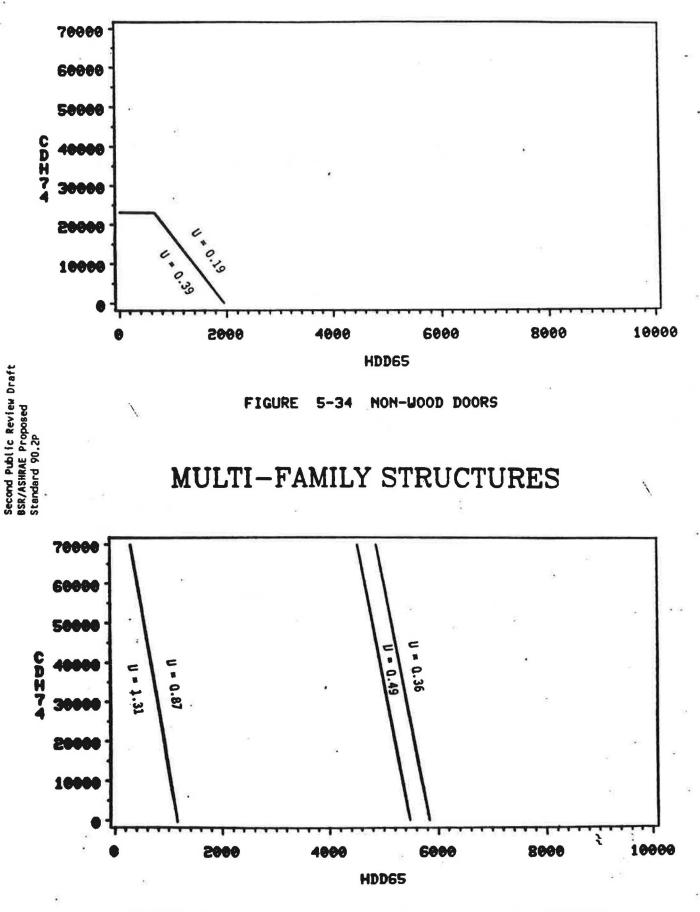




MULTI-FAMILY HOUSING



MULTI-FAMILY STRUCTURES



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FIGURE 5-35 FENESTRATION U-VALUES INCLUDING FRAMING

MULTI-FAMILY STRUCTURES

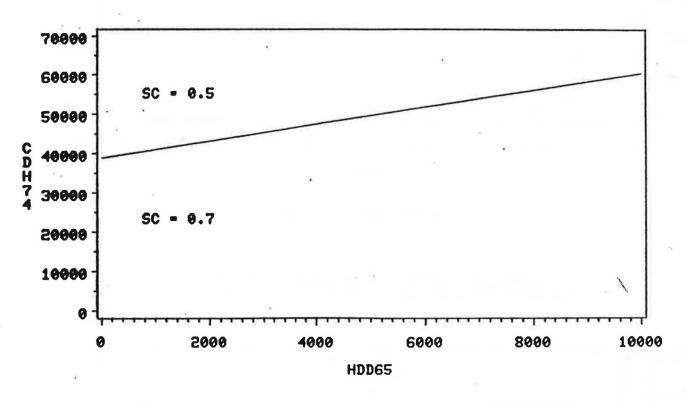


FIGURE 5-36 FENESTRATION SHADING COEFFICIENTS

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Table 5-4 Multi-Family Housing Requirements above 10,000 HDD65

	Ceil	ings		1	Walls							Floors				
HDD65	With Attic	With- out Attic	Wood Frame		Below Grade		Frame Adj. Uncon		Mass Adj. Uncon Space			Wood Frame Over Uncon	Conc. Slab	Doors	Fenestra	ation
65°F	U	U	U	U	С	С	υ	U	υ	R	U	U	U	U	U	SC
10001 to 12000	0.021	0.033	0.042	0.067	0.063	0.056	0.059	0.123	0.172	8	0.033	0.033	0.058	0.19	0.36	0.7
12001 to 15000	0.021	0.033	0.038	0.067	0.063	0.056	0.059	0.123	0.172	10	0.033	0.033	0.058	0.19	0.36	0.7
15001 to 18000	0.018	0.033	0.038	0.067	0.063	0.056	0.059	0.079	0.080	12	0.033	0.033	0.058	0.19	0.36	0.7
18001 to 21000	0.018	0.033	0.038	0.067	0.063	0.056	0.059	0.079	0.080	14	0.033	0.033	0.058	0.19	0.36	0.7

TABLE 5-5	HEATING AND COOLING INTERC FOR MULTI-FAMILY STRUCTURE		
FIG. 5-18	CEILINGS WITH ATTICS	BREAK POINTS	
rig. J-10	U=0.081 IHDD65 ICDH74		
	U=0.051 1196 13110		
	U=0.036 3516 38538	572 20050	
	U=0.026 9206 100886	5/3 32238	
	0=0.026 9206 100886		
FIG. 5-19			
	U=0.069 IHDD65 ICDH74	BPHDD65 BPCDH74	
	U=0.046 2337 26697	573 20151	
	U=0.033 5230 59738	573 53193	
FIG. 5-20	ABOVE-GRADE WOOD FRAME WAL	LS AND BAND JOISTS	
	U=0.376 IHDD65 ICDH74		
	U=0.099 879 15559	648 4091	
	U=0.063 2520 44563	648 33104	
FIG. 5-21	ABOVE-GRADE METAL FRAME WA	LLS	
	U=0.500 IHDD65 ICDH74		
	U=0.144 802 14158		
	U=0.129 1887 33374	648 21914	
	U=0.084 3861 68294	648 56832	
	U=0.072 4188 74059	648 62600	
	U=0.068 5726 101265		
	U=0.067 8037 142136		
FIG. 5-22	ABOVE-GRADE CONCRETE, MASO	NRY OR LOG WALLS WITH	EXT OR INTG INS
110. 5 22	U=0.410 IHDD65 ICDH74		LAT. OR INIC. IND.
	U=0.231 1767 44039		
	U=0.172 2185 54449	702 36962	
	U=0.100 5679 141529	102 30702	5
	U=0.080 6568 146200		
ь. -			
FIG. 5-23	ABOVE-GRADE CONCRETE, MASO		INTERIOR INS.
	U=0.410 IHDD65 ICDH74	BPHDD65 BPCDH74	12.
	U=0.231 1936 42476	739 26257	
	U=0.172 2347 51464	739 35255	
	U=0.080 4431 97209		
	U=0.065 7456 163644		
FIG. 5-24	WOOD FRAME WALLS ADJACENT		E
	U=0.474 IHDD65 ICDH74	BPHDD65 BPCDH74	
	U=0.095 1472 16655	648 9321	
	U=0.059 8326 94274		
FIG. 5-25	METAL FRAME WALLS ADJACENT	TO UNCONDITIOED SPAC	E
	U=0.420 IHDD65 ICDH74	BPHDD65 BPCDH74	
	U=0.137 1815 20551	648 13212	
	U=0.123 6353 71930	648 64593	

FIG. 5-26	CONCRETE	OR MASON	RY WALLS	ADJACENT TO	UNCONDITI	ONED SPACE
	U=0.410 I	HDD65	ICDH74	INSULATION	BPHDD65	BPCDH74
	U=0.231	5355	59677	FULL WALL	739	51440
	U=0.172	5340	94934	FULL WALL	739	69211
	U=0.080	8470	375699	FULL WALL		

- FIG. 5-27 WOOD FRAME FLOORS OVER EXTERIOR AMBIENT CONDITIONS U=0.250 IHDD65 ICDH74 BPHDD65 BPCDH74 U=0.072 1208 21367 648 9906 648 U=0.048 3061 54135 42675 U=0.033 5033 89003
- FIG. 5-28 WOOD FRAME FLOORS OVER UNCONDITIONED SPACE U=0.250 IHDD65 ICDH74 U=0.072 2000 40000 U=0.047 6000 120000
- FIG. 5-29 CONCRETE FLOORS OVER EXTERIOR AMBIENT CONDITIONS U=0.338 IHDD65 ICDH74 BPHDD65 BPCDH74 U=0.098 2037 50773 739 32353 U=0.058 5767 143733
- FIG. 5-30 BELOW-GRADE BASEMENT WALLS WITH EXTERIOR OR INTEGRAL INS. C=3.33 IHDD65 INSULATION ICDH74 C=0.200 1399 71395 HALF WALL C=0.200 1963 129784 FULL WALL C=0.167 4057 243345 FULL WALL 4584 C=0.111 352500 FULL WALL 6000 C = 0.063461387 FULL WALL

FIG. 5-31 BELOW-GRADE BASEMENT WALLS WITH INTERIOR INSULATION C=3.33 IHDD65 ICDH74 INSULATION C=0.093 FULL WALL 1355 76344 C=0.080 5372 432614 FULL WALL C=0.056 9265 1826592 FULL WALL

FIG.	5-32	SLAB-C	N-GRADE FLO	OORS	
		R=0	IHDD65	ICDH74	DEPTH
		R=4	2693	38664	2 FEET
		R=5	5000	88771	2 FEET
		R=8	7206	264375	2 FEET

FIG.	5-33	CRAWL S	PACE WALL	.S		
		C=3.33	IHDD65	ICDH74		
		C=0.125	2000	40000		
		C=0.093	3382	102145		
		C=0.056	6000	181215		
FIG.	5-34	NON-WOO	D DOORS			
		U=0.39	IHDD65	ICDH74	BPHDD65	BPCDH74
		U=0.19	1952	34601	648	23117

FIG. 5-35	FENESTRATION U-VALUES INCLUDING FRAMING
	U=1.31 IHDD65 ICDH74
	U=0.87 1151 94420
	U=0.49 5482 398041
	U=0.36 5842 423244
FIG. 5-36	FENESTRATION SHADING COEFFICIENTS SC=0.7 IHDD65 ICDH74 SC=0.5 -18154 38936

5.6 Air leakage - All Buildings

The requirements of this subsection are limited to the envelope of the conditioned space that separates exterior ambient conditions from the building conditioned spaces and are not applicable to separation of interior conditioned spaces from each other.

These requirements are intended to be used to reduce the energy use associated with uncontrolled air leakage (infiltration) through the building envelope of structures subject to the scope of this standard. These requirements are not intended to be used to adversely impact indoor air quality. They are not deemed to provide adequate air supply for combustion and ventilation or provide adequate fresh air supply. Consideration of uses other than reducing unwanted air leakage is not covered in this standard.

5.6.1 Applicable Standards--Rate of Air Leakage. The rates of air leakage through exterior windows, patio doors ("sliders"), and swinging doors; shall be determined in accordance with ANSI/ASTM E 283-84 (Ref 18) at a pressure differential of 1.57 lb/ft^2 (75 Pa) which is equivalent to a 25 mph wind speed.

5.6.2 Air Leakage Requirements

5.6.2.1 Windows. Windows shall be designed to limit air leakage. The air infiltration rate shall be as specified in the listed references depending on the type of window:

(a) The requirement for aluminum windows shall be 0.37 cfm/ft of sash crack as specified in ANSI/AAMA 101-88 (Ref 19).

(b) The requirement for PVC windows shall be either 0.37 cfm/ft of sash crack as specified in AAMA 101 V-86 (Ref 20) or 0.375 cfm/ft of sash crack as specified in ASTM D 4099-89 (Ref 21).

(c) The requirement for wood windows shall be 0.34 cfm/ft of sash crack as specified in ANSI/NWWDA I.S. 2-87 (Ref 22).

(d) The requirement for manufactured housing windows shall be 0.50 cfm/ft² of window area as specified in AAMA 1701.2-1985 (Ref 23).

The air infiltration rate requirement for windows not covered by any of the listed references shall be 0.34 cfm/ft of sash crack. The requirement for fixed windows shall be 0.34 cfm/ft² of window area.

5.6.2.2 Sliding Doors. Sliding doors used for entry or exit from residential living units shall be designed to limit air leakage. The air infiltration rate shall be as specified in the listed references depending on the type of door:

(a) The requirement for aluminum sliding doors shall be 0.37 cfm/ft^2 of door area as specified in ANSI/AAMA 101-88 (Ref 19).

(b) The requirement for PVC sliding doors shall be either 0.37 cfm/ft^2 of door area as specified in AAMA 101 V-86 (Ref 20) or 0.375 cfm/ft^2 of door area as specified in ASTM D 4099-89 (Ref 21).

(c) The requirement for wood sliding doors shall be 0.34 cfm/ft^2 as specified in ANSI/NWUDA I.S. 3-88 (Ref 24).

(d) The requirement for manufactured housing sliding doors shall be 0.50 cfm/ft^2 of door area as specified in AAMA 1701.2-1985 (Ref 23).

5.6.2.3 Swinging Doors. Swinging door used for entry or exit from residential living units shall be designed to limit air leakage. The air infiltration rate shall not exceed 0.5 cfm/ft^2 of door area except for manufactured housing swinging doors. The requirement for manufactured housing swinging doors shall be 1.0 cfm/ft^2 of door area as specified in AAMA 1702.2-1985 (Ref 25).

5.6.2.4 Access Hatches. Openings from conditioned spaces into unconditioned spaces other than sliding doors (5.6.2.2) or swinging doors (5.6.2.3) shall be well sealed using weather stripping and shall be provided with positive means of closure. If such access ways are placed in insulated envelope subsystems, their level of insulation shall be equivalent to that of the section to which they are installed, or shall be accounted for in the overall heat transfer value of the section using methods contained in the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3).

5.6.2.5 Foundations. Foundation walls and other walls below-grade enclosing conditioned space, or unheated space where HVAC equipment operate, shall be caulked and sealed in a thorough manner. All cracks shall be sealed with durable materials. The intersection of above-grade construction assemblies with below-grade construction materials shall be provided with a tight seal.

5.6.3 Caulking and Sealants. Exterior joints in the building envelope that are sources of air leakage (such as cracks around window and door frames, between wall cavities and framing, between walls and foundations, between walls and roofs, between separate wall panels, at utility or other service penetrations through any envelope sections) shall be properly sealed with compatible, durable caulking, gasketing, weather-stripping, or other materials. Joints between dissimilar materials such as between wood and masonry or between concrete and metal frames shall allow for differential expansion and contraction of such materials so as to provide a permanent seal.

5.6.4 Air-Infiltration Barriers. Air-infiltration barriers are recommended for use in all climates on the exterior walls of the building. When installed, air barrier materials used towards the exterior surfaces of buildings shall be continuous and have a water vapor permeance greater than or equal to 5.0 perm, and not significantly less than that of any other continuous membrane in the building section. All joints and penetrations of an air barrier shall be properly sealed against air leakage.

5.7 Water Vapor Retarders

5.7.1. General. Water vapor retarders shall be used to avoid moisture buildup and mold and mildew growth in energy efficient, low air-leakage, space-conditioned buildings. Vapor retarders shall be of a durable nature to resist tearing and breaking under normal construction conditions. For more information, refer to Chapters 20 and 21 of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3).

5.7.2 Attic or Roof Sections. For attic, or roof sections, or both, vapor retarders shall be used incorporating provisions of Chapter 21, Table 1, of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3).

Exception: The use of vapor retarders is not required in hot humid climates.

5.7.3 Wall Sections. Vapor retarders shall be installed on the conditioned-space side of thermal insulations in walls, so as not to conflict with provisions in Chapter 21 of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3).

Exception: The use of vapor retarders is not required in hot humid climates. When vapor retarders are used they should be on the exterior.

5.7.4 Crawl Spaces. Durable continuous vapor retarder sheeting (at least 6 mil in thickness) shall be placed over exposed soils, and extended 1.0 ft up walls. Joints in such sheeting shall overlap by at least 1.0 ft and may be taped or held in place by durable scrap materials.

5.8 Ventilation

5.8.1 Attic. A free ventilating area of 1.0 ft^2 for each 150 ft^2 of attic floor area is recommended where no attic vapor retarder is provided. If a vapor retarder is installed, the free ventilating area may be reduced to 1.0 ft^2 for each 300 ft^2 of attic floor area. These attic ventilation requirements shall not conflict with any

building code. A 1.0 in. ventilation space between insulating layers and roof decks in ceilings without attics (cathedral ceilings) is recommended, unless the assembly is designed to be of moisture vapor tight construction.

5.8.2 Crawl spaces. It is recommended that a crawl space be vented with a minimum of four vent openings. Each opening should be placed as high as possible in the crawl space wall and located within three feet of each corner.

5.8.2.1 Insulated Floors Over Crawl Spaces. When floors over crawl spaces are insulated, the minimum net area of the ventilation openings shall not be less than 1.0 ft^2 for each 150 ft² of crawl space floor area.

5.8.2.2 Insulated Crawl Space Walls. When crawl space walls are insulated, the minimum net area of the ventilation openings shall be reduced to 1.0 ft^2 for each 1500 ft² of crawl space floor area provided that the operable vents are used to provide cross ventilation.

5.9 Envelope Tradeoff Procedure

5.9.1 Scope. This subsection allows use of building envelope components which do not meet the prescriptive requirements of 5.3 or 5.5, if the added heating and cooling loads imposed thereby are compensated for by the load savings from other envelope components which exceed the prescriptive requirements.

Calculations shall be done using the load factors and equations from this subsection only. Tradeoffs shall be allowed only for items listed in Table 5-6 and, except for fenestration, only for the area or length actually included in the proposed building. No credit is allowed for changes from one component type to another, such as from masonry walls to frame walls. Fenestration however, has prescriptive requirements for area, U-value, and shading coefficient, all of which may be traded in this procedure.

The procedures in this section are appropriate for simple envelope tradeoff calculations in typical residential buildings. This section shall not be used for buildings with more than 8% of the floor area in fenestration in any cardinal orientation or 32% total. Designers are encouraged to use the procedures in Section 8 for more accurate analysis for constructions not covered here and for more flexibility than is permitted by this section.

5.9.2 Calculation Procedure. Calculations shall be done in accordance with the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3). The fenestration area for each cardinal orientation shall be the sum of the fenestration areas oriented within 45° of each cardinal orientation. If more than one U-value, conductance, or shading coefficient for a component is proposed, area weighted values shall be used.

The total load change shall be calculated according to Eq 5-7 as the sum of the heating and cooling load changes for each component which deviates from the prescriptive requirement. If the total load change is greater than or equal to zero, the proposed design complies with the standard.

$$TLC = \sum_{j=1}^{n} LC_{j} = LC_{1} + LC_{2} + ... + LC_{n}$$
 (5-7)

where

TLC = total load change, Btu

 $LC_j = load$ change from component j, Btu

n = number of components

With the exception of fenestration, the load change for each component which deviates from the requirements shall be calculated using Eq 5-8.

$$LC_{i} = (U_{m} - U_{p}) \times Size_{i} \times (HLF_{i} \times HDD65_{c} + CLF_{i} \times CDH74_{c})$$
(5-8)

where

 $HDD65_c$ = Heating Degree Days base 65°F of the city being evaluated. CDH74_c = Cooling Degree Hours base 74°F of the city being evaluated.

 U_m = mandatory U-value or conductance of component j as specified by the prescriptive requirements, Btu/(h•ft²•°F).

 U_p = U-value or conductance of component j in proposed design, Btu/(h•ft²•°F).

Size, = area or length of component j, ft² or ft.

 HLF_{j} = Heating Load Factor for component j from Table 5-6.

 CFL_j = Cooling Load Factor for component j from Table 5-6.

The change in loads for deviations from the prescriptive fenestration requirements shall be calculated using Eq 5-9.

 $LC_{f} = (Area_{m} \times U_{m} - Area_{p} \times U_{p}) \times (20 \times HDD65_{c} + 0.24 \times CDH74_{c} - 2440) \\ + (Area_{m} \times SC_{m}) \times (-5.5 \times HDD65_{c} + 1.8 \times CDH74_{c} + 11,825) \\ - (Area_{n} \times SC_{n}) \times (-2.5 \times HDD65_{c} + 1.2 \times CDH74_{c} + 9000) \\ - (Area_{s} \times SC_{s}) \times (-9.9 \times HDD65_{c} + 1.8 \times CDH74_{c} + 4,200) \\ - (Area_{e} \times SC_{e}) \times (-4.0 \times HDD65_{c} + 1.8 \times CDH74_{c} + 13,900) \\ - (Area_{w} \times SC_{w}) \times (-5.5 \times HDD65_{c} + 2.4 \times CDH74_{c} + 20,200)$ (5-9)

where

 LC_f = load change, fenestration, Btu

Area_m = smaller of Area_p or 15% of the building conditioned floor area, ft^2

Area_p = total fenestration area in proposed design, ft^2

Area_n, Area_e, Area_s, Area_w = fenestration area in proposed design for each orientation, ft^2

 SC_m = mandatory base shading coefficient required by prescriptive requirements.

 SC_n , SC_e , SC_s , SC_w - shading coefficients for proposed design by orientation.

Table 5-6 Load Factors

CATEGORY	SIZE <u>(UNITS)</u>	HEATING <u>(HLF)</u>	COOLING (CLF)
Ceilings with Attics	ft ²	26.0	2.0
Ceilings without Attics	ft ²	23.0	1.7
Above-Grade Frame Walls and Band Joist	ft ²	21.0	1.0
Doors	ft ²	21.0	1.0
Above-Grade Concrete, Masonry or Log Walls:			
Exterior or Integral InsulationInterior Insulation	ft ² ft ²	21.0 21.0	0.82 0.79
Floors Over Exterior Ambient Conditions (Overhang, carport, or porch)	ft ²	21.0	1.0
Floors Over Unconditioned Spaces (Vented crawl, basement, enclosed garage, or enclosed porch)	ft ²	5.4	0.4
Basement Walls: • Top-Half insulated			
(up to 2000 HDD65)	Linear f	t 26.0	0.4
• Entire Wall Insulated	Linear f	t 36.0	0.6
Slab-On-Grade	Linear f	t 3.5	0.3
Crawl Space Walls	Linear f	t 23.5	1.0
Walls Adjacent to Unconditioned space	ft ²	5.4	0.4

6 HEATING, VENTILATING AND AIR-CONDITIONING (HVAC) SYSTEMS AND EQUIPMENT

6.1 Scope

This section presents requirements for:

- (a) load and other design calculations
- (b) duct and piping sizing design
- (c) equipment selection, performance, and manufacturer's documentation
- (d) installation techniques, materials and methods
- (e) control system strategies and design
- (f) equipment efficiency levels.

Note: Use the minimum equipment requirements in ASHRAE/IES Standard 90.1-1989 (Ref 26) when the equipment to be used is not specifically for a single family residential unit (e.g., a larger single boiler, furnace or air conditioner used to condition several units of a multi-family housing complex).

Equipment covered in this standard (described in 6.4) is limited to:

- (a) equipment using single phase electric power
- (b) air conditioners and heat pumps with capacities less than 65,000 Btu/h
- (c) warm air furnaces less than 225,000 Btu/h input
- (d) boilers less than 300,000 Btu/h input.

Further, Item (b) shall not be limited to only air source.

6.1.1 Minimum Efficiency Levels. In succeeding portions of Section 6, minimum efficiency levels are established for HVAC system equipment and HVAC system components. Values lower than those presented in this section shall not be allowed.

6.2 Calculation of Heating and Cooling Loads

6.2.1 Calculation Procedures. Heating and cooling design loads for the purpose of sizing systems shall be determined in accordance with one of the procedures described in the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3) or an acceptable procedure listed in Table 6-1. The design parameters in 6.2.2 shall apply for all load calculation methods.

6.2.2 Design Parameters. The following design parameters shall be used for system design load calculations for general comfort applications.

6.2.2.1 Outdoor Design Conditions. Winter outdoor design conditions for the selected computational procedure shall be selected for listed locations from Chapter 24, Table 1, Column 5 (97.5% values) in the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3). Summer outdoor design conditions shall be selected for listed locations from Chapter 24, Table 1, Column 6 (2.5% values). Adjustments may be made to reflect local climates which differ from the ASHRAE tabulated temperatures, or local weather experience may be used for locations not listed.

6.2.2.2 Indoor Design Conditions

Winter. The heating design temperature shall be 70°F dry-bulb. If humidification is provided, it shall be designed to a relative humidity of 30%.

Summer. Where cooling is to be used, the design temperature shall be 75°F dry-bulb. The design relative humidity within the conditioned envelope shall be within the range of 50 to 60%.

6.2.2.3 Infiltration or Ventilation. Heat gain (loss) from air infiltration or ventilation (6.3.3), or both, shall be calculated in accordance with the selected procedure from 6.2.1. Equipment size and adjustments shall be made to offset this gain (loss).

Table 6-1 ACCEPTABLE PROCEDURES

	Standard	Organization
L.	Residential Load Calculation	Air-Conditioning Contractors
	Manual J, 7th Edition (Ref 27)	of America (ACCA)
2.	Cooling and Heating	American Society of Heating,
	Load Calculation Manual,	Refrigerating and Air Conditioning
	GRP 158 (Ref 28)	Engineers (ASHRAE)
3.	Heat Loss Calculation Guide No. H-21, 2nd Edition, 1977 (Ref 29)	Hydronics Institute (HI)
4.	Insulation Manual 1979 (Ref 30)	National Association of Home
		Builders (NAHB)
5.	HE-1-1980 - Manual for	National Electrical Manufacturers
	Electric Comfort Conditioning (Ref 31)	Association (NEMA)
5.	Room Air Conditioners	American National Standards
	RAC-1-1982 (Ref 7)	Institute/Association of
12		Home Appliance Manufacturers
		(ANSI/AHAM)
7.	Installation Techniques	Air-Conditioning Contractors
	for Perimeter Heating	of America (ACCA)
	and Cooling Systems	
	Manual 4 (Ref 32)	

6.2.2.4 Internal Heat Gains. Internal heat gains for cooling design loads shall be calculated as stated in the selected procedure from 6.2.1.

6.3 Systems

6.3.1 Air Distribution Systems

6.3.1.1 Sizing and Design. All air distribution systems shall be sized and designed in accordance with recognized engineering standards such as the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3) and ACCA Manual D (Ref 33) or other standards based on the following:

(a) Calculation of the supply air for each room shall be based on the greater of the heating load or sensible cooling load for that room.

(b) Duct size shall be determined by the supply air requirements of each room, the available static pressure and the total equivalent length of the various duct runs.

(c) Friction loss data shall correspond to the type of material used in duct construction.

6.3.1.2 Installation. All ductwork shall be constructed, erected and sealed in accordance with one of the following:

(a) Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Installation Standards for Residential Heating and Air-Conditioning Systems, 6th Edition, 1988 (Ref 34)

(b) SMACNA Fibrous Glass Duct Construction Standards, 5th Edition, 1979 (Ref 35)

(c) SMACNA HVAC Duct Construction Standards - Metal and Flexible, 1st Edition, 1985 (Ref 36).

Prior to insulation, all ductwork shall be properly sealed to minimize air leakage. See SMACNA HVAC Duct Leakage Test Manual, 1985 (Ref 37).

6.3.1.3 Balancing. The system design shall provide means for balancing the air distribution system unless the design procedure provides a system intended to operate within ± 10% of design air quantities. Adjustable dampers as a part of the outlet grill design (registers) are acceptable.

6.3.1.4 Insulation. All ducts, plenums and enclosures installed in or on buildings shall be thermally insulated as stated in Table 6-2a, Minimum Duct Insulation. Where ducts are used for both heating and cooling, the insulation shall be as required for the most severe condition. Where HDD65 exceed 10,000 (e.g., Alaska), consideration should be given to putting all ductwork within the building envelope.

The level of insulation may not be sufficient to prevent surface condensation in humid areas. The designer should verify this by using the predicted surface temperature and anticipated dew point temperature. Vapor retarders shall be installed on conditioned-air-supply ducts in spaces where the average cooling season outdoor dew point temperature exceeds 60°F. Vapor retarders shall have a water vapor permeance not exceeding 0.5 perm when tested in accordance with ASTM E96-80, Procedure A (Ref 9). See Table 6-3 for dew point temperatures.

Table 6-2a

MINIMUM DUCT INSULATION

			ation Levels ft ² ·h/Btu
Duct Location	<u>Climatic Zones</u> 1	Heating	Mech. Cooled
On roof or exterior of building	I, II and III	R-6	R-6
Attic or garage	I	R-4	R-4
	II	R-6	R-6
	III	R-6	R-6
Basement under insulated	I	R-4	R-2
floor or crawl space	II	R-4	R-2
	III	R-6	R-4
Concrete slab or within	(See Table 6-1,		
ground	Item 7)		

1. Climatic zones are found in Table 6-2b.

Table 6-2b CLIMATIC ZONES¹

Cooling Zones	CDH74
Zone I	Below 15,000
Zone II	15,001 to 30,000
Zone III	Over 30,000
Heating Zones	HDD65
Zone I	Below 3000
Zone II	3001 to 6000
Zone III	Over 6000

1. See Section 9 for CDH74 and HDD65.

6.3.1.4.1 Duct insulation is not required in any of the following cases, except where required to minimize condensation (6.3.1.4.3):

(a) when the ductwork is within the conditioned space

(b) where supply or return air ducts are used for heating only and are installed in basements or unvented crawl spaces (plenum) having insulated walls

(c) exhaust air ducts.

6.3.1.4.2 Uninsulated ducts shall not be installed in exterior walls unless all the required wall insulation is provided between the ducts and the building exterior.

6.3.1.4.3 The required thermal resistances do not consider condensation. Additional insulation with vapor retarders may be required to prevent condensation under some conditions.

Table 6-3a

Dewpoint Temperatures for Various Locations (Ref 38)

MEAN DEWPOINT TEMPERATURE (°F)

	V		1											
STATE AND STATION	YRS	MAL	FEB	MAR	APR	HAY.	JUN	JUL	AUG	SEP	ост	NOV	000	YEAR
ALA. BIRMENGHAH	20	36	37	41	49	58	66	69	68	62	52	41	36	51
MOBILE	20	44	45	48	57	64	70	72	72	68	57	48	44	57
MONTGOMERY	20	39	40	44	53	61	68	71	70	65	54	43	39	54
ALASKA ANCHORAGE ANNETTE	10	8 29	11	12	24	33	43	48	48	41	25	14	7	26
BARROW	10	-23	29	<u> </u>	-9	40	47	51	52	48	41	34	31	39
BARTER ISLAND	9	-23	-26	-26	-7	18	30 31	35	35	28 29		-8	-22	3
BETREL	10	1	2	-4	14	33	43	48	48	41	12	8	-20 -5	22
COLD BAY	10	25	24	24	28	35	41	46	47	44	35	30	25	34
CORDOVA	9	21	24	22	31	38	45	49	49	43	34	27	23	34
F AI RBANKS JUNEAU	10	-15	-9	-2	19	32	44	49	48	36	18	-4	-18	17
KING SALMON	10	20 9	23	23 13	32	38	45	49	49	45	38	30	23	35
KOTZEBUE	10	-8	-11	-7	24	34	42	47	48	42	27	16	5	27
MCGRATH	10	-12	-8	-2	16	30	42	47	47	36 37	16 -18	1	-12	15
NOME	10	0	-2	2	13	29	39	15	45	37	21	-3	<u>-17</u> -5	16
ST. PAUL ISLAND	10	23	19	21	25	32	38	44	45	42	34	29	24	31
SHENYA	7	28	27	29	31	35	40	45	46	44	36	30	28	34
YAKUTAT ARIZ, FLAGSTAFF	10	23	25	25	32	38	46	50	50	46	37	29	24	35
PHOENIX	14 20	14	16	17	20	22	25	43	43	35	25	20	15	25
PRESCOTT	15	19	21	33 21	35	36 25	42 29	58 48	60 50	53	44	36	33	41
TUCSON	20	28	26	27	26	27	35	56	50	41 48	31	24	21	29
WINSLOW	20	19	19	18	21	24	29	47	49	45	30	22	28	36 29
YUMA	20	27	28	29	33	36	42	57	61	54	43	32	29	39
ARK. FORT SMITH	20	30	33	37	48	59	67	69	67	61	51	38	32	49
LITTLE ROCK Texarkana	20	32	34	39	49	60	67	70	69	62	52	40	34	51
CALIF. BAKERSFIELD	11 17	35	38	43 40	52	63	69	70	70	64	53	₹3	36	53
BLUE CANYON	1 7	23	24	25	43	43	47 36	50 36	51	50 35	45	42	39	45
BURBANK	117	36	38	40	45	49	53	57	35	54	31	30	27	31
EUREKA	10	41	40	40	44	48	50	52	SI	53	49	48	43	46
FRESNO	20	38	41	41	44	45	46	51	52	51	46	42	40	1 45
LONG BEACH	7	38	42	44	48	50	55	58	60	58	53	46	42	50
LOS ANGELES	20	40	43	45	49	52	55	59	59	58	53	46	42	50
KT. SHASTA OAKLAND	18	25	28	26	30	35	40	41	38	38	34	34	30	33
RED BLUFF	20	34	42	42	45	47	51	53	54	54	50	45	41	47
SACRAMENTO	20	39	41	41	45	47	45	47	47	43	41	38	36	40
SANDBERG	10	24	24	27	33	35	36	37	37	36	47	42	40	46
SAN DIEGO	20	42	44	46	50	52	56	60	61	60	55	46	43	31
SAN FRANCISCO	10	41	42	43	46	47	50	52	53	53	50	46	43	47
SANTA MARIA	16	40	42	42	46	48	51	54	54	53	49	43	40	1 47
COLO, COLORADO SPRING	15	10	14	15	22	35	40	47	47	37	26	17	12	27
GRAND JUNCTION .	20	17	16	17	24	35	42	47	46	37	27	19	14	28
PUEBLO	20	12	17	21 19	25	29	31	39	43	35	29	24	19	28
CONN. BRIDGEPORT	16	22	22	27	37	47	57	51 66	51 62	42	30	22	16	31
HARTFORD	20	18	19	25	35	46	57	62	61	54	44	37	24	42
NEW HAVEN	10	24	22	27	37	48	57	63	63	55	47	44	25	43
DEL. WILMINGTON	20	24	24	29	40	50	60	64	64	58	47	35	26	43
D.C. WASHINGTON FLA. APALACHICOLA	20	25	25	29	40	52	61	65	64	59	48	36	26	44
FLA. APALACHICOLA DAYTONA BEACH	10	47	48	54 54	60	66	72	73	74	71	62	50	50	61
FT. WYERS	6	55	55	59	59 61	65	70	73	73	72	65	56	56	62
JACKSONVILLE	20	46	47	50	56	64	72	72	74	74	68	59	56	64
KEY WEST	16	61	63	65	66	69	73	74	75	74	62 71	53	64	58
NIANI.	16	57	59	61	63	68	72	73	74	74	69	63	58	
ORLANDO	17	52	52	55	59	65	70	73	73	72	65		751	
PENSACOLA TALLAHASSEE	10	48	47	51	59	65	70	73	73	68	59		46	
TANPA	17 20	44	46	49	55	62	69	72	72	69	58	49	43	
VEST PALM BEACH	17	52 57	53 58	56 61	60	66	70	73	73	72	65		52	
GA. ATHENS	10	32	34	19	63 46	68 59	72 65	74 69	74 68	74	68		57	
ATLANTA	20	34	34	39	48	57	65	68	67	63 62	52 51		34	
AUGUSTA	20	37	37	42	50	60	66	70	70		54	40	34	
MACON	20	37	38	42	51	59	66	70	69		53		37	
SAVANNAR	20	42	43	46	54	63	69	72	72		58			
HAWAII HILO	10	63	62	63	65	66	66	68	68	68	67		64	
HONOLULU	10	63		62	63	64	65		66	67				

Hawaii continued on next page

Table 6-3b

Dewpoint Temperatures for Various Locations (Ref 38)

MEAN DEWPOINT TEMPERATURE (°F) - Continued

		-							and the second	-				
STATE AND STATION	YRS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
KAHULUI	110	64	63	63	64	65	66	671	671	68	1 67	1		1.1.1.1.1.1.1
LIHUE	10	64	61	63	64	66	68	69	69	69	67 68	65	64	
DAHO BOISE	20	21	27	27	32	38	42	44	43	38	34	29	26	
LEWISTON	10	21	28	26	32	40	45	44	44	42	39	33	28	
POCATELLO	20	17	21	24	28	35	39	41	40	34	30	26	21	
LL. CHICAGO	20	18	20	26	36	46	56	61	61	53	43	31	21	
WOLINE	20	15	19	26	37	48	59	64	63	54	43	30	21	-
PEORIA	20	18	21	28	36	49	59	64	63	54	44	31	22	
ROCKFORD	7	12	17	24	35	-18	56	61	61	54	43	31	24	
SPRINGFIELD	20	20	23	30	41	49	61	65	64	55	44	32	24	
IND. EVANSVILLE	20	26	27	34	44	53	63	67	66	58	47	35	23	
FT. WAYNE	20	20	22	28	36	48	58	62	61	54	44	33	23	
INDIANAPOLIS	20	22	23	30	40	50	60	64	63	\$5	45	32	23	
SOUTH BEND .	20	20	22	27	37	48	57	62	61	53	44	33	24	
TERRE HAUTE	10	26	25	32	12	49	61	65	64	55	45	33	26	
IOWA BURLINGTON	20	17	21	27	39	49	60	65	64	54	43	30	21	
DES MOINES	20	14	18	25	37	48	60	64	63	53	42	29	19	39
DUBUQUE	10	15	18	25	35	45	. 59	64	62	52	42	27	19	39
SIOUX CITY	20	10	16	24	35	47	58	63	62	51	40	26	17	37
KANS. CONCORDIA	15	17	22	27	39	50	61	64	62	54	44	30	21	4
DODGE CITY	20	18	23	25	36	49	57	61	59	51	41	29	22	39
GOODLAND	20	15	21	21	30	42	52	56	55	45	34	23	18	3.
TOPEKA	20	19	23	29	41	53	63	66	65	56	45	31	23	4:
WICRITA	20	21	25	30	41	53	62	65	63	55	45	33	25	4
KY. LEXINGTON	20	27	27	32	42	53	61	65	64	56	46	34	28	
LOUISVILLE	20	27	28	33	43	54	63	66	65	57	47	35	27	
LA. ALEXANDRIA	6	37	40	46	56	62	68	72	71	67	56	49	40	
BATON ROUGE		44	46	49	57	64	70	73	72	68	57	48	44	
LAKE CHARLES	20	46	48	51	58	66	71	73	73	69	58	50	46	
NEW ORLEANS	20	46	48	52	59	66	72	73	73	70	60	52	47	
SHREVEPORT	20	38	40	44	54	62	69	71	70	65	55	45	39	
WAINE CARIBOU	18	7	5	15	28	38	50	56	54	47	36	27	12	
EASTPORT PORTLAND	20	18	20	25	33	40	47	55	57	52	42	33	22	
ND. BALTIMORE	20	16	16	23	33	10	53	59	58	49	39	32	19	
WASS. BLUE HILL	10	20	20	26	35	51 46	61	65	64	53	45	35	2:	
BOSTON	20	19	19	25	34	44	55	60	60	53	1 44		2:	
NANTUCKET	20	26	25	29	37	1 46	56	63	62	57	1 49		2	
VORCESTER	6	1 14	1 15	20	29	42		1 56	56	51	1 39			
	T		1	1	r	1	1	11	1	1	V	1	1	x
WICH. ALPENA	10	16	16	21	32	41		58						
DETROIT	20	19	19	25	35	45		60						
ESCANABA	10	12	14	20	32			59						
FLINT	10	15	16	23	34			58		1		_		
GRAND RAPIDS	20	19	19	25	34	44		59		_		_	_	
LANSING	17	18		24	34			59		1 1 1 1 1 1 1		10 I I I I I I I I I I I I I I I I I I I		
MARQUETTE	10	12		19	29			56					C.4	
MUSKEGON	20	20	1000		34			60						
SAULT STE. WARIE	20	9			29							_		
WINH. DULUTE	20	2			27			50						9 3
INTERNATL FALLS	20	-5			26							5 2		4 2
WINNST. PAUL	20	6			32							0 2		_
ROCHESTER	20				32							9 2		-
ST. CLOUD	16	2			30								2 1	
ST. PAUL		6			31								3 1	
	5	1 1 1				51 58	8 68						2 3	
WISS. JACKSON	20	40												9
MERIDIAN	20 16	39	40	45	54	6	_				_	5 4		2 L A
NERIDIAN Vicksburg	20 16 10	39	40	45	54	6	3 70	7	3 7	1 6:	5 .	54 4	3 3	6
MERIDIAN VICKSBURG MO. COLUMBIA	20 16 10 20	39	40	45 46 29	54 55 41	1 61 5 63 0 53	3 70	7	3 7	1 6:	5	64 4 15 3	3 3	5
MERIDIAN VICKSBURG NO. COLUMBIA KANSAS CITY	20 16 10 20 20	39 40 21 20	40 41 24	45 46 29 29	54	1 61 5 63 5 53	3 70 2 62 3 62	7 6 6	3 7 6 6 5 6	1 6: 4 5: 4 5:	5	5 3 5 3	3 3 2 2 3	5
NERIDIAN VICKSBURG WO. COLUNBIA KARSAS CITY ST. JOSEPH	20 16 10 20 20 10	39 40 21 20 19	40 41 24	45 46 29 29 29	54	6 6 5 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	3 70 2 62 3 62 1 63	7 6 6	3 7 6 6 5 6 5 6	1 6: 4 5: 4 5: 5 5:	5 4	5 3	3 3 2 2 3 2	5 4
NERIDIAN VICKSBURG WO. COLDWBIA KANSAS CITY ST. JOSEPH ST. LOUIS	20 16 10 20 20 10 20	39 40 21 20 13 21	2 40 41 24 24 24 24 24 24 24 24 24 24	45 46 29 29 29 29 29 30	54	1 61 5 63 0 53 0 53 0 53 0 53 2 53	3 70 2 62 3 62 1 63 2 62	7 6 6 6	3 7 6 6 5 6 6 6	1 6: 4 5: 4 5: 5 5: 4 5:	5 5 5	14 4 15 3 15 3 14 3 16 3	3 3 2 2 3 2 13 2 13 2	5 4 3 6
NERIDIAN VICKSBURG WO. COLTWBIA KANSAS CITY ST. JOSEPH ST. LOUIS SPRINGFIELD	20 16 10 20 20 10 20 20	39 40 21 20 19 21 21 21 21 21 21 21 21 21 21 21 21 21	40 41 24 24 24 24 24 24 24 24 24 24 24 24 24	45 46 29 29 29 29 29 30 7 32	54	6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	3 70 2 62 3 62 1 63 2 62 5 64	7 6 6 6 6	3 7 6 6 5 6 6 6 7 6	1 6: 4 5: 4 5: 5 5: 4 5: 4 5:	5 4 5 4 6 4 7 4 7 4	14 4 15 3 15 3 14 3 16 3 17 3	3 3 2 2 3 2 10 2 13 2 14 2	5 4 3 6 7
NERIDIAN VICKSBURG MO. COLUMBIA KANSAS CITT ST. JOSEPH ST. LOUIS SPRINGFIELD MONT. BILLINGS	20 16 10 20 20 10 20 20 20 20	39 40 21 20 19 21 21 21		45 46 29 29 29 29 30 7 32 5 30 7 32 5 20	54 55 40 40 40 40 40 40 40 40 40 40 40 40 40	6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	3 70 2 62 3 62 1 63 2 62 5 64 8 46	7 6 6 6 6	3 7 6 6 5 6 6 6 7 6 8 4	1 6: 4 5: 4 5: 5 5: 4 5: 4 5: 4 5: 6 3:	5 4 5 4 5 4 7 4 8	i4 i i5 i i5 i i6 i i7 i i31 i	3 3 12 2 13 2 10 2 13 2 14 2 12 1	5 4 3 6 7 5
NERIDIAN VICKSBURG WO. COLUNBIA KANSAS CITY ST. JOSEPH ST. LOUIS SPRINGFIELD WORT. BILLINGS BUTTE	20 16 10 20 20 10 20 20 20 10	39 40 21 20 19 21 21 21 21 21		45 46 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29 20	54 55 40 40 40 40 40 40 40 40 40 40 40 40 40	6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	3 70 2 62 3 62 3 62 1 63 2 62 5 64 6 46 2 36	7 6 6 6 6 6 4 3	3 7 6 6 5 6 6 6 7 6 8 3	1 6: 4 5: 4 5: 5 5: 4 5: 5 4 5: 5 4 5: 5 4 5: 5 4 5: 5 4 5: 5 5: 5	5 5 6 7 8 3	14 15 3 15 3 3 16 3 17 3 27 1	3 3 12 2 13 2 10 2 13 2 14 2 18 1	5 4 3 6 7 5
NERIDIAN VICKSBURG WO. COLUMBIA KANSAS CITY ST. JOSEPH ST. LOUIS SPRINGFIELD WONT. BILLINGS BUTTE GLASGOW	20 16 10 20 20 10 20 20 20 10	39 40 21 20 19 21 20 19 21 10	40 41 24 24 24 24 24 24 24 24 25 41 24 24 25 41 24 25 41 26 11 10 11 11 12 13 14 15	45 46 29 29 29 29 29 29 20 20 21 21 21 21 21 21 21 21 21 21 21 22 23 24 25 27 28 29 20 21 21 22 23 24 25 26 20 21 22 23 24 25 26 27 27 28 29 20 21 21 22 24 25 26 27 28 29 20 21 21 22 23 24 25 26 27 <td>54 55 40 40 40 40 40 40 40 40 40 40 40 40 40</td> <td>1 61 5 62 0 52 0 52 3 53 3 3 3 5</td> <td>3 70 2 62 3 62 3 62 1 63 2 62 5 64 6 46 2 36 7 45</td> <td>7 6 6 6 6 6 6 6 4 3 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6</td> <td>3 7 6 6 5 6 6 6 7 6 8 4 9 4</td> <td>1 6: 4 5: 4 5: 5 4 5: 4 5: 4 5: 5 4 5: 9 5: 9 4 5:</td> <td>5 5 6 7 8 3 8</td> <td>14 15 15 3 15 3 16 3 17 3 31 3 27 1 29 3</td> <td>3 3 12 2 13 2 14 2 18 1 122 1</td> <td>5 4 3 6 7 5 3 0</td>	54 55 40 40 40 40 40 40 40 40 40 40 40 40 40	1 61 5 62 0 52 0 52 3 53 3 3 3 5	3 70 2 62 3 62 3 62 1 63 2 62 5 64 6 46 2 36 7 45	7 6 6 6 6 6 6 6 4 3 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	3 7 6 6 5 6 6 6 7 6 8 4 9 4	1 6: 4 5: 4 5: 5 4 5: 4 5: 4 5: 5 4 5: 9 5: 9 4 5:	5 5 6 7 8 3 8	14 15 15 3 15 3 16 3 17 3 31 3 27 1 29 3	3 3 12 2 13 2 14 2 18 1 122 1	5 4 3 6 7 5 3 0
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Table 6-3c

Dewpoint Temperatures for Various Locations (Ref 38)

MEAN DEWPOINT TEMPERATURE (°F) - Continued

STATE AND STATION	YRS	JAN	FEO	MAR	APR	WAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
WILES CITY	19	10	15	20	29	39	47	- 51	48	39	32	23	15	31
MISSOULA (EBR. GRAND ISLAND	20 16	15	21 19	23 23	29 34	37	43 57	45	43 60	39 49	34	26 25	20 · 18	31
IEBR. GRAND ISLAND LINCOLN	8	16	21	28	37	46	60	63	62	51	41	28	20	3
NORFOLK	8	îi	18	23	34	44	58	62	61	49	38	24	16	3
NORTH PLATTE	20	13	18	22	32	44	55	59	58	48	36	24	17	30
ABANO	20	-14	19	26	37	48	60	64	63	54	43	29	20	4
SCOTTSBLUFF	16	13	17	19	28	40	49	54	53	43	32	21	17	3:
VALENTINE NEV. ELKO	10	13	15	22 22	31 26	39 32	51 35	56 36	34	43	34 25	22	16	3:
ELY	20	12	18	19	24	26	29	33	34	27	24	19	16	2
LAS VEGAS	20	21	22	20	24	26	28	39	41	33	29	25	23	2
RENO	20	20	24	23	26	32	37	40	38	35	31	25	22	
WINNEWUCCA	18	20	23	23	26	31	34	34	33	30	28	24	22	
N. H. CONCORD	20	14	14	22	32	43	53	59	58	51	39	30		
NT. WASHINGTON N. J. ATLANTIC CITY	10 18	4 27	5 26	30	20	29 50	41 60	45	45	36	28	17	28	2
NEWARK	20	23	23	27	37	47	57	62	62	56	1 46	34		
TRENTON	10	25	23	29	38	50	59	64	64	56	48	35		
R. WEX. ALBUQUERQUE	20	19	19	19	23	29	35	49	50	42	33	23		
CLAYTON	10	18	20	22	31	42	50	54	57	47	35	24		
ROSWELL .	17	20	22	22	28	37	48	56	55	48	39	26		
N. T. ALBANY BINGEANTON	20 15	16	16	24	34	44	55	60 58	59 58	53	42	32		
BUFFALO	20	19	19	25	35	45	55	59		51	1 3	33		
CANTON	5	16	14		30	43	53	57	57	50	42			
NEW TORK	15	22	23		38	47	57	62		56	46			
OSVEGO	7	20	16		33	42		60			44			3
ROCHESTER	20	19	19		35	45	55	59			43			
STRACUSE	20	18	18		35	45		59			42			
N. C. ASHEVILLE	10	30						65			47	32		45
CAPE RATTERAS CHARLOTTE	20	3	20 B - 227 P					67	10.00	1 CONS.	50	39		
GREENSBORO	20	29	1 2 4					67			48	37		
RALEIGE	20	3:		1.1				68	1 202		50	38		
VILWINGTON	16	39						71	-	and it is not only in succession.	56	46	37	54
WINSTON SALEK	19	29	2	9 32	42	54	59	66	68	59	51	36	28	46
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WILLISTON	16			7 17					CH 1717	St. 10003-11	32			
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BURNS	1 15		_											
EUGENE	20										43			1
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	20													
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SALEN	1 17			8 38										
PA. ALLENTOWN	18			2 27										
ERIE	13	2		1 27				60	5 60					4
HARRISBURG	20		1 2	1 26	3	7 4	8 58	6:	2 6:				23	4
PHILADELPHIA	16													
PITTSBURGH	20			2 27										
READING	10													
SCRANTON	20													
WILLIAMSPORT	1 13			9 25										
R.I. BLOCK ISLAND	1 10												9 30	
PROVIDENCE	20		0 1	9 2:	5 3	4 4	5 5	6 6:	2 6	1 54	1 4	(3	(2:	3 4

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Table 6-3d Dewpoint Temperatures for Various Locations (Ref 38)

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CREENVILLE 17 30 50 50 51 16 60 55 63 67 65 50 36 32 37 31 DML TURDY 20 6 12 21 32 43 56 60 36 37 31 SIDUX TALLS 20 12 15 20 28 35 50 53 30 33 31 22 13 SIDUX TALLS 13 30 34 42 54 62 65 58 47 37 23 12 CENTTAMOOCA 20 32 32 36 44 55 63 66 66 66 59 49 38 33 CENTTMOOCA 20 32 33 37 47 57 65 68 68 68 66 65 56 43 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33 33									1 (197) 100	69				1 35	5
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AUSTIN 20 36 42 45 55 64 68 69 68 65 56 46 41 BROWNSY ILLE 20 53 55 65 70 73 74 74 71 64 55 50 DALLAS 20 34 37 41 52 62 67 66 65 63 53 42 36 DEL <rio< td=""> 14 38 40 42 51 59 66 66 65 63 53 41 35 FORT WORTH 20 32 36 39 51 61 67 77 74 71 64 54 50 64 68 67 60 50 14 15 56 69 68 68 67 60 50 14 14 15 56 62 62 61 51 17 71 66 57 53</rio<>	요즘 이 방법에서 전자가 있는 것을 가지 않는 것이 좋아 집에 집에 많이 했다.			32		45	56	62	63	61	58	50	37	31	46
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FORT WORTH20333639316166676661534135GALVESTON18475054626973757471645450HOUSTOR2019434651576569686867605044LUBBOCK20252627374957616055453124HIDLAND10252929374958606865644330PALESTINE1040424555646464655664647330SAN ANTONIO20394242555646866655666641174VICORIA17464952596772727169615147VACO2037404555646866655664645858493630VTAHMILFORD71619152221195334465864646458841420222219SALTLAKE CITY202023263136404445383428						_		_							5:
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SAN ANTONIO 20 39 42 45 55 64 68 68 67 65 56 46 41 VICTORIA 17 46 49 52 59 67 72 71 69 61 51 47 WACO 20 37 40 43 54 63 68 69 67 63 55 44 38 WICHITA FALLS 20 28 35 34 46 58 64 64 63 58 49 36 30 SALT LAKE CITY 20 20 22 22 13 36 40 44 45 38 34 28 24 VT. BURLINGTON 20 12 12 20 32 45 56 64 63 65 74 53 38 29 ROANORE 17 26 26 29 39 52								0.772		1.				47	61
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WICHITA FALLS20283534465864646358593630SALT LAKE CITY2020202226313640444538342824VT.BURLINGTON20121220324354595851403017VA.LYNCHBURG10292732425361666558473427NORFOLK20323232645563676760493829ROANOKE17262629395260646357453325CAPE HENRY8383539455865706964574436NORTH BEAD7343940424751545553483140OLYUPIA17333635384348525351474037SEATTLE AP6333635384348525351474037SEATTLE AP6333635394348525351474037SEATTLE AP6333635384348525351<															60
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MEAN DEWPOINT TEMPERATURE (°F) - Continued

			Insulation Thickness for Pipe_Sizes ²			
Piping System Types	Fluid Temperature <u>Range</u>	Runouts ³	l in. and less	1.25-2 in.		
Tiping byseem types	(°F)	(in.)	(in.)	(in.)		
Heating systems - steam and hot water						
Low pressure/temperature	201-250	1.0	1.5	1.5		
Low temperature	120-200	0.5	1.0	1.0		
Steam condensate (for						
feed water)	Any	1.0	1.0	1.5		
Cooling systems - chilled						
water, refrigerant						
or brine	40-55	0.5	0.5	0.75		
	Below 40	1.0	1.0	1.5		

Table 6-4 MINIMUM PIPE INSULATION¹

1. See 6.3.2.2.1.

Pipe sizes are nominal dimensions. For piping larger than 1 in. diameter and exposed to outdoor ambient temperatures, increase thickness by 0.5 in.
 Runouts to individual thermal units (not exceeding 12 ft in length).

Notes: Insulation thicknesses in Table 6-4 are based on insulation having thermal resistivity in the range 4.0 to 4.6 $F \cdot ft^2 \cdot h/(Btu \cdot in.)$ on a flat surface at a mean temperature of 75°F. Minimum insulation thickness shall be increased for materials having R-values less than 4.0 $F \cdot ft^2 \cdot h/(Btu \cdot in.)$ or may be reduced for materials having R-values greater than 4.6 $F \cdot ft^2 \cdot h/(Btu \cdot in.)$

6.3.2 Hydronic Distribution Systems

6.3.2.1 Sizing and Design. All piping shall be sized and designed in accordance with recognized engineering standards such as the Hydronic Institute's publication I-B-R Advanced Installation Guide for Hydronic Heating Systems No. 250 (Ref 39), or ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3).

6.3.2.2 Insulation. All piping installed to serve buildings and within buildings shall be thermally insulated in accordance with Table 6-4 (for service water heating systems, see Section 7).

(a) For materials with thermal resistivity greater than 4.6 $F \cdot ft^2 \cdot h/(Btu \cdot in.)$, the minimum insulation thickness may be reduced as follows:

New Minimum Thickness = <u>Actual R-value per in.</u>

(b) For materials with thermal resistivity less than 4.0 $F \cdot ft^2 \cdot h/(Btu \cdot in.)$, the minimum insulation thickness shall be increased as follows:

New Minimum Thickness = <u>Actual R-value per in.</u>

6.3.2.2.1 Pipe insulation is not required in any of the following cases:

(a) piping is within the conditioned space

(b) piping within HVAC equipment

(c) piping contains fluid at temperatures between 55°F and 120°F

(d) piping is within basements or unvented crawl spaces (plenums) having insulated walls.

6.3.2.2.2 The required minimum thicknesses do not consider condensation. Additional insulation or vapor retarders or both, shall be required to prevent condensation during cooling conditions.

6.3.3 Ventilation. For the purposes of this standard, ventilation requirements consist of three components: outdoor air, combustion air and exhaust air.

6.3.3.1 Outdoor Air. If the design infiltration calculations based on Item 1 or 2 from Table 6-1 indicate that the summer infiltration rate is less than 0.35 air changes per hour (ACH), mechanical ventilation shall be provided. When mechanical ventilation is indicated, a minimum of 50 cfm of outdoor air shall be provided. See ASHRAE Standard 62-1989 (Ref 16) or local regulations for indoor air quality or other requirements.

Mechanical ventilation for any residence shall be calculated as follows:

Mechanical ventilation = $\frac{(0.35 - \text{Summer}) \times \text{Volume}}{60}$

where

Mechanical ventilation	= required mechanical ventilation rate to supplement
	summer infiltration, cfm
Volume	= volume of conditioned space, ft^3
Summer	= summer design infiltration rate, ACH

If the mechanical ventilation rate is less than 50 cfm, use 50 cfm. The mechanical ventilation requirement in this paragraph may be satisfied by the exhaust requirements of 6.3.3.3 and use of opened window(s).

6.3.3.2 Combustion Air. When fossil fuel heating equipment obtains combustion air from within the building envelope, and the winter design infiltration rate based on Item 1 or 2 from Table 6-1 is less than 0.5 cfm/(1000 Btu/h) of the equipment input rating, additional combustion air shall be provided to achieve 0.5 cfm/(1000 Btu/h).

6.3.3.3 Exhaust Air. Kitchens and baths shall be provided with intermittent mechanical exhaust to the outside atmosphere at the following rates:

Kitchens 100 cfm Baths 50 cfm

6.3.4 Electric Heating Systems. When individual electric resistance heating units are used, the structure shall be zoned and heaters installed in each zone in accordance with the heat loss of that zone (as calculated in 6.2.1). Where living and sleeping zones are separate, the minimum number of zones shall be two. If two or more heaters are installed in any one zone, they shall be controlled by one thermostat.

6.3.4.1 Baseboard Heaters. The maximum watt density shall be 250 W per linear ft of heater in order to decrease heat transfer to unconditioned space and to produce the optimum operating and comfort level. The exterior walls on which the recessed baseboard heaters are installed shall be insulated in accordance with Section 5 of this standard.

6.3.4.2 Wall Heaters. The exterior walls in which the recessed wall heaters are installed shall be insulated in accordance with Section 5.

6.3.4.3 Low Density Radiant Ceiling System. These systems shall be installed within the ceiling assemblies only (insulated to the outside in accordance with Section 5) and shall be controlled by a thermostat located on an interior wall. Ceiling cable installations shall have heat conducting plaster applied over the cable prior to the finish coat or bottom layer of gypsum board to conduct heat to the conditioned space.

6.3.4.4 Radiant Floor Systems. Structures with cable in the concrete floor shall have enough concrete below the cable to support the floor (minimum of 4 in.). A vapor retarder shall be installed beneath the concrete.

6.3.4.5 Bath Ceiling Units. Bath ceiling units providing any combination of heat, light or ventilation shall be provided with controls permitting separate operation of each function and shall be insulated to the outside in accordance with Section 5 if mounted in an exterior wall or ceiling.

6.3.4.6 Central Electric Furnace. Central electric furnaces shall be installed within the conditioned space unless they are specifically designed for use outside the conditioned space. Electric furnaces greater than 6 kW shall be divided into at least two stages and controlled as specified in 6.5.1.

6.3.4.7 Thermal Storage Units. Central units shall be installed within the conditioned space. Thermal performance shall comply with ASHRAE Standard 94.2-1989 (Ref 40). Unit capacity and sizing for the structure shall conform to the requirements of the utility supplying power to the structure. The installation of room thermal storage units shall be based on a zoned concept, and sizing shall conform to the requirements of the utility supplying power to the structure.

6.3.5 Fireplaces. To conserve energy, fireplaces shall be equipped with a tight-fitting damper, firebox doors and an outside combustion air source within the firebox.

6.4 Equipment

6.4.1 Performance Data for HVAC Equipment and System Components

6.4.1.1 Rated Combinations. Suppliers of HVAC system equipment and system components shall furnish upon request by prospective purchasers, system designers or contractors the input(s) and output(s) of all such HVAC products. These shall be based on equipment or components in new condition and shall cover full load and partial load, as required, to enable determination of their compliance with this standard. Manufacturers' recommended maintenance instructions shall be furnished with the equipment. The manufacturer of electric resistance heating equipment shall

furnish upon request by prospective purchasers, designers or contractors full load energy input over the range of voltages at which the equipment is intended to operate.

6.4.1.2 Non-Rated Combinations. Where elements such as indoor or outdoor coil combinations not rated by the manufacturer are used as part of the heating or cooling system, or both, it shall be the function of the system designer to determine compliance with these requirements using data provided by the component suppliers.

6.4.1.3 Cooling Equipment Selection Criteria. Cooling equipment selections shall be based on information which provides, or which can be extrapolated from the manufacturer's performance data, sensible and latent cooling capacity for the following conditions:

(a) air source condensing unit operating at the summer design temperature, or water-cooled condensing unit operating at the design water temperature

(b) indoor fan operating at the design air flow rate

(c) indoor coil operating at the entering air condition (dry- and wet-bulb temperatures) which corresponds to the cooling design condition. If mechanical ventilation is not used, the entering condition corresponds to the indoor design values which were used for the cooling load calculation. If mechanical ventilation is used, the entering dry- and wet-bulb temperatures must be adjusted for the effect of ventilation air (usually a percent of outdoor air).

6.4.1.4 Heat Pump Heating Selection Criteria. Manufacturer shall provide as a minimum, inputs and outputs at 17°F and 47°F outdoor air temperature for air source units and inputs and outputs at entering water temperatures of 70°F and 50°F for water source units.

6.4.2 Heating and Cooling Equipment Capacity

6.4.2.1 Heating Equipment

6.4.2.1.1 Fossil Fuel Heating Equipment. The capacity of the heating equipment with natural draft atmospheric burners without stack (vent) dampers shall not be more than 170% of the design load.

6.4.2.1.2 Electric Resistance. In the case of electric furnaces, fan-coil units and duct heaters, the equipment shall be sized within 6 kW of the design requirements calculated according to the procedure selected in 6.2.1. The total installed wattage of other types of electric resistance heating equipment shall not exceed 110% of the design requirements as calculated according to the procedure selected in 6.2.1.

6.4.2.1.3 Heating-Only Heat Pumps. Heat pumps used for "heating only" shall be sized so that the refrigeration cycle provides 80 to 100% of the requirements calculated according to the procedure selected in 6.2.1, or the closest available size. Capacities at the design heating requirement may be determined by interpolation or extrapolation of manufacturers' performance data if these data are not available for design temperatures. When the installed refrigeration cycle heating capacity is less than 100% of the calculated requirement, the auxiliary capacity plus refrigeration cycle capacity shall not exceed 120% of the design heating requirement calculated according to the procedure selected in 6.2.1. The total of the installed emergency heat and auxiliary heat should not exceed 120% of the design heating requirement as calculated according to 6.2.1.

6.4.2.2 Cooling Equipment

6.4.2.2.1 Cooling-Only Equipment. "Cooling only" equipment shall be selected so that its sensible capacity is not less than calculated total sensible load but not more than 125% of the design sensible load calculated according to the procedure selected in 6.2.1, or the closest available size provided by the manufacturer's product lines. In addition, the corresponding latent capacity of the equipment shall not be less than the calculated latent load.

6.4.2.2.2 Multi-Zone Cooling Equipment. Multi-zone cooling equipment sizing shall require a separate cooling load calculation for each zone. This calculation shall include an allowance for the peak zone (sensible) load and an estimate of the zone latent load. When simultaneous "whole house" cooling is not required, multi-zone systems can be selected to provide a total cooling capacity that is less than the total calculated load for the "entire" house. Refer to ACCA Residential Load Calculation, Manual J (Ref 27) for more information on calculating residential zone loads and sizing multi-zone equipment.

6.4.2.3 Heat Pump. Heat pump sizing shall be based on the cooling requirements as calculated according to the method selected in 6.2.1 unless the refrigeration cycle heating capacity is less than the heating requirements of the conditioned space at the design conditions. In this case, the refrigeration cycle heating capacity shall be sized to provide the lowest possible balance point on heating without exceeding 125% of the cooling load at design conditions. Capacity at the design heating temperature may be determined by interpolation or extrapolation of manufacturers' performance data if these data are not available for design temperatures. The auxiliary capacity plus refrigeration cycle heating capacity shall not exceed 120% of the design heating requirement as calculated according to 6.2.1. The total of the installed auxiliary electrical resistance heat, including manually controlled emergency heat if any, should not exceed 120% of the design heating requirement as calculated according to 6.2.1.

6.4.3 Heating and Cooling Equipment Efficiencies

6.4.3.1 Furnaces and Boilers. All gas- and oil-fired residential furnaces and boilers shall have minimum efficiencies as specified and defined in Tables 6-5 and 6-6.

6.4.3.2 Electric Heat

6.4.3.2.1 Installation of Electric Heat Pumps or Off-Peak Thermal Storage Heating. When electric central warm air heating is to be installed, an electric heat pump or an off-peak electric heating system with thermal storage shall be used, except as noted in 6.4.3.2.3.

6.4.3.2.2 Heat Pumps. Heat pumps whose energy input is entirely electric shall have a minimum performance at the condition specified and as defined in Tables 6-7, 6-8 and 6-9. These requirements apply to unitary (central) heat pumps (air or ground water source) in the heating mode, and to packaged terminal heat pumps or built-in room type heat pumps in the heating mode.

6.4.3.2.3 Resistance Heat. Electric resistance heat is in compliance with the efficiency standards of this section if it does not rely on ducts located outside the conditioned space and if the system has at least two separately controlled thermal zones.

Exception: Living units with one room need not have two thermal zones.

6.4.3.3 Air Conditioners, Electrically Driven. HVAC system equipment whose energy input in the cooling mode is entirely electric shall have a minimum performance at conditions specified as defined in Tables 6-7 through 6-11. These requirements apply to unitary cooling equipment (air-cooled and water-cooled), packaged terminal air conditioners, built-in room air conditioners and the cooling mode of heat pumps as described in 6.4.3.

6.4.4 Ventilation Equipment. Exhaust fans, heat recovery ventilators, and other ventilating equipment utilized to meet the requirements in 6.3.3.3 shall be rated and certified for airflow performance according to accepted standards such as HVI (Home Ventilation Institute, Ref 55) product certification procedures.

6.4.4.1 Heat Recovery Ventilators. Consideration should be given to use of heat recovery in ventilation systems where the cost of energy recovered exceeds the cost of energy expended in achieving recovery. The recovered energy within the process may be used for temperature and humidity control.

6.4.4.2 Controls. Each mechanical ventilator (supply or exhaust, or both) shall be provided with a readily accessible switch or device for shut-off or volume reduction and shut-off when ventilation is not required.

6.4.4.3 Dampers. Automatic or gravity dampers that close when the system is not operating shall be provided for outdoor air intakes and exhaust.

6.4.4.4 Recirculating devices. Recirculating devices without means to exhaust or bring in air from the outside and not having means to remove contaminants or moisture or both, shall not be relied upon to satisfy the requirements of 6.3.3.3.

Table 6-5

MINIMUM REQUIREMENTS OF WARM AIR HEATING EQUIPMENT

	Category/ Reference	Energy	Minimum Performa	nce
Product Type	Standard	Descriptor	Current	<u>1992</u> 1
Warm air furnaces and warm air furnaces	Gas-fired < 225,000 Btu/h DOE Test Procedure(Ref 4) ANSI/ASHRAE 103-88 (Ref 41	-	66% AFUE ²	78% AFUE ²
combined with an air conditioner 0i < DO	Oil-fired < 225,000 Btu/h DOE Test Procedure(Ref 4) ANSI/ASHRAE 103-88 (Ref 41	5	69% AFUE ²	78% AFUE ²

- 1. Year in which equipment is manufactured.
- 2. National Appliance Energy Conservation Act of 1987, Public Law 100-12, 42 U.S.C. 6295 (Ref 10) in which AFUE is defined as:

The term "annual fuel utilization efficiency" (AFUE) means the efficiency descriptor for furnaces and boilers, determined using the test procedures found in 10 CFR 430 (DOE Test Procedures, Ref 4) and based on the assumption that all:

(a) Weatherized warm air furnaces or boilers are located out-of-doors

(b) Warm air furnaces which are not weatherized are located indoors and all combustion and ventilation air is admitted through grills or ducts from the outdoors and does not communicate with air in the conditioned space

(c) Boilers which are not weatherized are located within the heated space.

Product Type	Category/ Reference Standard	Energy Descriptor	Minimum <u>Performa</u> <u>Current</u>	nce 1992 ¹
Boilers	Gas-fired < 300,000 Btu/h DOE Test Procedure(Ref 4) ANSI/ASHRAE 103-88 (Ref 41	-	66% AFUE ²	80% ³ AFUE ²
	Oil-fired < 300,000 Btu/h DOE Test Procedure(Ref 4) ANSI/ASHRAE 103-88 (Ref 41		69% AFUE ²	80% AFUE ²

Table 6-6 MINIMUM REQUIREMENTS OF HYDRONIC HEATING EQUIPMENT

- 1. Year in which equipment is manufactured.
- 2. National Appliance Energy Conservation Act of 1987, Public Law 100-12, 42 U.S.C. 6295 (Ref 10) in which AFUE is defined as:

The term "annual fuel utilization efficiency" (AFUE) means the efficiency descriptor for furnaces and boilers, determined using the test procedures found in 10 CFR 430 (DOE Test Procedures, Ref 4) and based on the assumption that all:

(a) Weatherized warm air furnaces or boilers are located out-of-doors

(b) Warm air furnaces which are not weatherized are located indoors and all combustion and ventilation air is admitted through grills or ducts from the outdoors and does not communicate with air in the conditioned space

(c) Boilers which are not weatherized are located within the heated space.

3. This value is good except for gas-fired steam boilers for which the minimum AFUE is 75%.

Table 6-7 MINIMUM COOLING AND HEATING EFFICIENCY PERFORMANCE OF UNITARY AIR SOURCE HEAT PUMPS

			Mi	lnimum Effic	iency Rating	
Oper	cating Mode	Efficiency <u>Descriptor</u>	<u>Split S</u> Current	<u>Systems</u> <u>1992¹</u>	<u>Package</u> <u>Current</u>	<u>Systems</u> 1993 ¹
C O L I G	Standard rating condition	SEER	8.5 SEER	10.0 ² SEER	8.5 SEER	9.7 ² SEER
H E A T I N G	Standard rating condition	HSPF ³	6.4 HSPF	6.8 ² HSPF	6.4 HSPF	6.6 ² HSPF

Performance for single phase electrically powered equipment with capacity less than 65,000 Btu/h when rated in accordance with ARI Standard 240-81 (Ref 8).

1. Year in which equipment is manufactured.

2. Minimum efficiency ratings as prescribed in the National Appliance Energy Conservation Act of 1987, Public Law 100-12, 42 U.S.C. 6295 (Ref 10).

3. Based on Region 4 at the standardized design heating requirement found in Section 6 of Appendix M of the Code of Federal Regulations (10 CFR 430, Subpart B, Ref 4), nearest the capacity measured in the 47° F test.

Table 6-8

MINIMUM COOLING AND HEATING EFFICIENCY PERFORMANCE OF GROUND WATER SOURCE HEAT PUMPS

			Minir	D1100
	Operating Mode	Efficiency <u>Descriptor</u>	<u>Efficiency</u> <u>Current</u>	
C 0 0	70°F entering water	EER	10.0	11.0
L I N G	50°F entering water	EER	10.5	11.5
H E A	70°F entering water	СОР	3.2	3.4
T I N G	50°F entering water	СОР	2.8	3.0

Performance for single phase electrically powered equipment with capacity less than 65,000 Btu/h when rated in accordance with ARI Standard 325-85 (Ref 42).

1. Year in which equipment is manufactured.

Table 6-9

MINIMUM COOLING AND HEATING EFFICIENCY PERFORMANCE OF PACKAGE TERMINAL AIR CONDITIONERS

AND

PACKAGE TERMINAL HEAT PUMPS

		DCC: I		nimum
	Operating Mode	Efficiency Descriptor	<u><u> </u></u>	ncy Rating 1992 ¹
	operacing mode	Descriptor		
С				
0	95°F outdoor ambient	EER	See A	See B
0			below	below
L				
I				
N	82°F outdoor ambient ²	EER	See C	See D
G		×	below	below
H ³				
E Ì			1	
A				
T	47°F outdoor ambient	COP	See E	See F
I			below	below
N				
G				

A: $EER_A = 10 - [0.19 \text{ x capacity (in Btu/h)/1000}]$ B: $EER_B = 10 - [0.16 \text{ x capacity (in Btu/h)/1000}]$ C: $EER_C = 12 - [0.23 \text{ x capacity (in Btu/h)/1000}]$ D: $EER_D = 12.2 - [0.20 \text{ x capacity (in Btu/h)/1000}]$ E: $COP_E = 1.3 + (0.16 \text{ x EER}_A)$ F: $COP_F = 1.3 + (0.16 \text{ x EER}_B)$

Performance for single phase electrically powered equipment rated per ARI Standard 310-87 (Ref 5) or ARI Standard 380-87 (Ref 6). If the unit's capacity is less than 7,000 Btu/h, use 7,000 Btu/h in the calculations. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculations.

1. Year in which equipment is manufactured.

2. For equipment in which capacity reduction is provided and allowed by the controls.

3. For heat pumps rated in the heating mode per ARI Standard 380-87 (Ref 6).

Table 6-10

MINIMUM COOLING EFFICIENCY PERFORMANCE OF

UNITARY AIR CONDITIONERS

				Minimum Efficiency Rating			
Heat Rejection	Operating Mode	Efficiency Descriptor	<u>Split S</u> Current		<u>Package</u> Current	ystems 1993 ¹	
AIR COOLED	Standard rating conditions	SEER	8.5	10.0 ²	8.5	9.7 ²	
WATER COOLED	Cooling 85°F entering water	EER	9.0	9.3			
	Cooling 75°F entering water	IPLV	8.0	8.3	-		
EVAPORATIVELY COOLED	Cooling 95°F outdoor ambient	EER	9.0	9.3	-	-	
	Cooling 80°F outdoor ambient	IPLV	8.0	8.5	-		

Performance for single phase electrically powered equipment with capacity less than 65,000 Btu/h when rated in accordance with ARI Standard 210-81 (Ref 43).

1. Year in which equipment is manufactured.

2. Minimum efficiency ratings as prescribed in the National Appliance Energy Conservation Act of 1987, Public Law 100-12, 42 U.S.C. 6295 (Ref 10).

Table 6-11

MINIMUM COOLING EFFICIENCY PERFORMANCE OF ROOM AIR CONDITIONERS, BUILT-IN

Cooling Operating	Efficiency		Minimum Efficiency Rating	
Mode	Descriptor	Current	1990 ¹	
			Product Class	EER ²
			Without reverse cycle and with louvered sides:	
			Less than 6,000 Btu	8.0
< 9000 Btu/h	EER	8.7	6,000 to 7,999 Btu	8.5
			8,000 to 13,999 Btu	
			14,000 to 19,999 Btu	8.8
			20,000 and more Btu	8.2
			Without reverse cycle and without louvered sides:	
			Less than 6,000 Btu	8.0
			6,000 to 7,999 Btu	
			8,000 to 13,999 Btu	
			14,000 to 19,999 Btu	
			20,000 and more Btu	8.2
> 9000 Btu/h	EER	7.8	STURDET - THE THE DESCRIPTION DESCRIPTION OF THE STURDED	
· ·			With reverse cycle and	
			with louvered sides	8.5
			With reverse cycle and	
			without louvered sides	8.0

Performance for single phase electrically powered equipment with capacity less than 65,000 Btu/h when rated in accordance with AHAM Standard RAC-1-1982, (Ref 7).

1. Year in which equipment is manufactured.

2. Minimum efficiency ratings as prescribed in the National Appliance Energy Conservation Act of 1987, Public Law 100-12, 42 U.S.C. 6295 (Ref 10).

6.5 Controls

6.5.1 Temperature Control. Each system or each zone within a system shall be provided with at least one thermostat for the regulation of temperature. Each thermostat shall be capable of being set by adjustment or selection of sensors as follows:

- (a) Where used to control heating, cooling, or both heating and cooling, it shall be capable of being set from 55°F to 85°F and shall be capable of operating the system heating and cooling. The thermostat or control system, or both, shall have an adjustable deadband of 10°F or more, when automatic changeover is provided.
- (b) Where wall mounted temperature controls are used, they shall be mounted on an inside wall.

(c) Where used to control an electric furnace:

- A furnace 12 kW or less and one stage shall be designed with the temperature control as in (a) above.
- 2. A furnace greater than 12 kW shall be designed with two or more controllable stages and shall be controlled by an outdoor thermostat having a range selection of -22°F to 55°F or by the second stage of a two stage indoor thermostat.

6.5.1.1 Setup, Setback and On or Off Control

6.5.1.1.1 The thermostat, or an alternate means such as a switch or clock, shall provide a readily accessible manual or automatic means for reducing the energy required for heating and cooling during periods of non-use or reduced need such as but not limited to unoccupied periods and sleeping hours.

6.5.1.1.2 Lowering thermostat set point to reduce energy consumption of heating systems shall not cause energy to be expended to reach the reduced setting. Conversely, raising the thermostat set point to reduce energy consumption of cooling systems shall not cause energy to be expended to reach the raised setting (i.e., energizing electric heaters).

6.5.1.1.3 Setbacks for heat pump heating systems shall not be considered unless the thermostat installed is specifically designed for best recovery control (i.e., controls the resistance elements independently of the refrigeration system) and uses a control strategy that minimizes the use of auxiliary heat for recovery.

6.5.1.2 Zoned Central System Control. Where zoned cooling units are used in conjunction with zoned heating, controls shall be provided to prevent simultaneous operation in the same zone.

6.5.2 Ventilation Control. Each mechanical ventilation system (supply or exhaust or both) shall be equipped with a readily accessible switch or other means for shut-off. Manual or automatic dampers installed for the purpose of isolating outside air intakes and exhausts from the air distribution system shall be designed for tight shut-off.

6.5.3 Humidity Control

6.5.3.1 Heating. If a structure has equipment with a means for adding moisture to maintain specific selected relative humidities in spaces or zones, a humidistat shall be provided. This device shall be capable of being set to prevent new energy from being used to produce relative humidity within the space above 30%.

6.5.3.2 Cooling. When a system for reducing humidity is provided, it shall be equipped with controls that prevent new energy from being used to produce a relative humidity within the space below 50%. This control shall be capable of maintaining a relative humidity of 50% to 60% during periods of human occupancy, and no lower than 60% during unoccupied periods.

6.5.4 Heat Pump Auxiliary Heater

6.5.4.1 Electric Resistance. The heat pump shall be installed with a control to prevent electric auxiliary heater operation when the outdoor temperature is above the design balance point (e.g., an outdoor air temperature sensing thermostat). The design balance point is that outdoor temperature at which refrigeration cycle heating capacity is equal to the building load. However, electric auxiliary heater operation is permitted during defrost.

6.5.4.2 Fossil Fuel. For units designed for combined application where the auxiliary heat is derived from any combustion heating or stored-energy heating, follow the manufacturer's instructions regarding the control system.

7 Service Water Heating

7.1 Scope

7.1.1 Energy Savings. The purpose of this section is to provide requirements for design and equipment selection that will produce energy savings when applied to service water heating. For a more complete systems design guide, the reader should consult Chapter 54, "Service Water Heating" from the ASHRAE Handbook, 1987 HVAC Systems and Applications (Ref 44).

7.1.2 Residential-Type Service Water Heating Equipment. This section shall address residential-type service water heating equipment only. Residential-type service water heating equipment subject to this section shall be clearly identified on the basis of physical or performance parameters or both (i.e., upper limits on storage capacity, input rating, etc.).

7.1.3 Central Water Heating Equipment. Service water heating equipment (i.e., central systems) that do not fall under the requirements of residential-type service water heating equipment as defined in this section but which is to be installed in buildings subject to this standard shall meet all applicable requirements for service water heating equipment found in ASHRAE/IES Standard 90.1-1989 (Ref 26).

7.2 Water Heaters, Storage Tanks And Piping

7.2.1 Performance Efficiency. Performance efficiencies of all water heaters and unfired hot water heater storage tanks shall meet the minimum performance requirements listed in Table 7-1 when tested with the stated test procedure.

7.2.2 Insulation

7.2.2.1 Circulating systems. Hot water piping shall be insulated with insulation of 1 in. minimum thickness with a thermal conductivity no greater than 0.30 Btu-in./($h \cdot ft^2 \cdot {}^{\circ}F$).

Exception: Piping insulation is not required when the heat loss of the piping, without insulation, does not cause a net increase in the annual energy requirements of the building.

7.2.2.2 Non-circulating systems. The first 8 ft of hot water piping from the storage system shall be insulated in accordance with 7.2.2.1.

7.3 Pump Operation. Circulating hot water systems shall be arranged so that the circulating pump(s) can be conveniently turned off (automatically or manually) when the hot water system is not in operation.

7.4 Conservation of Water Heating Energy

7.4.1 Shower Discharge Rate. Showers shall limit the maximum water discharge to 3.0 gal./min when tested in accordance with ANSI All2.18.1M-1979 (Ref 45). Shower heads should not use flow restricting inserts to meet this requirement. When flow restricting inserts are used as a convenient part of a shower head, they shall be mechanically retained at the point of manufacture. Mechanically retained means a pushing or pulling force to remove the flow restricting insert of 8 pounds or more.

7.4.2 Point of use Water Heaters. Point of use water heaters should be considered where their use will reduce energy consumption.

7.5 Swimming Pools, Hot Tubs and Spas

7.5.1 Pool Heaters

7.5.1.1 Pool Heater Performance Requirements. All water heaters for swimming pools, hot tubs, and spas shall meet the minimum performance requirements found in Table 7-1.

7.5.1.2 Solar Heating Systems. Active solar heating systems shall be used to supply a portion of the pool heating requirements when conditions permit their cost effective installation.

7.5.2 Pool Covers. Heated pools shall be equipped with a pool cover.

Exception: Outdoor pools deriving over 70% of the energy for heating (computed over an operating season) from non-depletable sources or from recovery of energy that would otherwise be wasted, need not use pool covers.

7.5.3 Time Switch. Time switches shall be installed so that the pump can be set to run in the off-peak electric demand period and can be set for the minimum time necessary to maintain the water in a clear and sanitary condition in keeping with applicable health standards.

Exception: Pumps required to operate solar pool heating systems need not use time switches.

7.6 Utilization of Waste Water Heat or Solar Energy

7.6.1 Solar Systems Testing. Where applicable, solar systems shall be tested in accordance with ASHRAE Standard 95-1987, Methods of Testing to Determine the Thermal Performance of Solar Domestic Water Heating Systems (Ref 46).

7.6.2 Waste Water Heat or Solar Energy. Consideration should be given to the use of condenser heat, waste energy, or solar energy to supplement hot water requirements.

7.6.3 Heat Pump Water Heaters. An economic evaluation should be made on the potential benefit of using an electric heat pump water heater instead of an electric resistance water heater. The analysis should compare the extra cost of the heat pump unit with the benefits in reduced energy costs (less increased maintenance costs) over the estimated service life of the heat pump water heater.

Exception: For electric resistance water heaters used in conjunction with site solar energy sources or off peak heating with thermal storage, an economic evaluation need not be performed.

7.6.4 Heat Recovery. Storage should be used to optimize heat recovery when the flow of heat to be recovered is out of phase with the demand for heated water.

7.7 Vent Dampers. Installation of an automatic vent damper should be considered for all gas fueled water heaters that are installed in an area of the United States having 4,000 or more Heating Degree Days base 65°F (HDD65) and use indoor air for combustion or draft hood dilution. The vent damper shall be approved for installation on gas water heaters and shall be installed in accordance with local codes (Ref 47 and 48) and in accordance with the manufacturer's installation instructions and testing requirements.

7.8 Heat Traps. Water heaters not equipped with integral heat traps and having vertical pipe risers shall be installed with heat traps on both the inlet and outlets. The heat trap shall be installed directly, or as close as possible to, the outlet fittings (Ref 48).

Exception: Circulating systems need not employ heat traps.

Note: A heat trap may take the form of a 180 degree loop in the piping; an arrangement of pipe fittings, such as elbows, connected so that the inlet and outlet piping make vertically upward runs just before turning downward to connect to the water heater's inlet and outlet fittings; a commercially available heat trap; or any other type which effectively restricts the natural tendency of hot water to rise in the vertical pipe during periods of standby. When the water heater outlet is directly horizontal out of the tank or is piped with an elbow on the vertical outlet and then downward this piping arrangement itself is effectively a heat trap and a separate heat trap is not then required.

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Туре	Fuel	Storage Capacity (GAL)	Input Rating	Applicable Test Procedure	Minimum Performance Required ¹
Storage	Elec	≥20	≤12kW	DOE Test	EF
		≤120		Procedure (Ref 4)	≥0.95-0.0132V
	Gas	≥20	≤22kW	DOE Test	EF
Oil		≤100 ≤75,000 Btu/h		Procedure (Ref 4)	≥0.62-0.0019V
		DOE Test	EF		
			≤104,000 Btu/h	Procedure (Ref 4)	≥0.59-0.0019V
Instan- Gas taneous	Gas	Gas N/A		DOE Test	EF
			Btu/h	Procedure (Ref 4)	≥0.62
Swim-	Gas	 N/A	A11		E _t
ming Pools,	{	Inputs	Inputs	(Ref 49)	78%
Hot Tubs,	011		A11	-T	E _t
and Spas			Inputs	1986 ² (Ref 49)	78%
Unfired	A11	Any	N/A	$\Delta T = 90^{\circ} F$	HL
			(Stored water and exterior tank ambient temperature difference)	<6.5 Btu/h•ft ²	

Table 7-1, Standard Rating Conditions and Minimum Requirements of Water Heating Equipment

Terms Defined:

- EF: Energy Factor, overall heater efficiency by DOE Test Procedure (see below)
- $E_t\colon$ Thermal efficiency with 70°F temperature difference
- HL: Heat loss through tank surface area, Btu/h.ft²
- V: Rated storage volume, gallons
- DOE Test Procedure: Tested in accordance with Appendix E to Subpart B of 10 Code of Federal Regulations, Part 430 - Uniform Test Method for Measuring the Energy Consumption of Water Heaters (Ref 4). The Minimum Performance Requirements are based on the DOE Test Procedure listed in this note. Minimum Performance Requirements established by the National Energy Conservation Act of 1987, Public Law 100-12, 42 U.S.C. 6295 (Ref 10).
- (1) Revisions to DOE Test Procedure may supercede values listed.
- (2) Maximum design ambient temperature, 65°F.

8 Annual Energy Cost Method

8.1 Purpose

8.1.1 Compliance. This section provides a compliance path for a proposed design based on calculated Annual Energy Cost (AEC). The procedure consists of a comparison of the AEC of the proposed design with the AEC of a prescriptive design which meets the requirements of Sections 5, 6 and 7 and whose characteristics are defined in this section. If the AEC of the proposed design is less than or equal to the AEC of the prescriptive design, then the proposed design complies with the standard and need not comply with the specific requirements of Section 5, 6, and 7. The intent is to allow flexibility in the design process, while ensuring that the AEC of the proposed design is no more than is allowed under the prescriptive path.

This compliance path provides an opportunity to account for the benefits of innovative designs, materials, and equipment (such as active and passive solar heating and cooling, heat recovery, air-to-air heat exchangers, innovative foundation systems, advanced controls, high efficiency equipment, radiant barriers, thermal mass, operable shading and insulation, and thermal storage) when they cannot be evaluated adequately under the prescriptive procedures.

8.1.2 Standard Estimate of Annual Energy Cost. This section also provides a procedure for estimating the Annual Energy Cost for building designs under standard conditions. In addition to compliance calculations, this procedure is intended to be used by designers for estimating energy costs of proposed designs. These estimates are based on reasonable assumptions for average conditions and may be used by designers, owners, financiers, and others in evaluating and comparing building designs. This procedure is intended to predict the AEC under average conditions. However, the AEC of any specified building may differ due to variations in construction, occupancy, operation, maintenance, and weather. Energy use for unusual equipment that is not included in the procedure; for example swimming pools, hot tubs, saunas, engine block heaters, or well pumps; may also be a significant factor.

8.2 Scope

Annual Energy Cost compliance analysis is not required for designs that meet the prescriptive requirements of this standard.

Annual Energy Cost compliance is applicable to energy use for space conditioning only. Energy for other uses such as domestic hot water, cooking, lighting and appliances is included for total energy cost estimates, but is not a variable between the proposed design and prescriptive design for compliance in this standard. Capital costs, replacement costs, maintenance costs, financing charges, and other construction or equipment costs are not included. Although space conditioning, domestic hot water heating, and appliance energy costs are calculated together, no compliance tradeoffs are allowed between them.

8.3 General

8.3.1 Professional Judgement. Where specified, the modeling techniques and assumptions prescribed in this standard shall be used; however, in many areas the proper exercise of professional judgement is required. Two rules shall be used in meeting this requirement. First, the proposed design and prescriptive design shall both be analyzed using the same techniques and assumptions except where differences in conservation features require a different approach. Second, simplifying assumptions which may reduce the energy use of the proposed design in relation to the prescriptive design shall not be used.

8.3.2 Assumption of Full Conditioning. All conditioned floor space in all buildings shall be assumed to be fully conditioned to maintain the specified thermostat set points during the entire year. Typical quantities of domestic hot water shall also be assumed to be supplied to all buildings. If equipment to supply full heating, cooling and domestic hot water is not specified for the proposed design, equipment meeting the prescriptive requirements of this standard shall be assumed to operate for purposes of calculating the AEC.

8.4 Annual Energy Cost

8.4.1 Annual Energy Cost Definition. The AEC of a design shall be the total cost to supply energy for a single year during which the weather is typical of the long term average conditions at the site. Energy prices during the typical year shall be those in effect at the time calculations are done.

8.4.2 Annual Energy Cost Calculation. The AEC shall be the sum of the costs for each energy type consumed as calculated using Eq 8-1. The monthly energy costs for an energy type shall be calculated using Eq 8-2, 8-3, and 8-4. The current rate or price quoted by the usual supplier and available at the site for the proposed design's type and size shall be used. The same rate schedule shall be used for the prescriptive design and proposed design unless a different rate is applicable to the proposed design because of energy conservation features. Where applicable, demand charges, rate blocks, and time of use rates shall be taken into account and energy cost calculated accordingly. In buildings with multiple meters and multiple bills, the energy usage shall be apportioned to each meter if this would affect the AEC. The energy consumed by space heating and cooling electric auxiliaries shall be included in the AEC.

 $AEC = \sum(MEC_{E,j} + MEC_{G,j} + MEC_{O,j})$ (8-1) j=1

where

j = Month of the year $MEC_{E,j} = Monthly Energy Cost for Electric, dollars$ $MEC_{G,j} = Monthly Energy Cost for Gas, dollars$ $MEC_{0,j} = Monthly Energy Cost for Other fuels, dollars$

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The monthly energy cost for electricity is calculate	d using Eq 8-2.
$MEC_{E,j} = ((O_E + DHW_E) \times Days_j + SH_{E,j} + SC_{E,j})$	x Rate _{E,j} (8-2)
where	
$0_{\rm E}$ = Occupant electricity use from Eq 8-13,	kWh/day
DHW_E - Domestic hot water electricity use fro	m Eq 8-11,
kWh/day	
Days _j = Days in the jth month	
SH _{E,j} = Space heating electricity use, kWh/mo	
SC _{E,j} = Space cooling electricity use, kWh/mo	
Rate _{E,j} = Electric rate cost (Including block eff	Eects), dollars/kWh
The monthly energy cost for gas is calculated using	Eq 8-3.
$MEC_{G,j} = ((O_G + DHW_G) \times Days_j + SH_{G,j} + SC_{G,j}) \times R_{G,j}$	ate _{G,j} (8-3)
where	
0_{G} = Occupant gas use from Eq 8-14, Therms/d	lay
DHW_G = Domestic hot water gas use from Eq 8-12	2, Therms/day
SH _{G,j} = Space heating gas use, Therms/month	
SC _{G,j} = Space cooling gas use, Therms/month	
Rate _{G,j} = Gas rate costs (Including block effects	s), dollars/Therm
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The monthly energy cost for other fuels is calculate	ed using Eq 8-4.
$MEC_{0,j} = (DHW_0 \times Days_j + SH_{0,j} + SC_{0,j}) \times Rate_{0,j}$	(8-4)
where	

DHW₀ = Domestic hot water use of other fuels, Units/day SH_{0,j} = Space heating use of other fuels, Units/month SC_{0,j} = Space cooling use of other fuels, Units/month Rate_{0,j} = Other fuels rate costs (including block effects), dollars/Unit

8.5 The Proposed Design

The analysis of the proposed design shall take into account all qualities, details and characteristics of the design which significantly affect energy use and cost. These may include construction, geometry, orientation, exposure, materials, equipment and renewable energy sources. The characteristics and all significant energy conservation features shall be documented in the construction documents.

8.5.1 Annual Energy Cost of the Proposed Design. The AEC for the proposed design shall be one of the following:

(a) The AEC for the proposed design, calculated for its combination of design, orientation, site, and climate.

(b) The highest AEC for the proposed design simulated in each of the four cardinal orientations. Note that compliance by this method allows the proposed design to be built in any orientation.

8.5.2 Groups of Buildings. Averaging of groups of buildings shall not be allowed. Each building must comply on its own.

8.5.3 Buildings With Multiple Living Units. The AEC shall be calculated for the entire building if it has conditioned common spaces such as corridors, recreation rooms, or laundries, or has central mechanical systems serving more than one living unit. If the building has no conditioned common spaces and no common mechanical systems, the AEC may be calculated either for the whole building or unit-by-unit.

8.5.3.1 Unit-by-Unit Calculations. For unit-by-unit calculations an AEC is calculated separately for each proposed living unit plan according to one of the two approaches in 8.5.1. Top floor, mid floor, and bottom floor units shall be considered separate living unit plans. Walls and other surfaces which separate living units from other living units shall be assumed to have no heat transfer.

8.5.3.2 Whole building Calculations. For whole building calculations a single AEC shall be determined by one of the following methods:

(a) Calculate the AEC for the entire building as a single zone. Conditioned common spaces such as corridors and lobbies shall be included.

(b) If each living unit meets the requirements of 8.7.4.2 the AEC may be calculated for the entire building as two zones by aggregating all of the living spaces of all units into one zone and all of the sleeping spaces into another. Sleeping spaces shall include bedrooms and associated bathrooms, dressing rooms, closets, and hallways. All other conditioned spaces shall be considered living spaces. Common spaces such as corridors and lobbies, if conditioned, shall be treated as living spaces.

(c) Calculate the AEC for the entire building as the sum of the AECs of each living unit calculated separately. The AEC of conditioned common spaces shall be calculated and included in the building total AEC.

8.5.4 Shading. When credit for passive solar heating effects is being included in the analysis, the effect of the following types of shading shall be included in the analysis using an appropriate calculation method (see 8.7.5):

(a) Self shading - shading by its own walls, roof, balconies, trellises, awnings, and other features or devices considered a part of the proposed design.

(b) External shading - shading by existing, permanent, landscape features such as trees, mountains, and other buildings.

8.6 The Prescriptive Design

Calculations for the prescriptive design establish the AEC budget allowed for the proposed design. The geometry and orientation of the prescriptive design shall be as defined below. Envelope, HVAC, and domestic hot water systems shall meet the requirements of Sections 5, 6 and 7. Note that the prescriptive design is not intended to be a real physical structure and in many cases may be geometrically impossible.

8.6.1 Ducts. Ducts in the prescriptive design, if any, shall be assumed to be completely in conditioned spaces. Single family prescriptive designs shall comply with Part A of each prescriptive envelope requirement.

8.6.2 Floor Area. The conditioned floor area of the prescriptive design shall be equal to that of the proposed design.

8.6.3 Volume. The volume of the prescriptive design shall be equal to the volume of the proposed design.

8.6.4 Ceiling. The exposed ceiling area of the prescriptive design shall be equal to the exposed ceiling area of the proposed design. The exposed ceiling area of the prescriptive design shall be assumed to be a horizontal, unventilated, lightweight construction meeting the U-value requirements for ceilings with attics.

8.6.5 Walls. The total exterior wall area of the prescriptive design shall be equal to the total exterior wall area of the proposed design. The area in the prescriptive design of each type of wall defined in Section 5 (for example, abovegrade frame walls, above-grade concrete, masonry or log walls with interior insulation) shall be equal to the area of that type of wall in the proposed design. One fourth of the area of each wall type shall face each cardinal orientation.

8.6.6 Doors. The prescriptive design shall have one 40 ft² opaque, non-wood door facing north for each living unit in the proposed design.

8.6.7 Fenestration. The total vertical fenestration area of the prescriptive design shall be equal to the total fenestration area of the proposed design (including skylights) or 15% of the conditioned floor area whichever is smaller. One-fourth of the fenestration area shall be located vertically on each orientation. The prescriptive design shall have no skylights.

8.6.8 Floors and Foundation Type. The prescriptive design shall have the same foundation type and floor constructions with the same fraction of each construction as the proposed design. The slab-on-grade perimeter shall be the same as in the proposed design. All floor conditions in the prescriptive design house shall be constructed and modeled in a manner consistent with that of the proposed design except that the prescriptive design shall meet the requirements of Section 5.

8.6.9 Shading. Walls and windows of the prescriptive design shall be considered to have no self or external shading.

8.7 Calculation Procedure for Space Conditioning

The same calculation procedure shall be used for both proposed design and prescriptive design except where noted. The calculation procedure shall account for the design parameters addressed in 8.7.1 through 8.7.4 using the appropriate calculation tool selected from 8.7.5.

8.7.1 Internal Heat Gains. Internal heat gains from lights, people, and equipment shall be considered in calculating space conditioning loads and energy consumption. The total internal gain shall be calculated by Eq 8-5. For single zone calculations, the daily total sensible internal gains (Btu/day) shall be determined by Eq 8-6. For multiple zone HVAC systems the sensible internal gains shall be determined using Eq 8-6 for the living zone and Eq 8-7 for the sleeping zone. The daily total latent load for each zone shall be determined using Eq 8-8.

Total Heat Gains = Sensible Heat Gains + Latent Heat Gains (8-5)

Single Zone or Living Zone: Sensible Heat Gains = (Floor Area of Zone x 15 Btu/day-ft²) +

(Number of living units x 20,000 Btu/day) (8-6) Sleeping Zone:

Sensible Heat Gains = Floor Area of Zone x 15 $Btu/day-ft^2$ (8-7)

Latent Heat Gains = 0.2 x Sensible Heat Gains (8-8)

Internal heat gains shall be distributed over the day according to the profile in Table 8-1. The load for each hour is the daily total gain times the factor from the appropriate column.

Table 8-1

Daily Internal Heat Gain Profile

Time	Single	Multiple	Zones
of Day	Zone	Zone 1	Zone 2
		Living	Sleep
MID - 1 a.m.	0.024	0.0161	0.0438
1 - 2 a.m.	0.022	0.0148	0.0402
2 - 3 a.m.	0.021	0.0114	0.0450
3 - 4 a.m.	0.021	0.0113	0.0450
4 - 5 a.m.	0.021	0.0121	0.0432
5 - 6 a.m.	0.026	0.0146	0.0546
6 - 7 a.m.	0.038	0.0277	0.0639
7 - 8 a.m.	0.059	0.0530	0.0740
8 - 9 a.m.	0.056	0.0633	0.0376
9 – 10 a.m.	0.060	0.0686	0.0385
10 - 11 a.m.	0.059	0.0638	0.0470
11 - NOON	0.046	0.0500	0.0361
12 - 13 p.m	0.045	0.0484	0.0365
13 - 14 p.m.	0.030	0.0315	0.0263
14 - 15 p.m.	0.028	0.0294	0.0246
15 - 16 p.m.	0.031	0.0341	0.0232
16 - 17 p.m.	0.057	0.0619	0.0447
17 - 18 p.m.	0.064	0.0718	0.0445
18 - 19 p.m.	0.064	0.0724	0.0429
19 - 20 p.m.	0.052	0.0596	0.0330
20 - 21 p.m.	0.050	0.0549	0.0375
21 - 22 p.m.	0.055	0.0620	0.0375
22 - 23 p.m.	0.044	0.0438	0.0445
23 - MID	0.027	0.0235	0.0359

Where multiple zone space conditioning is modeled, the profile shown for Zone 2 shall be used for bedrooms and bathrooms; the profile shown for Zone 1 shall be used for all other conditioned rooms. Where single zone space conditioning is modeled the hourly profile for single zone designs shall be used.

8.7.2 Internal Thermal Mass. Both the prescriptive design and proposed design shall have the same occupancy thermal mass (furniture and contents). The value shall be 8 lb/ft^2 of the conditioned floor area. This is based on 2 in. wood with a specific heat of 0.39 Btu/lb and a conductivity of 1.0 Btu·in/(h·ft².°F). To account for structural mass such as partition walls a value of 5.0 lb/ft^2 of the conditioned floor area shall be used for the prescriptive design. This is based on the thermal properties of 1/2 in. gypsum board. The proposed design with nonstandard construction features may use a different structural mass assumption if detailed calculations are documented. Calculation methods which assume massless exterior walls and a combined interior thermal mass node shall use 3.5 Btu/ft² total mass in the prescriptive design unless additional structural thermal mass is documented in the proposed design.

8.7.3 Envelope

8.7.3.1 Exterior Absorbtivity. Since colors are subject to change over the life of the building, the exterior absorbtivity of all exterior walls and roofs shall be 0.5 regardless of color. If unconditioned spaces such as garages are not modelled, walls between them and conditioned space shall be treated as exterior walls with an absorbtivity of zero.

8.7.3.2 Window Management. Fenestration shall be internally shaded by non-white draperies in both the prescriptive design and proposed design even if no draperies are shown on the plan. This drapery when closed shall reduce the shading coefficient of the fenestration to 70% of its value without drapery, but shall have no effect on window U-value. Credit may be taken for higher performance shading and insulation systems in the proposed design. All operable shading and drapes shall be closed when the air conditioner is running to meet a cooling load and at night, but open during the rest of the day.

8.7.3.3 Natural Ventilation. Both the proposed design and the prescriptive design shall utilize occupant managed natural ventilation to maintain the indoor comfort whenever the outdoor air condition allows the indoor cooling set point temperature to be maintained at a relative humidity of 70% or less. Natural ventilation shall be used to reduce indoor temperature below the cooling set point when this is advantageous. Both the proposed design and the prescriptive design shall use the same control strategy for natural ventilation. The free vent area for the prescriptive design shall be 10% of the glazing area uniformly distributed. To account for screens, other obstructions, and occupant behavior; the maximum free vent area in the proposed design shall be 20% of the operable sash area.

8.7.3.4 Infiltration. One of the three methods of calculating infiltration effects listed below shall be used. For the first two methods, infiltration rates for both proposed design and prescriptive design are identical and the prescriptive infiltration requirements of 5.6 shall be met.

8.7.3.4.1 Both the proposed design and prescriptive design shall be assumed to have a constant air change rate of 0.5 air changes per hour (ACH).

8.7.3.4.2 Infiltration shall be calculated for both proposed design and prescriptive design based on the effective leakage area (ELA) and site conditions for the proposed design plus an allowance for occupancy. The ELA shall be determined using methods described in Chapter 23 of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3) or from standard test methods such as ANSI/ASTM E283-84 (Ref 18). The determination of the energy loss from infiltration shall be based upon the hourly calculation of specific infiltration as described in Chapter 23 of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3) or an equivalent method. A constant of 0.15 ACH shall be added to the calculated leakage to account for occupancy caused infiltration through door openings, exhaust fans, etc.

8.7.3.4.3 The infiltration of the proposed design shall be calculated according to 8.7.3.4.2 based on an assumed ELA including an allowance of 0.15 air changes per hour for occupancy effects. The infiltration rate in the prescriptive design shall be a constant 0.5 air changes per hour. Every building shall be measured after completion using ASTM E779-87 (Ref 50) or equivalent to verify that the actual ELA is less than or equal to that assumed in the calculation. Compliance is not achieved until this test is successfully completed.

8.7.4. HVAC Systems and Equipment

8.7.4.1 General. The annual energy cost of the proposed design shall be calculated using the HVAC equipment specified. The same fuel source shall be used in the proposed design and the prescriptive design. The same equipment type shall be used in the proposed design and prescriptive design except:

(a) For an electric central warm air system without thermal storage, the prescriptive design shall have an air source heat pump.

(b) For any electric heating system without thermal storage in climates greater than 2000 Heating Degree Days (base 65°F), the prescriptive design shall have an air source heat pump.

The mechanical systems in the prescriptive design shall meet the minimum requirements specified in Section 6. If the system specified in the design is not directly categorized in Section 6, then the system from Section 6 which uses the same fuel type and which is most similar to the design shall be selected. If a design uses more than one fuel type for one purpose, such as a combination of electricity and gas for space heating, the prescriptive design shall utilize the same fuel sources for that purpose in the same proportions as the design. In no case shall the design energy cost comparison between prescriptive design and proposed design include changes from one fuel type to another for the same purpose, except that the proposed design may utilize renewable sources not included in the prescriptive design.

8.7.4.2 Zoning. The prescriptive design shall have one thermal zone. If electric resistance is modelled in the prescriptive design as specified in 6.4.3.2.3 then both the prescriptive and proposed design shall be modelled as a single thermal zone. Otherwise two thermal zones, a living zone and a sleeping zone, may be simulated in each living unit when calculating the AEC of the proposed design if the following three conditions are met:

(a) Each zone has its own thermostat which controls the supply of heating and cooling to the zone.

(b) The total non-closable opening area between adjacent zones in a living unit is less than 40 ft², and all remaining zonal boundary areas shall be separated by permanent walls or operable doors, or both, that are capable of restricting free air movement in the closed position.

(c) For forced air systems, conditioned air flows into, through, and out of a zone only when a zone requires conditioning. No measurable amount of air may be discharged into any zone through damper leakage or as a bypass for system control. Each zone has its own return register located in the zone, but return dampers are not required.

8.7.4.3 Mechanical Ventilation. If the proposed design has a mechanical outdoor air ventilation system, the prescriptive design shall have a similar system meeting the prescriptive requirements and supplying the same air quantity.

8.7.4.4 Equipment Efficiency. Calculation of energy consumption shall be based on the data collected in the DOE mandated test procedure for the equipment specified. The efficiency descriptor used to set minimum efficiency requirements in Section 6 shall be used to calculate energy consumption based on loads for methods in which a single efficiency is required. The use of more sophisticated calculations which take any combination of ambient temperature, part load, sizing, or other effects into account is encouraged. The same calculation method shall be used in both proposed design and prescriptive design.

8.7.4.5 Distribution Losses. The effects of distribution losses on the AEC of the proposed design shall be included for all central systems which use ducts that run partly or completely through unconditioned spaces. Equation 8-9 shall be used to adjust the efficiency of equipment to account for distribution losses.

Adjusted Efficiency = Equipment Efficiency x Distribution Factor (8-9)

The distribution factors from Table 8-2 shall be used with Eq 8-9. For systems with equipment and ducts located entirely within conditioned space or with less than 8 linear feet of ducts located in unconditioned space, the distribution factor shall be 1.0. If a basement with insulated walls contains ducts, the distribution factor shall be 1.0 provided all other ducts are within conditioned space or less than 8 linear ft are located in unconditioned space and all assemblies in the basement envelope meet the prescriptive requirements in Section 5. If equipment or ducts, or both, are located on the roof or the exterior of the building, the distribution factor shall be 0.75 for heating and 0.80 for cooling. If a system has ducts located in more than one type of situation, the lowest applicable distribution factor shall be used.

Duct Insulation	At	tic	Crawl spa insulat	ce under ed floor	Basement un floor or cr with insula	and the second second
<u>°F•ft²•h/Btu</u>	Heating	<u>Cooling</u>	<u>Heating</u>	<u>Cooling</u>	<u>Heating</u>	<u>Cooling</u>
One Story Buil	dings:					
R-2	0.78	0.74	0.78	0.84	0.81	0.85
R-4	0.82	0.81	0.82	0.86	0.85	0.87
R-6	0.84	0.83	0.84	0.87	0.86	0.88
Two and Three	Story Buil	dings:				
R-2	0.85	0.83	0.85	0.89	0.87	0.90
R-4	0.88	0.87	0.88	0.91	0.90	0.91
R-6	0.90	0.89	0.90	0.91	0.91	0.92

Table 8-2 Distribution Factors Duct Location

8.7.4.6 Equipment Capacity and Redundant Equipment. For calculation methods where equipment capacity does not affect energy consumption the capacity of the equipment in the proposed design may be ignored. Otherwise actual equipment capacities and types shall be used in calculations unless the actual capacity is not adequate to meet the calculated load. In that case for the purpose of calculating the AEC, the equipment capacity shall be increased to meet the load. If more than one type of equipment is assigned to the load, the capacity of the one with the highest energy cost shall be increased. For example, if a heat pump system with resistance backup heat is too small to meet the heating load, the resistance heater capacity shall be increased. The proposed design and the prescriptive design shall have equipment sized in a consistent manner, but not necessarily the same capacity if, for example, the design loads are different.

Redundant equipment or emergency equipment, or both, need not be included if it is controlled such that it will not operate under normal conditions.

8.7.4.7 Thermostat Set Points. In calculating the AEC for both the prescriptive design and the proposed design, all conditioned spaces shall be maintained at the specified thermostat set points at all times except for minor deviations at thermostat setup and setback and when outdoor conditions exceed normal design conditions. If the specified equipment in the proposed design is too small to meet the load, its capacity shall be increased in the calculations. If equipment to meet a load is not included in the design, such equipment shall be assumed in the calculations and its energy cost included. In no case shall the annual energy cost of the proposed design be reduced by not conditioning its spaces.

For central space conditioning systems without zonal control, the entire conditioned floor area shall be one thermostatically controlled zone. The thermostat settings shall be those listed for single zone in Table 8-3. For multiple zone designs the multi-zone thermostat settings in Table 8-3 shall be used. Zone 1 represents all conditioned spaces other than Zone 2 (bedrooms and bathrooms). The effect of heat transfer between zones including non-closable openings shall be included in the calculation.

			Single Zone		Multiple Zone			
						one 1 iving		ne 2 Sleeping
<u>Time</u>	of Da	<u>ay</u>	<u>Heat</u>	<u>Cool</u>	<u>Heat</u>	<u>Cool</u>	<u>Heat</u>	<u>Cool</u>
						1	·	
6 -	9 a.	.m.	68	78	68	78	68	78
9 -	5 p.	. m .	68	78	68	78	60	85
5 -	11 p.	.m.	68	78	68	78	68	78
11 p.	m	6	a.m. 60	78	60	85	60	78

Table 8-3 Thermostat Settings (°F)

8.7.5 The Calculation Tool. The same calculation tool shall be used to calculate the AEC of both the prescriptive design and the proposed design. The calculation tool shall be appropriate for the design parameters which are being analyzed. The calculation tool shall estimate the energy cost impact of each energy conservation feature of the proposed design which deviates from the prescriptive design. Simplified calculation methods may be used to calculate the impact of certain design parameters, however dynamic simulations using hourly weather data are recommended.

Hand calculation analyses shall include a written documentation of the assumptions made. Computer analyses shall be performed using programs which utilize scientifically justifiable techniques and procedures for modeling building loads, systems and equipment. Computer program documentation shall state what methods are used and which conservation methods are accurately modeled.

Energy consumption for occupant energy uses shall be calculated according to Eq 8-15 and Eq 8-16. The energy consumption for these end uses shall be added to those calculated for heating and cooling for both the prescriptive design and the proposed design before annual energy costs are calculated.

One of the calculation methods addressed in 8.7.5.1 through 8.7.5.4 shall be used.

8.7.5.1 Simplified Calculation Methods. Annual heating and cooling energy shall be calculated using variable base degree days. Passive solar effects shall be calculated using the solar load ratio method as specified in Ref 9. These methods may be used for calculations for the following conservation measures in climates with less than 8,000 Cooling Degree Hours base 74°F (CDH74).

(a) envelope and glazing U-value and area

(b) equipment efficiency

(c) passive solar effects.

8.7.5.2 Bin Calculation Method. Calculation techniques for this method are specified in Simplified Energy Calculations (Ref 3 and 51). This procedure may be used for the following measures in any climate:

- (a) envelope and glazing U-value and areas
- (b) equipment efficiency
- (c) evaporative and ventilative cooling.

8.7.5.3 Correlation Methods. Heating and cooling energies are calculated through correlation to a data base generated for representative configurations using detailed hourly transient analysis, the data base results are then translated into simplified algorithms that can be presented as tables, nomographs or micro-computer programs. Correlation methods may be used if it is shown that the construction variables to be analyzed are adequately quantified by the simulation program used to generate the data base and that the results are reliably recreated by the simplified algorithms. Correlation methods shall not be used for analysis of weather or construction variables not covered by or outside the range of the data base. The methodology used to generate the database, the correlation techniques and their comparison to the basic data shall be well documented.

8.7.5.4 Transient Analysis Using Hourly Weather Data. This method uses calculation techniques as specified in Chapter 28 of the ASHRAE Handbook, 1989 Fundamentals Volume (Ref 3). The method uses transfer functions, finite differences, or other methods to calculate the transient responses of the building to hourly weather data for a typical year. ASHRAE WYEC (Ref 52 and 53) or TMY weather (Ref 54) data sets or equivalent shall be used. If weather data for an entire year is not used, a statistically representative sample of at least 168 consecutive hours for each of four seasons of the year shall be used. Weather data may be adjusted to compensate for microclimate differences between the building site and the weather station. Programs based upon this methodology that include algorithms for computing shading and other solar effects plus algorithms for computing the psychrometrics of air systems may be used to evaluate all building and equipment variables.

8.8 Calculation Procedures for Domestic Hot Water Heating

8.8.1 General. Domestic hot water shall be assumed to be supplied to all living units. Both the proposed design and the prescriptive design shall use the domestic hot water heating system designed for the proposed design, which may include high efficiency equipment, utilization of waste heat, off-peak storage, and renewable energy sources.

8.8.2 Domestic Hot Water Load. The total domestic hot water load used to calculate the AEC shall be the same for the prescriptive design and the proposed design. It shall be determined using Eq 8-10.

DHWL = ((30))	x Units) + (10 x Bedrooms)) x 8.22 x (135 - Tinlet) (8-10)
where	
DHWL	- Domestic hot water load of the building, Btu/day.
Units	- Number of living units in the proposed design.
Bedrooms	- Total number of bedrooms in all the living units in the proposed
	design.
Tinlet	- Inlet mean water temperature which may be assumed to be equal to
	the average annual outdoor dry-bulb air temperature for the location
	or 40°F, whichever is higher (see Section 9 for Climatic Data).

8.8.3 Energy Consumption. The daily electric energy consumption of electric water heaters shall be determined by Eq 8-11 if the equipment is listed in Table 7-1, otherwise Eq 8-13 shall be used. The daily gas consumption of gas water heaters shall be determined by Eq 8-12 if the equipment is listed in Table 7-1, otherwise Eq 8-14 shall be used. The daily energy use by domestic water heaters using other fuels shall be determined using appropriate conversion factors.

DHW_E	- (DHWL/0.98 + Heaters x (41000/EF - 41837)) / 3413	(8-11)
DHW _G	- (DHWL/ E_r + Heaters x (41000/EF - 41000/ E_r)) / 100,000	(8-12)
DHW_E	= (DHWL + 24 x Standby) / 3413	(8-13)

= $(DHWL + 24 \times Standby)/((1.0 - Flue) \times 100,000)$ (8-14)DHW_G where = Domestic hot water electricity use, kWh/day DHWE = Domestic hot water gas use, Therms/day DHWG Heaters = Number of water heaters in the proposed design. EF - Energy Factor E_r = Recovery Efficiency. If E_r is not known use 0.76. Standby = Total hourly standby loss from all water heaters, Btu/h. Flue = Flue losses, fraction.

8.8.4 Hourly Domestic Hot Water Fraction. Where hourly hot water consumption is required to be calculated the hot water use shall be distributed over the day according to the profile in Table 8-4. The hourly use is DHWC times the factor for the hour.

Table 8-4 Daily Domestic Hot Water Load Profile

Time of Day	
MID - 1 a.m.	0.0085
1 - 2 a.m.	0.0085
2 - 3 a.m.	0.0085
3 - 4 a.m.	0.0085
4 - 5 a.m.	0.0085
5 - 6 a.m.	0.0085
6 - 7 a.m.	0.075
7 – 8 a.m.	0.075
8 - 9 a.m.	0.065
9 - 10 a.m.	0.065
10 - 11 a.m.	0.065
11 - NOON	0.046
12 - 13 p.m.	0.046
13 - 14 p.m.	0.037
14 - 15 p.m.	0.037
15 - 16 p.m.	0.037
16 - 17 p.m.	0.037
17 - 18 p.m.	0.063
18 - 19 p.m.	0.063
19 - 20 p.m.	0.063
20 - 21 p.m.	0.063
21 - 22 p.m.	0.051
22 - 23 p.m.	0.051
23 - MID	0.0085

Note: These hourly values include a large diversity factor and should not be used to calculate peak loads for equipment sizing.

8.9 Occupant Energy Use. Occupant energy consumption for uses other than heating, cooling, and domestic hot water shall be calculated according to Eq 8-15 for "electricity and Eq 8-16 for natural gas. Consumption of other fuels shall be calculated using appropriate conversion factors. If hourly values are required, Occupant Energy Use shall be apportioned using the hourly profile for Single Zones in Table 8-1.

Occupant Electricity Consumption:

 $O_E = A_F \ge 0.007 + R_E \ge (1.7 + A_F \ge 0.001) + D_E \ge (1.2 + A_F \ge 0.001)$ (8-15)

Occupant Gas Consumption:

 $O_{\rm g} = R_{\rm g} \ge (0.1 + A_{\rm F} \ge 0.0007) + D_{\rm g} \ge (0.08 + A_{\rm F} \ge 0.0005)$ (8-16)

Where

 A_F = Conditioned floor area of building, ft² O_E = Occupant electricity use, kWh/day R_E = Number of electric range tops D_E = Number of electric dryers O_G = Occupant gas use, Therms/day R_G = Number of gas range tops D_G = Number of gas dryers

9 CLIMATIC DATA

The climatic data contained in this section shall be used in Sections 5 and 8 to determine a requirement for a given geographic location. The data is organized alphabetically by the state and city, or location. Weather variables listed for each entry are:

(a) average annual dry-bulb air temperature (TAVG)

(b) Heating Degree Days to base 65°F (HDD65)

(c) Cooling Degree Hours to base 74°F (CDH74).

ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>		<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
AK ADAK	41	8938	0	Ĩ	AT.	BAY MINETTE	67	1688	24530
AK ADAK AK ANCHORAGE WSO AP AK ANNETTE WSO AP AK ANNEX CREEK AK BARROW WSO AP AK BARTER ISLAND WSO AP	35	10825	35		AL	BAY MINETTE BELLE MINA 2 N	61	3284	18251
AK ANNETTE WSO AP	46	7135	308		AL	BELLE MINA 2 N BIRMINGHAM WSO CITY BIRMINGHAM WSO BREWTON 3 SSE CHATOM 3 N CLANTON DAYTON	62	2953	21533
AK ANNEX CREEK	39	9316	104		AL	BIRMINGHAM WSO	62	2876	20324
AK BARROW WSO AP	9	20372	42		AL	BREWTON 3 SSE	66	1969	21392
AK BARTER ISLAND WSO AP	10	20173	0		AL	CHATOM 3 N	66	2000	22161
AK BEAVER FALLS	44	7557	570		AL	CLANTON	62	2911	17882
AK BETHEL WSO AP	28	13349	238		AL	DAYTON	64	2430	23325
AK BARTER ISLAND WSO AF AK BEAVER FALLS AK BETHEL WSO AP AK BETTLES WSO AP AK BIG DELTA WSO AP AK COLD BAY WSO AP AK COLLEGE OBSERVATORY AK CORDOVA FAA AP AK EIELSON FIELD AK EKLUTNA PROJECT AK ELMENDORF A F BASE AK FAIRBANKS WSO AP AK FIVE FINGER LIGHT ST AK GULKANA WSO	21	15965	1013		AL	DEMOPOLIS LOCK AND D	63	2643	22202
AK BIG DELTA WSO AP	27	13710	582		AL	EUFAULA	65	2266	22525
AK COLD BAY WSO AP	38	9876	4		AL	DEMOPOLIS LOCK AND D EUFAULA EVERGREEN FAIRHOPE 2 NE FAYETTE FRISCO CITY GADSDEN STEAM PLANT GREENSBORO HALEYVILLE HEADLAND HIGHLAND HOME HUNTSVILLE WSO LAFAYETTE MARION JUNCTION 2 NE	65	2242	22173
AK COLLEGE OBSERVATORY	27	13928	557		AL	FAIRHOPE 2 NE	67	1617	25888
AK CORDOVA FAA AP	38	9844	5		AL	FAYETTE	62	3046	18923
AK EIELSON FIELD	25	14490	347		AL	FRISCO CITY	65	2144	24186
AK EKLUTNA PROJECT	34	11489	24		AL	GADSDEN STEAM PLANT	61	3170	17089
AK ELMENDORF A F BASE	35	10944	106		\mathbf{AL}	GREENSBORO	65	2365	24080
AK FAIRBANKS WSO AP	26	14280	752		AL	HALEYVILLE	60	3466	15882
AK FIVE FINGER LIGHT ST	43	8085	38		AL	HEADLAND	66	2068	22169
AK GULKANA WSO	27	14010	106	1	AL	HIGHLAND HOME	64	2303	21029
AK HOMER WSO	37	10352	0		AL	HUNTSVILLE WSO	61	3289	18603
AK JUNEAU WSO AP	40	9113	34		AL	LAFAYETTE	63	2642	18204
AK KASILOF	33	11509	28			THATTON OUTOFFOR L TH			
AK KENAI FAA MUNICIPAL	33	11619	22		AL	MOBILE WSO MONTGOMERY WSO	68	1694	28912
AK FIVE FINGER LIGHT ST AK GULKANA WSO AK HOMER WSO AK JUNEAU WSO AP AK KASILOF AK KENAI FAA MUNICIPAL AK KETCHIKAN AK KING SALMON WSO AP AK KODIAK WSO AK KOTZEBUE WSO AP AK LITTLE PORT WALTER AK MATANUSKA AGR EXP ST AK MCGRATH WSO AP AK MC KINLEY PARK AK NOME WSO AP AK NORTHWAY FAA AP AK PALMER AAES AK PETERSBURG AK ST PAUL ISLAND WSO A	46	7067	443		AL	MONTGOMERY WSO	65	2283	24564
AK KING SALMON WSO AP	33	11735	64		AL	MUSCLE SHOALS FAA AP	61	3325	20704
AK KODIAK WSO	41	8848	335		AL	ONEONTA	60	3418	15952
AK KOTZEBUE WSO AP	21	16036	578		AL	OZARK 6 NNW	66	1928	24621
AK LITTLE PORT WALTER	43	8121	4		AL	ROBERTSDALE 1 E	67	1737	23268
AK MATANUSKA AGR EXP SI	35	10899	10		AL	ROCK MILLS	61	3008	16212
AK MCGRATH WSO AP	25	14581	405		AL	SAINT BERNARD	59	3578	15539
AK MC KINLEY PARK	26	14163	82		AL	SAND MT SUBSTA AU	60	3422	15201
AK NOME WSO AP	26	14380	272		AL	SCOTTSBORO	59	3546	15827
AK NORTHWAY FAA AP	21	15855	221		AL	SELMA	66	2040	26552
AK PALMER AAES	35	11092	41		AL	TALLADEGA	62	2885	18130
AK PETERSBURG	42	8513	7		AL	THOMASVILLE	64	2418	23130
AK ST PAUL ISLAND WSO A	. 34	111/9	0		AL	TROY	65	2052	22823
AK KENAI FAA MUNICIPAL AK KETCHIKAN AK KING SALMON WSO AP AK KODIAK WSO AK KOTZEBUE WSO AP AK LITTLE PORT WALTER AK MATANUSKA AGR EXP ST AK MCGRATH WSO AP AK MC KINLEY PARK AK NOME WSO AP AK NORTHWAY FAA AP AK PALMER AAES AK PETERSBURG AK ST PAUL ISLAND WSO A AK SEWARD AK SITKA FAA AIRPORT AK SITKA MAGNETIC OBSY AK TALKEETNA WSO AK TANANA WSO	39	9355	31		AL	TUSCALOOSA FAA AP	63	2672	23398
AK SHEMYA WSO AP	38	9706	0		AL	UNION SPRINGS	64	2432	218/2
AK SITKA FAA AIRPORT	44	7512	15		AL	VALLEY HEAD	58	3968	13018
AK SITKA MAGNETIC OBSY	43	8207	7						
AK TALKEETNA WSO AK TANANA WSO	33	11811	84		AZ	AJO ANVIL RANCH	72	1346	53951
Int Indiana woo	A	19294	505				00	2050	30703
AK UNIVERSITY EXP STATI	27	13846	438		AZ	APACHE POWDER COMPAN	63	264/	16567
AK VALDEZ WSO AK WRANGELL AK YAKUTAT WSO AP	38	9/17	55		AZ	BARTLETT DAM	70	1508	49096
AK WRANGELL	43	8204	361		AZ	BETATAKIN	50	6127	3645
AK YAKUTAT WSU AP	39	9609	1		AZ	BLACK KIVER PUMPS	52	5204	2882
AT ANDATHOTA 1 MT		0005	04.040		AZ	DUUSE	/0	1550	49238
AL ANDALUSIA I NW	65	2305	24260		AZ	BUCKEYE	/0	1000	49/99
AL ANDALUSIA 1 NW AL ANNISTON FAA AP AL AUBURN AGRONOMY FARM	62	28/9	10100		AZ	CARA CRANDE) C	3003	6116
AL AUBUKN AGKUNUMI FARM	03	2014	19193		AZ	CASA GRANDE	70	T2A2	49010

ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74	ST CITY OR LOCATION TAVE HDD65 CDH74
AZ CASA GRANDE RUINS N	69	1683	45521	AZ TEMPE CITRUS EXP STA 69 1694 40776
AZ CHILDS	65	2551	30161	AZ TOMBSTONE 64 2350 17729
AZ CHILDS AZ CHINO VALLEY	55	4603	5913	AZ TOMBSTONE 64 2350 17729 AZ TRUXTON CANYON 59 3540 15094 AZ TUCSON CAMP AVE EXP 67 1959 31047 AZ TUCSON MACHETIC OPEN 67 2017 22108
				AZ TUCSON CAMP AVE EXP 67 1959 31047
AZ CHIRICAHUA NAT MON AZ CLIFTON AZ CORDES AZ DEER VALLEY AZ DOUGLAS B D FAA AP AZ DUNCAN AZ FLAGSTAFF WSO AZ FLORENCE AZ FORT VALLEY AZ GANADO AZ GILA BEND AZ HEBER RANGER STATION	66	2294	33687	AZ TUCSON MAGNETIC OBSY 67 2017 32108
AZ CORDES	61	3105	17526	
AZ DEER VALLEY	70	1628	45958	AZ TUCSON UNIV OF ARIZO 69 1477 40465 AZ TUCSON WSO 68 1737 35946 AZ TUMACACORI NAT MON 64 2236 20056 AZ WALNUT CREEK 52 5230 2979 AZ WELLTON 70 1526 47457 AZ WHITERIVER 55 4425 5344 AZ WICKENBURG 66 2292 34125 AZ WILLOX 3 NNW 59 3458 12837 AZ WILLIAMS 50 5894 1236 AZ WINDOW ROCK 48 6679 1882 AZ WUPATKI NAT MON 58 4190 17296 AZ YUMA CITRUS STATION 71 1340 48148 AZ YUMA WSO 74 983 62507
AZ DOUGLAS B D FAA AP	62	2801	13142	AZ TUMACACORI NAT MON 64 2236 20056
AZ DUNCAN	59	3508	11999	AZ WALNUT CREEK 52 5230 2979
AZ FLAGSTAFF WSO	45	7256	373	AZ WELLTON 70 1526 47457
AZ FLORENCE	70	1565	47203	AZ WHITERIVER 55 4425 5344
AZ FORT VALLEY	43	8164	56	AZ WICKENBURG 66 2292 34125
AZ GANADO	48	6421	2099	AZ WILLCOX 3 NNW 59 3458 12837
AZ GILA BEND	72	1294	60194	AZ WILLIAMS 50 5894 1236
AZ HEBER RANGER STATION	48	6273	904	AZ WINDOW ROCK 48 6679 1882
AZ HOLBROOK	54	4992	9380	AZ WINSLOW WSO 55 4844 10636
AZ JEROME	59	3639	13179	AZ WUPATKI NAT MON 58 4190 17296
AZ JUNIPINE	56	4241	5964	AZ YUMA CITRUS STATION 71 1340 48148
AZ KINGMAN NO 2	62	3124	21601	AZ YUMA WSO 74 983 62507
AZ LAVEEN 3 SSE	71	1470	50210	
AZ HEBER RANGER STATION AZ HOLBROOK AZ JEROME AZ JUNIPINE AZ KINGMAN NO 2 AZ LAVEEN 3 SSE AZ LEES FERRY AZ LEUPP AZ LITCHFIELD PARK AZ MC NARY	63	3324	33784	AR ALUM FORK62310020572AR ARKADELPHIA 2 N63288723405
AZ LEUPP	54	5122	7846	AR ARKADELPHIA 2 N 63 2887 23405
AZ LITCHFIELD PARK	70	1487	48906	AR BATESVILLE LIVESTOCK 59 3751 19318
AZ MC NARY	47	6637	223	
AZ MESA EXPERIMENT FARM	1 70	1600	44686	AR BATESVILLE L AND D 1 60 3579 19076 AR BENTON 61 3171 19665 AR BENTONVILLE 5 WSW 57 4230 15186 AR BLYTHEVILLE 61 3445 23523 AR BRINKLEY 61 3372 21769 AR CAMDEN 1 63 2835 23687 AR CONWAY 62 3147 22827 AR CORNING 60 3746 19643 AR CROSSETT 7 S 63 2672 22356 AR DARDANELLE 61 3254 22554 AR DE QUEEN 63 2907 23022 AR DES ARC 62 3202 23945 AR DUMAS 63 2756 24739 AR EL DORADO FAA ATRPOR 63 2759 23699
AZ MIAMI	63		23599	AR BENTONVILLE 5 WSW 57 4230 15186
AZ MONTEZUMA CASTLE N M	61	3143	18720	AR BLYTHEVILLE 61 3445 23523
AZ MORMON FLAT	71	1481	54665	AR BRINKLEY 61 3372 21769
AZ NOGALES	61	2915	9904	AR CAMDEN 1 63 2835 23687
AZ MORMON FLAT AZ NOGALES AZ ORACLE 2 SE	62	2751	19316	AR CONWAY 62 3147 22827
AZ ORGAN PIPE CACTUS N	69	1467	40755	AR CORNING 60 3746 19643
AZ PARKER	73	1296	61294	AR CROSSETT 7 S 63 2672 22356
AZ PARKER AZ PAYSON AZ PEARCE	55	4349	6405	AR DARDANELLE 61 3254 22554
AZ PEARCE	62	2740	14141	AR DE QUEEN 63 2907 23022
AZ PETRIFIED FOREST NP	54	4808	6749	AR DES ARC 62 3202 23945
AZ PHOENIX WSO	71	1444	54404	AR DUMAS 63 2756 24739
AZ PRESCOTT	53	4951	3828	AR DUMAS 63 2756 24739 AR EL DORADO FAA AIRPOR 63 2759 23699 AR EUREKA SPRINGS 59 3881 18910
AZ ROOSEVELT 1 WNW	68	2101	42008	AR EUREKA SPRINGS 59 3881 18910
AZ SABINO CANYON AZ SACATON	69	1594	38254	AR FAYETTEVILLE FAA AP 57 4179 14956
AZ SACATON	69	1800	46145	AR FAYETTEVILLE EXP STA 58 3939 17119
AZ SAFFORD EXPERIMENT H	63	2829	20351	AR FORT SMITH WSO 61 3482 23485
AZ SAINT JOHNS	53	4970	46.31	AR GILBERT 58 3855 15811
AZ SAN CARLOS RESERVOIR	65	2477	33309	AR GRAVETTE 58 4100 17201
AZ SANTA RITA EXP RANGE	64	2277	19931	AR FORT SMITH WSO61348223485AR GILBERT58385515811AR GRAVETTE58410017201AR HELENA 5 NW61325124444
AZ SEDONA RANGER STATIC	60	3430	16888	AR HOPE 3 NE 62 3051 22482
AZ SELIGMAN	54	4809	5862	AR HOT SPRINGS 1 NNE 63 2942 26592
AZ SNOWFLAKE	52	5419	3441	AR JONESBORO 61 3533 23193
AZ SOUTH PHOENIX	69	1610	42159	AR HOPE 3 NE 62 3051 22482 AR HOT SPRINGS 1 NNE 63 2942 26592 AR JONESBORO 61 3533 23193 AR KEO 62 3110 20473
AZ SPRINGERVILLE	48	6341	488	AR LEAD HILL 59 3926 18470
AZ TEMPE	69	1657	42552	AR JONESBORO 61 3533 23193 AR KEO 62 3110 20473 AR LEAD HILL 59 3926 18470 AR LITTLE ROCK WSO 62 3161 23839
			0	

ST CITY OR LOCATION					<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>
AR MAGNOLIA 3 N AR MALVERN AR MAMMOTH SPRING AR MARIANNA 2 S AR MENA AR MONTICELLO 3 SW AR MORRILTON AR MOUNT IDA 3 SE AR MOUNTAIN HOME 1 NNW AR NASHVILLE EXP STATIO	63	2633	22990	1	CA	BURBANK VALLEY PMP P	64	1681	11400
AR MALVERN	62	3046	21539					6408	793
AR MAMMOTH SPRING	58	4026	16518		CA	BURNEY BUTTONWILLOW	63		20961
AR MARIANNA 2 S	62	3173	21154		CA	CALAVERAS BIG TREES	50	5853	
AR MENA	61	3249	18839		CA	CAMPO	58	3310	
AR MONTICELLO 3 SW	62	2871	21100		CA	CAMPO CAMP PARDEE	61	2819	15234
AR MORRILTON	62	3080	23200			CANOGA PARK PIERCE C		1884	13047
AR MOUNT IDA 3 SE	60	3540	18860					6836	1086
AR MOUNTAIN HOME 1 NNW	58	3950	17794		CA	CANYON DAM CEDARVILLE	49	6309	5036
AR NASHVILLE EXP STATIC	61	3170	20511	(CA	CHICO EXPERIMENT STA	61	2881	14432
AR NEWPORT	61	3487	21674	(CA	CHULA VISTA	60	2079	1092
AR NEWPORT AR NIMROD DAM	60	3643	20749	(CA	CHULA VISTA CLAREMONT POMONA COL	62	2054	10409
		3170	22985	(CA	CLOVERDALE 3 SSE COALINGA COLFAX COLUSA 1 SSW CORCORAN IRRIG DIST	60	2768	5073
AR OKAY	64	2516	25742	(CA	COALINGA	63	2586	19786
AR OZARK	62	3216	23035		CA	COLFAX	59	3433	15958
AR PARAGOULD 1 S	60	3624	20143	(CA	COLUSA 1 SSW	61	2796	12187
AR PINE BLUFF	64	2730	26701	(CA	CORCORAN IRRIG DIST	63	2671	19432
AR POCAHONTAS 1	59	3786	18601	(CA	CORCORAN TRRIG DIST CORONA COVELO CULVER CITY CUYAMACA DAGGETT FAA AP	63	1001	1019/
AR PRESCOTT	63	2790	25198	(CA	COVELO	55		6383
AR RUSSELLVILLE 4 N	61	3353	22689		CA	CULVER CITY	63		4915
AR SAINT CHARLES	62	3204	22789		CA	CUYAMACA	53	4854	
AR SEARCY	61	3247	22185	(CA	DAGGETT FAA AP	67		40146
AR SILOAM SPRINGS	58	3975	18506	(CA	DAVIS 2 WSW EXP FARM	60	2847	8749
AR STUTTGART	63	2870	26347	(CA	DEATH VALLEY	77	1151	88444
AR NO. LITTLE ROCK WSFC AR OKAY AR OZARK AR PARAGOULD 1 S AR PINE BLUFF AR POCAHONTAS 1 AR PRESCOTT AR RUSSELLVILLE 4 N AR SAINT CHARLES AR SEARCY AR SILOAM SPRINGS AR STUTTGART AR STUTTGART 9 ESE AR SUBIACO AR TEXARKANA FAA AIRPOR	61	3306	21094	(CA	DENAIR 3 NNE	60	2977	9895
AR SUBIACO	62	3164	24481	(CA	DE SABLA	55	4240	7207
				(CA	EAGLE MOUNTAIN	73	1138	63321
AR WALDRON	61		21812	(CA	EAST PARK RESERVOIR	59	3457	10897
AR WALDRON AR WARREN AR WYNNE	63		24321	(CA	EL CAPITAN DAM	65	1533	12867
AR WYNNE	61	3325	21315	(CA	EL CENTRO 2 SSW	72	1218	52899
				0	CA	DAVIS 2 WSW EXP FARM DEATH VALLEY DENAIR 3 NNE DE SABLA EAGLE MOUNTAIN EAST PARK RESERVOIR EL CAPITAN DAM EL CENTRO 2 SSW ELECTRA POWER HOUSE ELSINORE ESCONDIDO EUREKA WSO FAIRFIELD FIRE STATI	61	2860	11955
CA ALDERPOINT CA ALTURAS RANGER STATI	57	3426		(CA	ELSINORE	64	2133	18055
CA ALTURAS RANGER STATI	47	6899	1257	(CA	ESCONDIDO	62	2012	6563
CA ASH MOUNTAIN CA AUBERRY 1 NW CA AUBURN CA AVALON PLEASURE PLEE	63	2708	25161		CA	EUREKA WSO	52	4729	19
CA AUBERRY 1 NW	60	3319	18641		CA	FAIRFIELD FIRE STATI	60	2693	5584
CA AUBURN	60	3094	14381		CA	FAIRMONT	60	3341	18280
ON AVALON ILEASONE TIEN		2204	J 340	יו	Un	FUNIANA KAISEK	00	1720	ZIJJZ
CA BAKERSFIELD WSO	66	2127	29954		CA	FORT BIDWELL	48	6386	1218
CA BARRETT DAM	61	2664	11124		CA	FORT BRAGG	53	4473	18
CA BARRETT DAM CA BARSTOW CA BEAUMONT 1 E CA BERKELEY CA BISHOP WSO	64	2585	2/584		CA	FORT JONES RANGER ST	51	5593	2511
CA BEAUMONT I E	61	2632	14006		CA	FORT ROSS	54	4134	36
CA BERKELEY	57	2957	237		CA	FRESNO WSO	63	2649	19366
CA BISHOP WSO	56	4291	9317		CA	FRIANT GOVERNMENT CA	62	2774	18015
CA BLUE CANYON WSO CA BLYTHE CA BLYTHE FAA AIRPORT CA BOCA CA BOWMAN DAM CA BRAWLEY 2 SW	50	5/5/	4115		CA	GLENNVILLE	54	4427	3800
CA BLYTHE	72	1314	54958		CA	GRANT GROVE	46	7050	852
CA BLYTHE FAA AIRPORT	/3	1219	65174		CA	GRATON	56	3413	487
CA BUCA	42	8348	418		CA	HAIWEE	59	3705	16504
CA BOWMAN DAM	49	59/2	2093		CA	HALF MOON BAY	55	3848	116
CA BRAWLEY 2 SW CA BROOKS FARNHAM RANCH	/2	1204	52996		CA	HANFURD	62	2737	14652
UA BRUUKS FARNHAM RANCH	60	29/0	1294/	1	UA	HAPPY CAMP RANGER ST	55	4263	7225

ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74		<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>
CA HAT CREEK PH NO 1	50	5693	1663		CA	NEVADA CITY	53	4915	2747
CA HAYFIELD PUMPING PLA			45657			NEWPORT BEACH HARBOR		1959	957
CA HEALDSBURG	60		5194					2880	435
CA HEALDSBURG CA HENSHAW DAM CA HETCH HETCHY	57	3711	8229		CA	OAKLAND WSO OJAI ORANGE COVE	62	2149	8139
CA HETCH HETCHY	53	4818	4327		CA	ORANGE COVE	62		17604
CA HUNTINGTON LAKE	44	7636	603		CA	ORICK PRAIRIE CREEK	52		31
CA HUNTINGTON LAKE CA IMPERIAL	73	976	56119		CA	ORLAND ORLEANS OXNARD PALMDALE PALM SPRINGS	61		15564
CA INDIO U S DATE GARDE	73	1059	58779		CA	ORLEANS	57	3634	
CA INYOKERN	63	2776	26531		CA	OXNARD	60		1232
CA IRON MOUNTAIN	73	1251	64745		CA	PALMDALE	62		21075
CA INYOKERN CA IRON MOUNTAIN CA JESS VALLEY CA JULIAN WYNOLA CA KENTFIELD CA KERN RIVER PH NO 1	46	7051	1186		CA	PALM SPRINGS	72		54087
CA JULIAN WYNOLA	56	4060	9745		CA	PALO ALTO JR MUSEUM	58		667
CA KENTFIELD	58	3012	1220			PALOMAR MT OBSERVATO		4152	9086
CA KERN RIVER PH NO 1	68	1880	40549		CA	PARKER RESERVOIR	74	1217	68577
CA KERN RIVER PH NO 3	62	2899	20306			PASADENA	64	1556	11027
	15	0105	30096		CA	PASO ROBLES	59		5349
CA KING CITY	59	2646	1279			PASO ROBLES FAA AP		2976	8310
CA KLAMATH	53	4511	25			PETALUMA FIRE STA 2			574
CA LAGUNA BEACH	60	2225	1426		CA	PINNACLES NAT MONUME	59	2963	8325
CA LAKE ARROWHEAD	52	5314	2548		CA	PISMO BEACH	58	2765	252
CA LAKEPORT	57	3735	8113		CA	PLACERVILLE	56	4087	7831
CA LAKE SPAULDING	48	6453	943		CA	POMONA CAL POLY	63	1973	10240
CA LA MESA	63	1571	7024		CA	PORTERVILLE	63	2460	21413
CA KETTLEMAN STATION CA KING CITY CA KLAMATH CA LAGUNA BEACH CA LAKE ARROWHEAD CA LAKE PORT CA LAKE SPAULDING CA LA MESA CA LE GRAND CA LEMON COVE CA LINDSAY	61	2704	12408		CA	PISMO BEACH PLACERVILLE POMONA CAL POLY PORTERVILLE PRIEST VALLEY QUINCY RANDSBURG DED BLUE USO	55	4148	5458
CA LEMON COVE	63	2517	19738		CA	QUINCY	50	5766	1741
CA LINDSAY	62	2640	16266		CA	RANDSBURG	63	2932	26326
CA LIVERMORE COUNTY F D	59	3015	5236		UA	KED BLUFF WSO	63	2686	22618
CA LODI	60	2863	8691		CA	REDDING FIRE STN 4	64	2548	27881
CA LODI CA LOMPOC	57	2896	216		CA	REDDING FIRE STN 4 REDLANDS	64	1995	16859
CA LONG BEACH WSO	64	1485	7755		CA	REDWOOD CITY RICHMOND	59	2602	1198
CA LOS ANGELES WSO	63	1595	4306		CA	RICHMOND	58	2688	428
CA LOS ANGELES CIVIC CE		1210	10575		CA	RIVERSIDE FIRE STA.	64	1823	14176
CA LOS BANOS	62	2618	13134		CA	SACRAMENTO WSO	61	2775	10464
CA LOS BANOS CA LOS GATOS CA MADERA	59		3122		CA	SACRAMENTO CITY WSO		2404	12556
		2678	17870			SAINT HELENA		2885	3145
CA MANZANITA LAKE	44	/624	873		CA	SAINT MARYS COLLEGE	56	3544	1744
CA MARICOPA	65	2303	29608		CA	SALT SPRINGS PWR HOU	57	3865	10822
CA MARYSVILLE	62	2556	15285			SAN BERNARDINO CO HO			
CA MC CLOUD	49	5995	1665		CA	SANDBERG WSO	55	4437	9801
CA MECCA FIRE STATION	72	1189	51660		CA	SAN DIEGO WSO	64	1284	4643
CA MERCED FIRE STATION	62	2658	14060		CA	SAN FRANCISCO WSO	57	3164	265
CA MINERAL	45	7262	690		CA	S F FEDERAL BLDG. WS	57	3078	216
CA MERCED FIRE STATION CA MINERAL CA MODESTO	61	2673	11513			SAN GABRIEL FIRE DEP	64	1537	10200
CA MONO LAKE	48	6521	1108		CA	SAN JOSE	60	2442	1430
CA MONTEREY	57	3177	137		CA	SAN LUIS OBISPO POLY	59	2503	1085
CA MOUNT HAMILTON	54	4727	9012		CA	SAN RAFAEL	60	2447	1925
CA MOUNT SHASTA WSO	50	5936	2097		CA	SANTA ANA FIRE STATI	64	1434	6921
CA MOUNT SHASTA WSO CA MOUNT WILSON FC 338	56	4301	10097		CA	SANTA BARBARA	61	1996	1238
CA NADA CTATE HOCDITAL	50	2752	1361	11	CA	SANTA BARBARA FAA AP	59	2493	894
CA MOUNT WILSON FC 338 CA NAPA STATE HOSPITAL CA NEEDLES FAA AIRPORT	73	1394	65218		CA	SANTA CRUZ	57	3141	148

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ST CITY OR LOCATION				3	<u>ST</u>	CITY OR LOCATION BONNY DAM BOULDER BUENA VISTA BURLINGTON BYERS 5 NE CANON CITY CEDAREDGE CENTER 4 SSW CHEESMAN CHERRY CREEK DAM CHEYENNE WELLS COCHETOPA CREEK COLORADO NAT MON COLORADO SPRINGS WSO CORTEZ CRESTED BUTTE DEL NORTE DENVER WSFO DILLON 1 E DURANGO EADS EAGLE FAA AP ESTES PARK FORT COLLINS FORT LEWIS FORT MORGAN FRUITA GLENWOOD SPRINGS 1 N GRAND JUNCTION WSO GRAND LAKE 1 NW	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
CA SANTA MARIA WSO CA SANTA MONICA PIER CA SANTA PAULA CA SANTA ROSA CA SCOTIA CA SHASTA DAM CA SIERRAVILLE RANGER S	57	3064	131	1	CO	BONNY DAM	51	6175	10277
CA SANTA MONICA PIER	61	1873	1908		CO	BOULDER	52	5466	7684
CA SANTA PAULA	61	2030	3385		CO	BUENA VISTA	44	7736	128
CA SANTA ROSA	58	2983	1221		со	BURLINGTON	52	5748	9364
CA SCOTIA	54	4108	12		СО	BYERS 5 NE	49	6372	5556
CA SHASTA DAM	62	2948	22720		CO	CANON CITY	54	4845	9185
CA SIERRAVILLE RANGER S	46	6896	653		CO	CEDAREDGE	49	6325	2469
CA SONOMA CA SONORA RS CA SO ENTRANCE YOSEMITE	58	3000	3493		CO	CENTER 4 SSW	41	8751	290
CA SONORA RS	58	3542	13222		CO	CHEESMAN	46	7244	969
CA SO ENTRANCE YOSEMITE	50	5795	1578		CO	CHERRY CREEK DAM	50	6183	4058
CA STOCKTON WSO CA STOCKTON FIRE STA NO	62	2676	13139		CO	CHEYENNE WELLS	52	5811	9485
CA STOCKTON FIRE STA NO	60				CO	COCHETOPA CREEK	37	10285	108
CA STONY GORGE RESERVOI	60	3151	14414	1	CO	COLORADO NAT MON	52	5841	11247
CA STRAWBERRY VALLEY	52	5124	4821		CO	COLORADO SPRINGS WSO	49	6353	3658
CA SUSANVILLE AIRPORT	49	6237	2251		CO	CORTEZ	49	6351	2215
CA TAHOE CITY	43	8090	499		CO	CRESTED BUTTE	35	10834	167
CA TEHACHAPI	54	4505	5555	1	CO	DEL NORTE	43	7995	39
CA STONY GORGE RESERVOI CA STRAWBERRY VALLEY CA SUSANVILLE AIRPORT CA TAHOE CITY CA TEHACHAPI CA TEJON RANCHO CA THERMAL FAA AIRPORT CA TIGER CREEK PH CA TORRANCE CA TRACY CARBONA CA TRONA CA TRUCKEE RANGER STATI CA TULELAKE	63	2605	24898		CO	DENVER WSFO	50	6023	5908
CA THERMAL FAA AIRPORT	72	1154	55269	1	CO	DILLON 1 E	35	10755	28
CA TIGER CREEK PH	57	3797	9145		CO	DURANGO	47	6849	441
CA TORRANCE	62	1719	3918		CO	EADS	53	5519	11454
CA TRACY CARBONA	61	2/08	9844		CO	EAGLE FAA AP	42	83/8	248
CA TRONA	66	2419	40143		CO	ESTES PARK	43	/968	66
CA TRUCKEE RANGER STATI	43	8235	429		CO	FORT COLLINS	48	6488	2946
CA TULELAKE	4/	685/	995		CO	FORT LEWIS	43	8206	220
CA TUSTIN IRVINE RANCH	62	1860	5023		CO	FORT MORGAN	49	6524	/190
CA TWENTYNINE PALMS	68	19/6	40327		CO	FRUITA	50	6101	5509
CA TWIN LAKES	40	9204	394		00	GLENWOOD SPRINGS I N	4/	6991	2119
CA UKIAH	29	2964	/228		00	GRAND JUNCTION WSO	23	10000	44
CAUDIAND 2 N	60	2177	4005		00	GRAND LAKE 1 NW	35	10503	25
CA VACAVILLE	61	21//	10179		00	CREAT SAND DINES NM	50	7006	282
CA TRUCKEE RANGER STATT CA TULELAKE CA TUSTIN IRVINE RANCH CA TWENTYNINE PALMS CA TWIN LAKES CA UKIAH CA U C L A CA UPLAND 3 N CA VACAVILLE CA VICTORVILLE PUMP PLA CA VISALIA	60	2190	16346		00	GRAND LAKE 6 SSW GREAT SAND DUNES NM GREELEY CSC GREEN MOUNTAIN DAM GUNNISON	44	6456	5097
CA VISALIA	63	2462	18953		CO	CREEN MOUNTAIN DAM	40	9002	214
CA VISALIA CA WASCO	64	2402	22085		co	CUNNI SON	37	10125	111
CA WATSONVILLE WATERWOR					co	HAYDEN	42	8585	622
CA WEAVERVILLE RANGER S	53	4992	3847		CO	HERMIT 7 ESE	34	11368	3
CA WILLOWS CA WINTERS CA WOODFORDS CA WOODLAND 1 WNW CA YORBA LINDA	61	2839	14120		co	HERMIT 7 ESE HOLLY HOLYOKE	53	5484	15238
CA WINTERS	62	2595	14856		CO	HOLYOKE	50	6122	7960
CA WOODFORDS	49	6051	3018		CO	JOHN MARTIN DAM	54	5155	13918
CA WOODLAND 1 WNW	61	2711	11421		CO	KASSLER	51	5665	5834
CA YORBA LINDA	64	1647	7658		CO	KAUFFMAN 4 SSE	47	6870	3422
CA YOSEMITE PARK HEADOT	54	4/X/	635/	H 4	CO	LA JUNTA FAA AIRPORT	54	5295	15007
CA YREKA	52	5401	5911		CO	LAKEWOOD	51	5888	5723
					CO	LAMAR	54	5357	12887
CA YREKA CO AKRON FAA AIRPORT CO ALAMOSA WSO CO ALLENSPARK	49	6618	6688		CO	LAS ANIMAS	54	5150	12111
CO ALAMOSA WSO	41	8718	46		СО	LITTLE HILLS	43	8207	265
CO ALLENSPARK	41	8900	311		СО	LONGMONT 2 ESE	49	6441	3817
CO ASPEN	41	8853	76		со	MESA VERDE NAT PARK	50	6040	3914
CO ASPEN CO BAILEY	42	8356	245		CO	MONTE VISTA	41	8671	320

CO MONTROSE NO 2 49 6403 3617 FL APALACHICOLA WSO 68 1406 26051 CO NORTHDALE 45 7478 555 FL ARCADIA 72 567 29773 CO NORWOOD 44 7740 455 FL ARCADIA 73 551 31090 CO OURAY 45 7505 291 FL AVON PARK 73 620 31173 CO PARKER 9 E 48 6602 3508 FL BRADENTON 5 ESE 72 616 29216 CO PARKER 9 E 46 6402 516 FL BRADENTON 5 ESE 72 616 29217 CO REGELV 46 7454 4284 FL BUSINELL 2 E 71 712 245 26407 CO RELMADATSPRINCS 33 1314 FL CH FL FL 7172 270	ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74	ST CITY OR LOCATION TAVE HDD65 CDH74	
CO NORTHDALE 45 7478 555 FL ARCADIA 72 567 29773 CO NORWOOD 44 7740 465 FL ARCHBOLD BIOLOGICS T 73 551 31090 CO OURAY 45 7505 291 FL AVON PARK 73 556 35570 CO PAGOSA SPRINGS 42 8368 280 FL BARTOW 73 620 33173 CO PARLSADE 54 5200 13026 FL BARTOW 73 620 33173 CO PARKE 9 E 48 6602 3508 FL BROOKSVILLE CHIN HIL 71 770 29670 CO RANGELY 46 7454 4284 FL BROOKSVILLE CHIN HIL 71 770 29670 CO ROCKY FORD 2 ESE 53 5341 8766 FL CLEWISTON 15 SEM 72 731 32404 CO STAGMBOAT SPRINCS 39 9597 84 FL DE FUNTAK SPRINCS 70 904 2107 CO STRATTON 3 NE 51 5874 9239 FL ORT HAUDERDALE 75 2553 73096 CO TATLING PAAK	CO MONTROSE NO 2	49	6403	3617	FL APALACHICOLA WSO 68 1406 26051	
C0 RYE 47 6991 2460 FL CLEWISTON USENG 74 416 34402 C0 SAGUACHE 43 8281 268 FL CROSS CITY 2 WNW 68 1451 24607 C0 SILVERTON 36 10663 1 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STRATTON 3 NE 51 5874 9239 FL EVERGLADES 74 416 34402 C0 TRINDAD FAA AIRPORT 52 5549 FL PORT HARRS WSO 74 440 37444 C0 TRINDAD FAA AIRPORT 52 5549 554 FL FORT MYERS WSO 74 440 3744 C0 WALDEN 610469 14 FL GAINESVILLE 2 WSW 70 1069 27679 C0 WATERDAL	CO NORTHDALE	45	7478			
C0 RYE 47 6991 2460 FL CLEWISTON USENG 74 416 34402 C0 SAGUACHE 43 8281 268 FL CROSS CITY 2 WNW 68 1451 24607 C0 SILVERTON 36 10663 1 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STRATTON 3 NE 51 5874 9239 FL EVERGLADES 74 416 34402 C0 TRINDAD FAA AIRPORT 52 5549 FL PORT HARRY 1W 56 3557 C0 WALDEN 36 10469 14 FL GEN ST MARY 1W 68 1434 22668 C0 WATERDALE 48 6484 2646 FL HICHER SFINCS 69 1194 27312 C0	CO NORWOOD	44	7740	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
C0 RYE 47 6991 2460 FL CLEWISTON USENG 74 416 34402 C0 SAGUACHE 43 8281 268 FL CROSS CITY 2 WNW 68 1451 24607 C0 SILVERTON 36 10663 1 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STRATTON 3 NE 51 5874 9239 FL EVERGLADES 74 416 34402 C0 TRINDAD FAA AIRPORT 52 5549 FL PORT HARRY 1W 56 3557 C0 WALDEN 36 10469 14 FL GEN ST MARY 1W 68 1434 22668 C0 WATERDALE 48 6484 2646 FL HICHER SFINCS 69 1194 27312 C0	CO OURAY	45	7505			
C0 RYE 47 6991 2460 FL CLEWISTON USENG 74 416 34402 C0 SAGUACHE 43 8281 268 FL CROSS CITY 2 WNW 68 1451 24607 C0 SILVERTON 36 10663 1 FL DE GNUSS 70 904 27107 C0 STEAMBOAT SPRINGS 39 9597 84 FL DE FUNIAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNIAK SPRINGS 67 1729 26892 C0 STRATTON 3 NE 51 5874 9239 FL EVERGLADES 74 416 34402 C0 TRINDAD FAA AIRPORT 52 5549 FL PCRT HYERS WSO 74 403 37444 C0 WALDEN 36 10469 14 FL GENST MARY 1 W 68 1434 22668 C0 WATERDALE 48 6444 2646 FL HICHERSEN 71 863 30245 <t< td=""><td>CO PAGOSA SPRINGS</td><td>42</td><td>8368</td><td></td><td>FL BARTOW 73 620 33173</td><td></td></t<>	CO PAGOSA SPRINGS	42	8368		FL BARTOW 73 620 33173	
C0 RYE 47 6991 2460 FL CLEWISTON USENG 74 416 34402 C0 SAGUACHE 43 8281 268 FL CROSS CITY 2 WNW 68 1451 24607 C0 SILVERTON 36 10663 1 FL DE GNUSS 70 904 27107 C0 STEAMBOAT SPRINGS 39 9597 84 FL DE FUNIAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNIAK SPRINGS 67 1729 26892 C0 STRATTON 3 NE 51 5874 9239 FL EVERGLADES 74 416 34402 C0 TRINDAD FAA AIRPORT 52 5549 FL PCRT HYERS WSO 74 403 37444 C0 WALDEN 36 10469 14 FL GENST MARY 1 W 68 1434 22668 C0 WATERDALE 48 6444 2646 FL HICHERSEN 71 863 30245 <t< td=""><td>CO PALISADE</td><td>54</td><td>5200</td><td>Recta weat fact</td><td></td><td></td></t<>	CO PALISADE	54	5200	Recta weat fact		
C0 RYE 47 6991 2460 FL CLEWISTON USENG 74 416 34402 C0 SAGUACHE 43 8281 268 FL CROSS CITY 2 WNW 68 1451 24607 C0 SILVERTON 36 10663 1 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STRATTON 3 NE 51 5874 9239 FL EVERGLADES 74 416 34402 C0 TRINDAD FAA AIRPORT 52 5549 FL PORT HARRY 1W 56 3557 C0 WALDEN 36 10469 14 FL GEN ST MARY 1W 68 1434 22668 C0 WATERDALE 48 6484 2646 FL HICHER SFINCS 69 1194 27312 C0	CO PARKER 9 E	48	6602			
C0 RYE 47 6991 2460 FL CLEWISTON USENG 74 416 34402 C0 SAGUACHE 43 8281 268 FL CROSS CITY 2 WNW 68 1451 24607 C0 SILVERTON 36 10663 1 FL DE GNUSS 70 904 27107 C0 STEAMBOAT SPRINGS 39 9597 84 FL DE FUNIAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNIAK SPRINGS 67 1729 26892 C0 STRATTON 3 NE 51 5874 9239 FL EVERGLADES 74 416 34402 C0 TRINDAD FAA AIRPORT 52 5549 FL PCRT HYERS WSO 74 403 37444 C0 WALDEN 36 10469 14 FL GENST MARY 1 W 68 1434 22668 C0 WATERDALE 48 6444 2646 FL HICHERSEN 71 863 30245 <t< td=""><td>CO PUEBLO WSO</td><td>53</td><td>5471</td><td></td><td></td><td></td></t<>	CO PUEBLO WSO	53	5471			
C0 RYE 47 6991 2460 FL CLEWISTON USENG 74 416 34402 C0 SAGUACHE 43 8281 268 FL CROSS CITY 2 WNW 68 1451 24607 C0 SILVERTON 36 10663 1 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNTAK SPRINGS 67 1729 26892 C0 STRATTON 3 NE 51 5874 9239 FL EVERGLADES 74 416 34402 C0 TRINDAD FAA AIRPORT 52 5549 FL PORT HARRY 1W 56 3557 C0 WALDEN 36 10469 14 FL GEN ST MARY 1W 68 1434 22668 C0 WATERDALE 48 6484 2646 FL HICHER SFINCS 69 1194 27312 C0	CO RANGELY	46	7454			
C0 RYE 47 6991 2460 FL CLEWISTON USENG 74 416 34402 C0 SAGUACHE 43 8281 268 FL CROSS CITY 2 WNW 68 1451 24607 C0 SILVERTON 36 10663 1 FL DE GNUSS 70 904 27107 C0 STEAMBOAT SPRINGS 39 9597 84 FL DE FUNIAK SPRINGS 67 1729 26892 C0 STERLING 49 6618 6815 FL DE FUNIAK SPRINGS 67 1729 26892 C0 STRATTON 3 NE 51 5874 9239 FL EVERGLADES 74 416 34402 C0 TRINDAD FAA AIRPORT 52 5549 FL PCRT HYERS WSO 74 403 37444 C0 WALDEN 36 10469 14 FL GENST MARY 1 W 68 1434 22668 C0 WATERDALE 48 6444 2646 FL HICHERSEN 71 863 30245 <t< td=""><td>CO RIFLE</td><td>47</td><td>6945</td><td>1610</td><td>FL CHIPLEY 3 E 67 1696 24957</td><td></td></t<>	CO RIFLE	47	6945	1610	FL CHIPLEY 3 E 67 1696 24957	
CO STEAMBOAT SPRINGS 39 9597 84 FL DE FUNIAK SPRINGS 67 1729 26892 CO STERLING 49 6618 6815 FL DE LAND 1 SSE 70 925 27687 CO STRATTON 3 NE 51 5874 9239 FL EVERCLADES 74 356 35956 CO TAYLOR PARK 33 11714 0 FL FORT LAUDERDALE 75 255 37096 CO TELLURIDE 40 9169 28 FL FORT MUDERDALE 73 499 30357 CO VALLECITO DAM 43 8153 174 FL GAINESVILLE 2 WSW 70 1069 27679 CO WALDEN 36 10469 14 FL GLEN ST MARY 1 W 68 1434 22668 CO WATERDALE 48 6484 2646 FL HIGL SPRINGS 69 1194 27312 CO WATERDALE 48 6484 2646 FL HIGL SPRINGS 71 863 31749 CO WATERDALE 48 64761 2679 9808	CO ROCKY FORD 2 ESE	53	5341	8746	FL CLERMONT 6 SSW 72 731 32404	
CO STEAMBOAT SPRINGS 39 9597 84 FL DE FUNIAK SPRINGS 67 1729 26892 CO STERLING 49 6618 6815 FL DE LAND 1 SSE 70 925 27687 CO STRATTON 3 NE 51 5874 9239 FL EVERCLADES 74 356 35956 CO TAYLOR PARK 33 11714 0 FL FORT LAUDERDALE 75 255 37096 CO TELLURIDE 40 9169 28 FL FORT MUDERDALE 73 499 30357 CO VALLECITO DAM 43 8153 174 FL GAINESVILLE 2 WSW 70 1069 27679 CO WALDEN 36 10469 14 FL GLEN ST MARY 1 W 68 1434 22668 CO WATERDALE 48 6484 2646 FL HIGL SPRINGS 69 1194 27312 CO WATERDALE 48 6484 2646 FL HIGL SPRINGS 71 863 31749 CO WATERDALE 48 64761 2679 9808	CO RYE	47	6991	2460		
CO STEAMBOAT SPRINGS 39 9597 84 FL DE FUNIAK SPRINGS 67 1729 26892 CO STERLING 49 6618 6815 FL DE LAND 1 SSE 70 925 27687 CO STRATTON 3 NE 51 5874 9239 FL EVERCLADES 74 356 35956 CO TAYLOR PARK 33 11714 0 FL FORT LAUDERDALE 75 255 37096 CO TELLURIDE 40 9169 28 FL FORT MUDERDALE 73 499 30357 CO VALLECITO DAM 43 8153 174 FL GAINESVILLE 2 WSW 70 1069 27679 CO WALDEN 36 10469 14 FL GLEN ST MARY 1 W 68 1434 22668 CO WATERDALE 48 6484 2646 FL HIGL SPRINGS 69 1194 27312 CO WATERDALE 48 6484 2646 FL HIGL SPRINGS 71 863 31749 CO WATERDALE 48 64761 2679 9808	CO SAGUACHE	43	8281	268		
CO STEAMBOAT SPRINGS 39 9597 84 FL DE FUNIAK SPRINGS 67 1729 26892 CO STERLING 49 6618 6815 FL DE LAND 1 SSE 70 925 27687 CO STRATTON 3 NE 51 5874 9239 FL EVERCLADES 74 356 35956 CO TAYLOR PARK 33 11714 0 FL FORT LAUDERDALE 75 255 37096 CO TELLURIDE 40 9169 28 FL FORT MUDERDALE 73 499 30357 CO VALLECITO DAM 43 8153 174 FL GAINESVILLE 2 WSW 70 1069 27679 CO WALDEN 36 10469 14 FL GLEN ST MARY 1 W 68 1434 22668 CO WATERDALE 48 6484 2646 FL HIGL SPRINGS 69 1194 27312 CO WATERDALE 48 6484 2646 FL HIGL SPRINGS 71 863 31749 CO WATERDALE 48 64761 2679 9808	CO SILVERTON	36	10663	1		
CO STERLING 49 6618 6815 FL DELAND 1 SSE 70 925 27687 CO STRATTON 3 NE 51 5874 9239 FL DELAND 1 SSE 74 356 35956 CO TAYLOR PARK 33 11714 0 FL FORT LAUDERDALE 75 255 37096 CO TELLURIDE 40 9169 28 FL FORT MYERS WSO 74 440 37444 CO TRINIDAD FAA AIRPORT 52 5549 5549 FL FORT MYERS WSO 74 440 37444 CO TRINIDAD FAA AIRPORT 52 5549 14 FL GAINESVILLE 2 WSW 70 1069 27679 CO WALECITO DAM 36 10469 14 FL GAINESVILLE 2 WSW 70 1069 27679 CO WALECITO FDE 42 8331 100 FL HIGH SPRINCS 69 1194 2433 30245 CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA	CO STEAMBOAT SPRINGS	39	9597	84	FT DE EINTAK CERTNES 67 1720 26802	
CO WALDEN 36 10469 14 FL GLEN ST MARY 1 W 68 1434 22668 CO WALSENBURG POWER PLA 51 5509 2951 FL HIALEAH 75 284 35893 CO WATERDALE 48 6484 2646 FL HIGH SPRINGS 69 1194 27312 CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA 74 283 30245 CO WRAY 52 5759 9808 FL INVERNESS 71 863 31749 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE WSO 68 1402 24148 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE BEACH 69 1196 24305 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT MIDDLETOWN 4 W 50 5977 5188 FL LAKE LAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT NORFOLK 2 SW 48 6674 1389 FL MALSONNE 68 1440 25165 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 CT WIGWAM RESERVOIR 48 649	CO STERLING	49	6618		FL DELAND 1 SSE 70 925 27687	
CO WALDEN 36 10469 14 FL GLEN ST MARY I W 68 1434 22668 CO WALSENBURG POWER PLA 51 5509 2951 FL HIALEAH 75 284 35893 CO WATERDALE 48 6484 2646 FL HIGH SPRINGS 69 1194 27312 CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA 74 283 30245 CO WRAY 52 5759 9808 FL INVERNESS 71 863 31749 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE WSO 68 1402 24148 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE BEACH 69 1196 24305 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT MIDDLETOWN 4 W 50 5977 5188 FL LAKE LAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT NORFOLK 2 SW 48 6674 1389 FL MALSONNE 68 1440 25165 CT WEST THOMPSON DAM 48 6720 2032 FL MAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 19	CO STRATTON 3 NE	51	5874	9239	FL EVERGLADES 74 356 35956	
CO WALDEN 36 10469 14 FL GLEN ST MARY I W 68 1434 22668 CO WALSENBURG POWER PLA 51 5509 2951 FL HIALEAH 75 284 35893 CO WATERDALE 48 6484 2646 FL HIGH SPRINGS 69 1194 27312 CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA 74 283 30245 CO WRAY 52 5759 9808 FL INVERNESS 71 863 31749 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE WSO 68 1402 24148 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE BEACH 69 1196 24305 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT MIDDLETOWN 4 W 50 5977 5188 FL LAKE LAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT NORFOLK 2 SW 48 6674 1389 FL MALSONNE 68 1440 25165 CT WEST THOMPSON DAM 48 6720 2032 FL MAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 19				0	FL FORT LAUDERDALE 75 255 37096	
CO WALDEN 36 10469 14 FL GLEN ST MARY 1 W 68 1434 22668 CO WALSENBURG POWER PLA 51 5509 2951 FL HIALEAH 75 284 35893 CO WATERDALE 48 6484 2646 FL HIGH SPRINGS 69 1194 27312 CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA 74 283 30245 CO WRAY 52 5759 9808 FL INVERNESS 71 863 31749 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE WSO 68 1402 24148 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE BEACH 69 1196 24305 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT MIDDLETOWN 4 W 50 5977 5188 FL LAKE LAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT NORFOLK 2 SW 48 6674 1389 FL MALSONNE 68 1440 25165 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 CT WIGWAM RESERVOIR 48 649			9169	28	FL FORT MYERS WSO 74 440 37444	
CO WALDEN 36 10469 14 FL GLEN ST MARY 1 W 68 1434 22668 CO WALSENBURG POWER PLA 51 5509 2951 FL HIALEAH 75 284 35893 CO WATERDALE 48 6484 2646 FL HIGH SPRINGS 69 1194 27312 CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA 74 283 30245 CO WRAY 52 5759 9808 FL INVERNESS 71 863 31749 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE WSO 68 1402 24148 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE BEACH 69 1196 24305 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT MIDDLETOWN 4 W 50 5977 5188 FL LAKE LAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT NORFOLK 2 SW 48 6674 1389 FL MALSONNE 68 1440 25165 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 CT WIGWAM RESERVOIR 48 649	CO TRINIDAD FAA AIRPORT	52	5549	5594	FL FORT PIERCE 73 499 30357	
CO WALDEN 36 10469 14 FL GLEN ST MARY 1 W 68 1434 22668 CO WALSENBURG POWER PLA 51 5509 2951 FL HIALEAH 75 284 35893 CO WATERDALE 48 6484 2646 FL HIGH SPRINGS 69 1194 27312 CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA 74 283 30245 CO WRAY 52 5759 9808 FL INVERNESS 71 863 31749 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE WSO 68 1402 24148 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE BEACH 69 1196 24305 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT MIDDLETOWN 4 W 50 5977 5188 FL LAKE LAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT NORFOLK 2 SW 48 6674 1389 FL MALSONNE 68 1440 25165 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 CT WIGWAM RESERVOIR 48 649				174	FL GAINESVILLE 2 WSW 70 1069 27679	
CO WATERDALE 48 6484 2646 FL HIGH SPRINGS 69 1194 27312 CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA 74 283 30245 CO WRAY 52 5759 9808 FL INVERNESS 71 863 31749 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE WSO 68 1402 24148 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE BEACH 69 1196 24305 CT ADANBURY 50 6103 2879 FL JACKSONVILLE BEACH 69 1196 24305 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT MIDDLETOWN 4 50 5977 5188 FL LAKELAND WSO 73 617 356 28630 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907	CO WALDEN	36	10469	14	FL GLEN ST MARY 1 W 68 1434 22668	
CO WATERDALE 48 6484 2646 FL HIGH SPRINGS 69 1194 27312 CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA 74 283 30245 CO WRAY 52 5759 9808 FL INVERNESS 71 863 31749 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE WSO 68 1402 24148 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE BEACH 69 1196 24305 CT ADANBURY 50 6103 2879 FL JACKSONVILLE BEACH 69 1196 24305 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT MIDDLETOWN 4 50 5977 5188 FL LAKELAND WSO 73 617 356 28630 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907	CO WALSENBURG POWER PLA	51	5509	2951	FL HIALEAH 75 284 35893	
CO WESTCLIFFE 42 8331 100 FL HOMESTEAD EXP STA 74 283 30245 CO WRAY 52 5759 9808 FL INVERNESS 71 863 31749 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE WSO 68 1402 24148 CT BRIDGEPORT WSO 52 5501 4977 FL JACKSONVILLE BEACH 69 1196 24305 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT MIDDLETOWN 4 W 50 5977 5188 FL LAKE LAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT STORRS 48 6674 1389 FL MELBOURNE 72 606 29693 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI BEACH 76 132 39007 CT WIGWAM RESERVOIR	CO WATERDALE	48	6484	2646	FL HIGH SPRINGS 69 1194 27312	
CT BRIDGEPORT WSO5255014977FL JACKSONVILLE WSO68140224148CT DANBURY5061032879FL JACKSONVILLE BEACH69119624305CT FALLS VILLAGE4767801840FL JASPER67155722608CT HARTFORD BRAINARD FL5061564404FL LAKE ALFRED EXP STA7274631105CT HARTFORD WSO5061794840FL LAKE ALFRED EXP STA7274631105CT MIDDLETOWN 4 W5059775188FL LAKE CITY 2 E68136223977CT MOUNT CARMEL5059793155FL LOXAHATCHEE7335628630CT NORFOLK 2 SW447800722FL MADISON68140926907CT STORRS4866741389FL MELBOURNE7260629693CT WEST THOMPSON DAM4867202032FL MIAMI BEACH7613239007CT WIGWAM RESERVOIR4864981969FL MIAMI 12SSW7527334545FL MILTON EXP STATION671684233941414141414	CO WESTCLIFFE	42	8331	100		
CT BRIDGEPORT WSO5255014977FL JACKSONVILLE WSO68140224148CT DANBURY5061032879FL JACKSONVILLE BEACH69119624305CT FALLS VILLAGE4767801840FL JASPER67155722608CT HARTFORD BRAINARD FL5061564404FL LAKE ALFRED EXP STA7274631105CT HARTFORD WSO5061794840FL LAKE ALFRED EXP STA7274631105CT MIDDLETOWN 4 W5059775188FL LAKE CITY 2 E68136223977CT MOUNT CARMEL5059793155FL LOXAHATCHEE7335628630CT NORFOLK 2 SW447800722FL MADISON68140926907CT STORRS4866741389FL MELBOURNE7260629693CT WEST THOMPSON DAM4867202032FL MIAMI BEACH7613239007CT WIGWAM RESERVOIR4864981969FL MIAMI 12SSW7527334545FL MILTON EXP STATION671684233941414141414	CO WRAY	52	5759	9808	FL INVERNESS 71 863 31749	
CT DANBURY 50 6103 2879 FL JASPER 67 1557 22608 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT HARTFORD WSO 50 6179 4840 FL LAKE ALFRED EXP STA 73 617 34916 CT MUDDLETOWN 4 W 50 5977 5188 FL LAKELAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT NORWALK GAS PLANT 51 5854 3633 FL MAYO 68 1440 25165 CT STORRS 48 6674 1389 FL MELBOURNE 72 606 29693 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI BEACH 76 132 39007 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION </td <td></td> <td></td> <td></td> <td></td> <td>FL JACKSONVILLE WSO 68 1402 24148</td> <td></td>					FL JACKSONVILLE WSO 68 1402 24148	
CT DANBURY 50 6103 2879 FL JASPER 67 1557 22608 CT FALLS VILLAGE 47 6780 1840 FL KEY WEST WSO 78 114 50236 CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT HARTFORD WSO 50 6179 4840 FL LAKE ALFRED EXP STA 73 617 34916 CT MUDDLETOWN 4 W 50 5977 5188 FL LAKELAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT NORWALK GAS PLANT 51 5854 3633 FL MAYO 68 1440 25165 CT STORRS 48 6674 1389 FL MELBOURNE 72 606 29693 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI BEACH 76 132 39007 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION </td <td>CT BRIDGEPORT WSO</td> <td>52</td> <td>5501</td> <td>4977</td> <td>FL JACKSONVILLE BEACH 69 1196 24305</td> <td>ĺ</td>	CT BRIDGEPORT WSO	52	5501	4977	FL JACKSONVILLE BEACH 69 1196 24305	ĺ
CT HARTFORD BRAINARD FL 50 6156 4404 FL LAKE ALFRED EXP STA 72 746 31105 CT HARTFORD WSO 50 6179 4840 FL LAKE CITY 2 E 68 1362 23977 CT MIDDLETOWN 4 W 50 5977 5188 FL LAKE CITY 2 E 68 1362 23977 CT MOUNT CARMEL 50 5979 3155 FL LAKELAND WSO 73 617 34916 CT NORFOLK 2 SW 44 7800 722 FL MADISON 68 1409 26907 CT NORWALK GAS PLANT 51 5854 3633 FL MAYO 68 1440 25165 CT STORRS 48 6674 1389 FL MELBOURNE 72 606 29693 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI BEACH 76 132 39007 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545	CT DANBURY	50	6103	2879		
CT HARTFORD WSO5061794840FL LAKE CITY 2 E68136223977CT MIDDLETOWN 4 W5059775188FL LAKELAND WSO7361734916CT MOUNT CARMEL5059793155FL LOXAHATCHEE7335628630CT NORFOLK 2 SW447800722FL MADISON68140926907CT NORWALK GAS PLANT5158543633FL MAYO68144025165CT SHEPAUG DAM4866741389FL MELBOURNE7260629693CT STORRS4865221255FL MIAMI BEACH7613239007CT WEST THOMPSON DAM4864981969FL MIAMI 12SSW7527334545CT WIGWAM RESERVOIR4864981969FL MIAMI 12SSW7527334545	CT FALLS VILLAGE	47	6780	1840	FL KEY WEST WSO 78 114 50236	
CT NORWALK GAS PLANT 51 5854 3633 FL MAYO 68 1440 25165 CT SHEPAUG DAM 48 6674 1389 FL MELBOURNE 72 606 29693 CT STORRS 48 6522 1255 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION 67 1684 23394 1684 1684 1684 23394	CT HARTFORD BRAINARD FL	, 50	6156	4404	FL LAKE ALFRED EXP STA 72 746 31105	
CT NORWALK GAS PLANT 51 5854 3633 FL MAYO 68 1440 25165 CT SHEPAUG DAM 48 6674 1389 FL MELBOURNE 72 606 29693 CT STORRS 48 6522 1255 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION 67 1684 23394 1684 1684 1684 23394	CT HARTFORD WSO	50	6179	4840	FL LAKE CITY 2 E 68 1362 23977	
CT NORWALK GAS PLANT 51 5854 3633 FL MAYO 68 1440 25165 CT SHEPAUG DAM 48 6674 1389 FL MELBOURNE 72 606 29693 CT STORRS 48 6522 1255 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION 67 1684 23394 1684 1684 1684 23394	CT MIDDLETOWN 4 W	50	5977		FL LAKELAND WSO 73 617 34916	
CT NORWALK GAS PLANT 51 5854 3633 FL MAYO 68 1440 25165 CT SHEPAUG DAM 48 6674 1389 FL MELBOURNE 72 606 29693 CT STORRS 48 6522 1255 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION 67 1684 23394 1684 1684 1684 23394	CT MOUNT CARMEL	50	5979		FL LOXAHATCHEE 73 356 28630)
CT SHEPAUG DAM 48 6674 1389 FL MELBOURNE 72 606 29693 CT STORRS 48 6522 1255 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION 67 1684 23394 667 667 667 667				722	FL MADISON 68 1409 26907	1
CT SHEPAUG DAM 48 6674 1389 FL MELBOURNE 72 606 29693 CT STORRS 48 6522 1255 FL MIAMI BEACH 76 132 39007 CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION 67 1684 23394 667 667 1684 2394				3633	FL MAYO 68 1440 25165	•
CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION 67 1684 23394	CT SHEPAUG DAM	48	6674	1389	FL MELBOURNE 72 606 29693	1
CT WEST THOMPSON DAM 48 6720 2032 FL MIAMI WSO 76 198 39401 CT WIGWAM RESERVOIR 48 6498 1969 FL MIAMI 12 SSW 75 273 34545 FL MILTON EXP STATION 67 1684 23394 6498 1969 1684 23394	CT STORRS	48	6522	1255	FL MIAMI BEACH 76 132 39007	(
FL MILTON EXP STATION 67 1684 23394	CT WEST THOMPSON DAM	48	6720	2032	FL MIAMI WSO 76 198 39401	
	CT WIGWAM RESERVOIR	48	6498	1969	FL MIAMI 12 SSW 75 273 34545	
DE BRIDGEVILLE 1 NW 56 4484 7936 FL MONTICELLO 3 W 67 1737 23957 DE DOVER 56 4359 9260 FL MOORE HAVEN LOCK 1 73 510 31642 DE GEORGETOWN 5 SW 55 4572 8073 FL MOUNTAIN LAKE 72 615 31620 DE LEWES 1 SW 55 4510 6437 FL NAPLES 2 NE 74 323 34397 DE MILFORD 2 WSW 56 4464 8859 FL NICEVILLE 66 1918 21925 DE NEWARK UNIVERSITY FA 54 4916 7633 FL OCALA 71 881 32180 DE WILMINGTON NCASTLE W 54 4989 8167 FL ORLANDO WSO MCCOY AF 72 660 33985 DE WILMINGTON PORTER RE 53 5129 6724 FL PALATKA 71 935 32514					FL MILTON EXP STATION 67 1684 23394	•
DE DOVER 56 4359 9260 FL MOORE HAVEN LOCK 1 73 510 31642 DE GEORGETOWN 5 SW 55 4572 8073 FL MOUNTAIN LAKE 72 615 31620 DE LEWES 1 SW 55 4510 6437 FL NAPLES 2 NE 74 323 34397 DE MILFORD 2 WSW 56 4464 8859 FL NICEVILLE 66 1918 21925 DE NEWARK UNIVERSITY FA 54 4916 7633 FL OCALA 71 881 32180 DE WILMINGTON NCASTLE W 54 4989 8167 FL ORLANDO WSO MCCOY AF 72 660 33985 DE WILMINGTON PORTER RE 53 5129 6724 FL PALATKA 71 935 32514	DE BRIDGEVILLE 1 NW	56	4484	7936	FL MONTICELLO 3 W 67 1737 23957	
DE GEORGETOWN 5 SW 55 4572 8073 FL MOUNTAIN LAKE 72 615 31620 DE LEWES 1 SW 55 4510 6437 FL NAPLES 2 NE 74 323 34397 DE MILFORD 2 WSW 56 4464 8859 FL NICEVILLE 66 1918 21925 DE NEWARK UNIVERSITY FA 54 4916 7633 FL OCALA 71 881 32180 DE WILMINGTON NCASTLE W 54 4989 8167 FL ORLANDO WSO MCCOY AF 72 660 33985 DE WILMINGTON PORTER RE 53 5129 6724 FL PALATKA 71 935 32514	DE DOVER		4337	7200	FL MOORE HAVEN LOCK 1 73 510 31642	!
DE LEWES 1 SW 55 4510 6437 FL NAPLES 2 NE 74 323 34397 DE MILFORD 2 WSW 56 4464 8859 FL NICEVILLE 66 1918 21925 DE NEWARK UNIVERSITY FA 54 4916 7633 FL OCALA 71 881 32180 DE WILMINGTON NCASTLE W 54 4989 8167 FL ORLANDO WSO MCCOY AF 72 660 33985 DE WILMINGTON PORTER RE 53 5129 6724 FL PALATKA 71 935 32514	DE GEORGETOWN 5 SW	55	4572	8073	FL MOUNTAIN LAKE 72 615 31620	
DE MILFORD 2 WSW 56 4464 8859 FL NICEVILLE 66 1918 21925 DE NEWARK UNIVERSITY FA 54 4916 7633 FL OCALA 71 881 32180 DE WILMINGTON NCASTLE W 54 4989 8167 FL ORLANDO WSO MCCOY AF 72 660 33985 DE WILMINGTON PORTER RE 53 5129 6724 FL PALATKA 71 935 32514	DE LEWES 1 SW	55	4510		FL NAPLES 2 NE 74 323 34397	ľ
DE NEWARK UNIVERSITY FA 54 4916 7633 FL OCALA 71 881 32180 DE WILMINGTON NCASTLE W 54 4989 8167 FL ORLANDO WSO MCCOY AF 72 660 33985 DE WILMINGTON PORTER RE 53 5129 6724 FL PALATKA 71 935 32514 FL DENSACOLA USO FL DENSACOLA USO FL DENSACOLA USO 68 1570 20023	DE MILFORD 2 WSW	56	4464	8859	FL NICEVILLE 66 1918 21925	i
DE WILMINGTON NCASTLE W 54 4989 8167 FL ORLANDO WSO MCCOY AF 72 660 33985 DE WILMINGTON PORTER RE 53 5129 6724 FL PALATKA 71 935 32514 EL DENSACOLA USO 68 1570 20023	DE NEWARK UNIVERSITY FA	54	4916	7633	FL OCALA 71 881 32180	¢.
DE WILMINGTON PORTER RE 53 5129 6724 FL PALATKA 71 935 32514	DE WILMINGTON NCASTLE W	54	4989	8167	FL ORLANDO WSO MCCOY AF 72 660 33985)
	DE WILMINGTON PORTER RE	53	5129	6724	FL PALATKA 71 935 32514	ŀ
FL PENSACOLA WSO 66 15/0 29025					FL PENSACOLA WSO 68 1570 29023	•

ST CITY OR LOCATION				<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
FL PLANT CITY FL POMPANO BEACH FL PUNTA GORDA 4 ENE FL QUINCY 3 SSW FL SAINT LEO FL SAINT MARKS 6 SE FL ST PETERSBURG FL SANFORD EXP STATION FL STUART 1 N	72	618	31564	GA	GAINESVILLE GLENNVILLE HARTWELL HAWKINSVILLE JASPER 1 NNW LA FAYETTE LA GRANGE LOUISVILLE 3 S LUMBER CITY MACON WSO MILLEDGEVILLE MILLEN 4 N MOULTRIE 2 ESE NEWNAN ROME SAVANNAH WSO SILOAM SWAINSBORO TALBOTTON THOMASVILLE 4 SE TIFTON EXP STATION	59	3413	14823
FL POMPANO BEACH	75	242	38238	GA	GLENNVILLE	67	1744	23965
FL PUNTA GORDA 4 ENE	74	463	35324	GA	HARTWELL	63	2778	19830
FL OUINCY 3 SSW	67	1593	22638	GA	HAWKINSVILLE	65	2229	23584
FL SAINT LEO	72	707	31949	GA	JASPER 1 NNW	59	3510	11642
FL SAINT MARKS 6 SE	68	1486	25552	GA	LA FAYETTE	59	3627	14513
FL ST PETERSBURG	74	544	38641	GA	LA GRANGE	62	2668	16945
FL SANFORD EXP STATION	72	735	29757	GA	LOUISVILLE 3 S	65	2238	22601
FL STUART 1 N	74	353	34654	GA	LUMBER CITY	65	2215	21112
FL STUART 1 N FL TALLAHASSEE WSO	67	1651	25185	GA	MACON WSO	65	2282	24443
FL TAMIAMI TRL 40 MI BE	75	212	39210	GA	MILLEDGEVILLE	62	2816	17344
FL TAMPA WSO		741	33677	GA	MILLEN 4 N	65	2187	21966
ET TADDON COCC CEUACE D	71	773	29992	GA	MOULTRIE 2 ESE	67	1742	22554
FL TAVERNIER	77	91	45857	GA	NEWNAN	62	2729	16349
FL TITUSVILLE 3 NW	72	711	29876	GA	ROME	61	3136	17745
FL VERO BEACH 4 W	72	523	29263	GA	SAVANNAH WSO	66	1921	22773
FL WAUCHULA 2 N	72	587	31173	GA	SILOAM	63	2571	19135
FL TAKFON SFGS SEWAGE F FL TAVERNIER FL TITUSVILLE 3 NW FL VERO BEACH 4 W FL WAUCHULA 2 N FL WEST PALM BEACH WSO FL WINTER HAVEN	75	262	35175	GA	SWAINSBORO	65	2078	22970
FL WINTER HAVEN	72	612		GA	TALBOTTON	63	2457	19044
				GA	THOMASVILLE 4 SE	67	1672	24599
GA ALBANY 3 SE	66	2062	26516	GA	TIFTON EXP STATION	66	1992	22492
GA ALMA FAA AIRPORT	66	1836	21847	GA	TOCCOA	61	3029	13873
GA AMERICUS 4 ENE	65	2144	22309	GA	WARRENTON	63	2604	18989
GA ATHENS WSO	61	2980	16147	GA	WASHINGTON	61	3119	17655
GA ATLANTA WSO	61	3025	16803	GA	WAYCROSS 4 NE	66	1880	23559
GA AUGUSTA WSO	63	2571	19510	GA	TIFTON EXP STATION TOCCOA WARRENTON WASHINGTON WAYCROSS 4 NE WEST POINT	63	2675	18312
GA BLAIRSVILLE EXP STA	55	4533	4687					
GA BLAKELY	66	1984	23270	HI	HALEAKALA RS 338	53	4276	8
GA BROOKLET 1 W	66	1923	21012	HI	HALEAKALA RS 338 HAWAII VOLCNS NP HQ	60	1716	0
GA BRUNSWICK	69	1384	27480	HI	HILO WSO 87 AP	74	0	14770
FL WINTER HAVEN GA ALBANY 3 SE GA ALMA FAA AIRPORT GA AMERICUS 4 ENE GA ATHENS WSO GA ATLANTA WSO GA AUGUSTA WSO GA BLAIRSVILLE EXP STA GA BLAKELY GA BROOKLET 1 W GA BRUNSWICK GA BRUNSWICK FAA AP GA CAMILLA GA CARROLLTON GA CARTERSVILLE GA CEDARTOWN GA CLAYTON 1 W	67	1611	24730	HI	HONOLULU WSFO 703 AP	77	0	
GA CAMILLA	67	1702	27539	HT	KAHIILIIT WSO 398 AP	76	0	28523
GA CARROLLTON	60	3113	12618	HI	KAINALIU 73.2	70	30	
GA CARTERSVILLE	61	3155	18123	HI	KAINALIU 73.2 KAMUELA 192.2 KANEOHE MAUKA 781	64	826	1082
GA CEDARTOWN	61	3123	15091	HI	KANEOHE MAUKA 781	74	0	18962
GA CLAYTON 1 W	57	3758	5762	HI	KILAUEA POINT 1133			
GA COLUMBUS WSO			22115		KOHALA MISSION 175.1			
GA CORNELIA			10296		KULA SANATORIUM 267			
GA COVINGTON			16945		LAHAINA 361			23409
GA CUTHBERT			25824	HI	LIHUE WSO 1020.1 AP	75	9	25602
GA DAHLONEGA			10002	HI	MANA 1026 MOUNTAIN VIEW 91	75	0	20275
GA DALTON	59	3509	14735	HI	MOUNTAIN VIEW 91	68	184	1029
GA DOUGLAS 2 NNE			22348	HI	NIU RIDGE 1035	71	29	9874
GA DUBLIN 3 S	65		23286	HI	NIU RIDGE 1035 OOKALA 223	72	2	10025
GA EASTMAN 1 W			24634	HI	OPAEULA 870	71	157	11959
GA EXPERIMENT			16316	HI	WAIALUA 847	73	6	12187
GA FITZGERALD	67		26427	-				
GA FOLKSTON 9 SW			24148	ID	ABERDEEN EXP STATION	45	7635	1506
GA FORT GAINES								
GA FORT STEWART	67	1658	23718	ID	ANDERSON DAM	49	6365	6716
	10000 a 4							

ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74	ST CITY OR LOCATION TAVG HDD65 CDH	7 <u>4</u>
			1002		
ID ARCO 3 SW	42	8622	1093		45
ID ARROWROCK DAM			6642		
ID ASHTON 1 S ID AVERY R S NO 2	41		416	ID MOUNTAIN HOME 51 5986 77	
		7056	2449	ID NEW MEADOWS RANGER S 41 8775 5 ID NEZPERCE 46 7250 14	16
ID BAYVIEW MODEL BASIN			496	ID NEZPERCE 46 7250 14 ID OAKLEY 49 6405 30 ID OLA 4 S 48 6580 33 ID OROFINO 52 5460 59 ID PALISADES DAM 44 8024 11	
ID BLISS ID BOISE WSO	50		6112	ID OLA 4 S 48 6580 33	
	51	5808	7979	ID OLA 4 S 48 6580 33 ID OROFINO 52 5460 59	
ID BONNERS FERRY 1 SW		7077 6706	1259	ID OROFINO 52 5460 59 ID PALISADES DAM 44 8024 11	
ID BURLEY FAA AIRPORT	48	6/06	2763	ID PALISADES DAM 44 8024 11 ID PARMA EXPERIMENT STA 50 6006 61	
ID CALDWELL ID CAMBRIDGE	52	2227	10086		
ID CAMBRIDGE	4/	6890	3842		
ID CASCADE 1 NW ID CHALLIS	42	8620 7755	553 2048	ID PAYETTE 51 5728 67 ID POCATELLO WSO 47 7131 32	
ID CHALLIS ID CHILLY BARTON FLAT	40	9649	870	ID POCATELLO WSO 47 7131 32 ID PORTHILL 45 7379 12	
			2764	ID PORTHILL 45 7379 12 ID POTLATCH 3 NNE 46 7114 13	
ID COEUR D'ALENE 1 E ID COUNCIL	40	6594		ID PRIEST RIVER EXP STA 44 7737 8	
ID DEED FLAT DAM	49 51	5656	4806	ID RICHFIELD 45 7443 20	
ID DEER FLAT DAM ID DRIGGS	21	9031	4808	ID RIGGINS RANGER STATI 54 4897 112	
ID DUBOIS EXP STATION	40	8428	2017		13
ID DOBOIS EXP STATION ID EMMETT 2 E	43 51		6385	ID SAINT MARIES 47 6696 20	
ID FAIRFIELD RANGER STA			1017	ID SALMON 1 N 45 7622 15	
ID FAIRFIELD RANGER STATION			2826		66
ID FORT HALL INDIAN AGN				ID SHOSHONE 1 WNW 49 6673 77	
	47			ID SHOSHONE I WAW 49 0073 77 ID SWAN FALLS POWER HOU 56 4714 148	
ID GLENNS FERRY	52		8478	ID WALLACE WOODLAND PAR 44 7687 11	
ID GLENNS FERRI ID GRACE	43		409	ID WALLACE WOODLAND FAR 44 7087 11 ID WEISER 2 SE 50 5920 55	
ID GRACE	52				47
ID GRAND VIEW 2 W ID GRANGEVILLE ID GROUSE	46	7132		IL ALEDO 50 6278 90 IL ALTON DAM 26 55 5135 153 IL ANNA 1 E 57 4411 145	47
ID CROUSE	37	10017	432	IL ALEDO DAM 26 55 5135 153	
ID HATLEY AIRPORT	43	8253		IL ANNA 1 E 57 4411 145	
TD HAMER 4 NW	43	8443	1537	IL ANTIOCH 2 NW 47 7010 56	
ID HAZELTON	49	6480		IL AURORA COLLEGE 49 6620 63	
ID HILL CITY	40	8693	1993 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	IL BELLEVILLE SO ILL UN 55 4823 147	
ID GROUSE ID HAILEY AIRPORT ID HAMER 4 NW ID HAZELTON ID HILL CITY ID HOLLISTER ID IDAHO CITY	48	6587		IL CAIRO WSO 59 3918 201	
ID IDAHO CITY	40	7631		IL CARBONDALE SEWAGE PL 56 4568 141	
TD TDAHO FALLS FAA AP	44	7998	1583	TI CADITMUTTE 54 5216 124	
ID IDAHO FALLS 46 W	42	8629	1371	IL CARLINVILLE 54 5210 124 IL CARLYLE RESERVOIR 55 5059 151 IL CHARLESTON 53 5358 111 IL CHENOA 51 6100 87 IL CHICAGO O HARE WSO 49 6459 66	
ID IDAHO FALLS 46 W ID ISLAND PARK DAM	36	10456	540	IL CHARLESTON 53 5358 111	
ID JEROME	50	6238	6448	IL CHENOA 51 6100 87	
ID KELLOGG	47			IL CHICAGO O HARE WSO 49 6459 66	
ID KOOSKIA	50			IL CHICAGO UNIVERSITY51601381IL CHICAGO MIDWAY AP51618397	
ID KUNA 2 NNE	50	6034		IL CHICAGO MIDWAY AP 51 6183 97	
ID LEWISTON WSO	52	5435	1	IL DANVILLE 52 5605 96	
ID LIFTON PUMPING STATI				IL DECATUR 53 5460 121	
ID MACKAY RANGER STATIO				IL DANVILLE 52 5605 96 IL DECATUR 53 5460 121 IL DE KALB 49 6707 69 IL DIXON 49 6548 81 IL DU QUOIN 1 NNW 56 4606 144 IL EFFINGHAM 54 5338 132	
ID MALAD	47			IL DIXON 49 6548 81	
ID MALAD CITY FAA AP	45	7459	1686	IL DU QUOIN 1 NNW 56 4606 144	
ID MAY RANGER STATION	43	8239	809	IL EFFINGHAM 54 5338 132	
ID MC CALL	41	8901	421	IL FAIRFIELD RADIO WFIW 55 4790 130	
ID MINIDOKA DAM	48			IL FLORA 5 NW 55 4934 130	

ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>		<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65 CDH74
IL FULTON DAM 13	49	6524	7740	1	ΤN	ANDERSON SEWAGE PLAN	51	5891 9279
IL GALESBURG IL GALVA IL GRIGGSVILLE	50	6313	8899					
IL GALVA	50	6430	8426		IN	BERNE BROOKVILLE	51	
IL GRIGGSVILLE	53	5489	13910			CAMBRIDGE CITY		
IL HARRISBURG	58	4272	16849			COLUMBIA CITY 1 S		
IL HILLSBORO 2 SSW	54	5154	12750			COLUMBUS	52	
IL HOOPESTON	51		9190			CRANE NAVAL DEPOT		
TI TACKSONUTTEE	53	5602	12250			CRAWFORDSVILLE PWR P		
IL JERSEYVILLE 2 SW	54	5208	12759			DELPHI 3 NNE		
IL KEWANEE	50	6380	8966			EDWARDSPORT POWER PL		
IL JERSEYVILLE 2 SW IL KEWANEE IL LA HARPE IL LINCOLN IL MARENGO IL MATTOON	51	5954	9840					6244 6784
IL LINCOLN	52	5645	10898		IN	ELWOOD WATERWORKS EVANSVILLE	58	
IL MARENGO	48	6903	6036		IN	EVANSVILLE WSO	56	4734 14797
IL MATTOON	52	5625	10571			FORT WAYNE WSO		6324 6816
IL MCLEANSBORO 2 E	56	4708	14807		IN	FRANKFORT DISPOSAL P		
IL MINONK 3 NE	50	6205	8873			GARY	50	6256 9053
IL MOLINE WSO	50	6504	8616		IN	GOSHEN COLLEGE	50	6294 5861
IL MONMOUTH	51	6038	8918		IN	GREENCASTLE 1 E GREENFIELD	52	5613 10184
IL MORRISON	49	6504	7839		IN	GREENFIELD	52	5800 9265
IL MORRISON IL MOUNT CARROLL	48	6893	6156		IN	GREENSBURG 3 SW HOBART	52	5569 7738
					IN	HOBART	51	6030 7477
IL NEWTON 2 NE	55	5109	14008		IN	HUNTINGTON	51	5987 6682
IL OLNEY 2 S	55	4854	13473		IN	INDIANAPOLIS WSO	52	5653 9082
IL MOUNT VERNON IL NEWTON 2 NE IL OLNEY 2 S IL OTTAWA IL PALESTINE IL PANA IL PARIS WATERWORKS IL PARK FOREST IL PEORIA WSO IL PERU 2 W	52	5918	10014		TN	INDIANAPOLIS SE SIDE	52	5616 9212
IL PALESTINE	55	5036	13287		IN	JOHNSON EXP FARM	56	4758 15091
IL PANA	53	5358	11195		IN	KENTLAND	51	5923 8958
IL PARIS WATERWORKS	53	5456	10984		IN	JOHNSON EXP FARM KENTLAND KOKOMO 7 SE LA PORTE MARION 2 N	51	6042 11141
IL PARK FOREST	49	6486	7368		IN	LA PORTE	50	6304 7104
IL PEORIA WSO	50	6233	9503		IN	MARION 2 N	50	6320 6272
IL PERU 2 W	51	6237	11065		IN	MARTINSVILLE 2 SW MOUNT VERNON NEW CASTLE	52	5641 9124
IL PIPER CITY 3 SE	51	6018	8846		IN	MOUNT VERNON	56	4769 14104
IL PIPER CITY 3 SE IL PONTIAC	52	5901	9421		IN	NEW CASTLE	50	
IL QUINCY FAA AIRPORT IL RANTOUL IL ROCKFORD WSO	52	5795	12195		IN	NORTH VERNON 2 SW	54	4952 10616
IL RANTOUL	51	5967	10363		IN	OAKLANDON GEIST RESV	51	5833 8215
IL ROCKFORD WSO	48	6955	6523			OGDEN DUNES		
IL ROSICLARE	57	4318	15238		IN	OOLITIC PURDUE EXP F PAOLI RADIO WVAK	53	5340 10718
IL RUSHVILLE	52	5733	11939		IN	PAOLI RADIO WVAK	53	5335 9815
IL SPARTA IL SPRINGFIELD WSO	57	4515	16720		IN	PLYMOUTH POWER SUBST PRINCETON 1 W RICHMOND WTR WKS 2 N	50	6147 7588
IL SPRINGFIELD WSO	53	5662	12438		IN	PRINCETON 1 W	56	4768 13987
IL STOCKTON	47	7058			IN	RICHMOND WTR WKS 2 N	51	5979 5560
IL TUSCOLA	53	5477	11199		IN	ROCHESTER ROCKVILLE	49	6528 6507
IL URBANA	52	5766	9949		IN	ROCKVILLE	53	5405 10807
IL VIRDEN 1 N	53	5394	11981			RUSHVILLE SEWAGE PLA		
IL WALNUT	50	6388	9103		IN	SCOTTSBURG	54	5173 10244
IL WATSEKA 2 NW	51	6109	8800			SEYMOUR 2 N		5438 9177
IL UKBANA IL VIRDEN 1 N IL WALNUT IL WATSEKA 2 NW IL WAUKEGAN 4 WSW	48	6884	5160		IN	SHELBYVILLE SEWAGE P	52	5666 9220
IL WHEATON 3 SE	49	6431	6906		IN	SHOALS HIWAY 50 BRID	54	5241 9888
IL WHEATON 3 SE IL WHITE HALL 1 E IL WINDSOR	54	5215	12451		IN	SOUTH BEND WSO	49	6381 6606
IL WINDSOR	53	5393	11579		IN	SOUTH BEND WSO SPENCER TELL CITY POWER PLAN	52	5581 9472
					IN	TELL CITY POWER PLAN	56	4674 13800

IN TERRE HAUTE 8 S 53 5527 9499 IA ESTHERVILLE 2 N 45 7891	6730
	10990
	4714
IN VEVAY 55 4833 11083 IA FAYETTE 46 7573 IN VINCENNES 1 NW 54 5163 12418 IA FOREST CITY 46 7707	6424
IN WABASH 49 6481 6146 IA FORT DODGE 47 7179	7982
	12119
IN WATERLOO 49 6376 5261 IA GREENFIELD 50 6465	9781
IN WEST LAFAYETTE 6 NW 50 6229 7728 IA GRINNELL 3 SW 47 7153	9148
IN WHEATFIELD 2 NNW 49 6637 6341 IA GRUNDY CENTER 46 7452	5025
IN WHITESTOWN 51 6013 7437 IA GUTTENBERG L AND D 1 48 6930	7407
IN WINAMAC 5 SW 50 6242 6366 IA HAMPTON 3 NNE 46 7485	6498
IN WINCHESTER AIRPORT 50 6267 6810 IA HARLAN 49 6675	9317
IA HAWARDEN 48 7183	9157
IA ALBIA 51 6062 11108 IA HUMBOLDT NO 2 47 7336	7668
IA ALGONA 3 W 46 7503 6262 IA IDA GROVE 48 7118	8609
IA ALLISON 47 7206 7271 IA INDEPENDENCE 2 SW 46 7431	5750
	10588
IA ANAMOSA 1 WNW 47 7049 6378 IA IOWA CITY 50 6378	
IA ANKENY 2 SW 49 6792 8357 IA IOWA FALLS 1 E 47 7255	6823
IA ATLANTIC 1 NE 49 6801 8790 IA JEFFERSON 49 6705	9540
	13324
IA BEDFORD 51 6058 11525 IA KEOSAUQUA 52 5881	10282
	10806
IA BELLEVUE L AND D NO 48 6771 7045 IA LAKE PARK 45 7920	6812
	9553
IA BOONE 48 6968 8200 IA LE CLAIRE L AND D 14 50 6289 IA BDIME 46 7507 7340 IA LE MADE O N 7136	9470
	10484
IA CARROLL 2 SSW 48 7095 8223 IA LOGAN 50 6429 IA CASCADE 47 7122 6183 IA MAPLETON 4 NNW 48 6932	10507 8110
IA CASCADE 47 7122 6185 IA MAPLEION 4 NNW 48 6952 IA CASTANA EXP FARM 48 6868 8362 IA MAQUOKETA 48 6796	6728
IA CASIANA EAF FARM4868688362IA MAQUOREIA486796IA CEDAR RAPIDS NO 14966767869IA MARSHALLTOWN487019	7646
IA CEDAR RAFIDS NO 1 49 6076 7869 IA MARSHALLIOWN 48 7019 IA CENTERVILLE 4 SSW 51 6096 10548 IA MASON CITY 3 N 46 7670	6687
IA CHARITON 50 6288 9242 IA MASON CITY FAA AP 45 7886	5584
IA CHARTION 50 6288 5242 IA MASON CITI FAA AF 45 7888 IA CHARLES CITY 47 7394 6568 IA MILFORD 4 NW 45 7851	6472
IN CHERCIES 46 7471 7430 IN MELLOR 4 NW 45 7051 IA CHERCKEE4674717430IA MOUNT PLEASANT516185	
	9712
IA CLARION 46 7556 6233 IA NEW HAMPTON 45 7666	
	10613
	6809
IA CORNING 49 6638 9461 IA OAKLAND 2 E 49 6573	
IA CORYDON 50 6340 10852 IA OELWEIN 2 SE 46 7424	
IA CRESCO 45 7947 4381 IA ONAWA 50 6590	10821
IA CRESTON 2 SW 50 6493 9452 IA OSAGE 46 7649	5082
IA DAVENPORT L AND D NO 51 6281 9984 IA OSCEOLA 50 6327	
IA DECORAH 2 N 46 7566 5292 IA OSKALOOSA 50 6269	
IA DENISON 48 6951 7681 IA OTTUMWA FAA AIRPORT 50 6343	
IA DES MOINES WSO 50 6563 10484 IA PERRY 48 6923	7636
IA DUBUQUE L AND D NO 1 49 6754 8047 IA POCAHONTAS 47 7366	7593
IA DUBUQUE WSO 46 7379 4661 IA PRIMGHAR 47 7344	
IA EMMETSBURG 46 7491 6827 IA RED OAK 51 6224	11457

			BSR/ASHRAE	Proposed	Standard	90.2P
HDD65	<u>CDH74</u>	<u>st</u>	CITY OR LOCAT	LON TA	AVG HDD65	<u>CDH74</u>

01	OTTI OK LOOATION	100	<u> 110005</u>	001174	÷	CITI ON LOCATION		<u>mbb05</u>	
Т۸	ROCK RAPIDS ROCKWELL CITY SAC CITY SANBORN SHELDON SHENANDOAH SIBLEY SIGOURNEY SIGOURNEY SIOUX CITY WSO SIOUX RAPIDS SPENCER 1 N STORM LAKE 2 E TIPTON TOLEDO TRIPOLI VINTON WASHINGTON WASHINGTON WATERLOO WSO WAUKON WEBSTER CITY WILLIAMSBURG WINTERSET 3 NW ABILENE 2 S	1.6	7670	7637	l ve	FLORENCE FORT SCOTT FREDONIA 1 E GARDEN CITY FAA AP GARNETT GOODLAND WSO GREAT BEND GREENSBURG HAYS 1 S HEALY HERINGTON HILL CITY FAA AIRPOR	56	1.020	20610
	ROCK KAPIDS	40	7030	7909	NO VC	FLORENCE FORT SCOTT	50	4000	20019
	ROCKWELL CITT	40	7020	9391	NO VC	FURI SCUII	50	4324	24110
TA	SAU CITI	40	7020		NO VC	CADDEN CITY EAA AD	50	4000	16750
TA	SANDURN	40	7664	- CAS 20-00 20	NO NO	GARDEN CITI FAA AP	54	2212	10104
	SHELDON	40	/004		KS	GARNEII	20	409/	19194
	SHENANDOAH	52	2622	12737	KS	GOUDLAND WSO	51	6103	10079
IA	SIBLEY	46	/6/9	6447		GREAT BEND	56	4840	21032
LA	SIDNEY	52	5810	13580		GREENSBURG	56	4902	19665
IA	SIGOURNEY	50	6336	10972	KS	HAYS 1 S	53	5665	16258
IA	SIOUX CITY WSO	48	6953	10117	KS	HEALY	54	5374	15537
IA	SIOUX RAPIDS	46	7472	7247	KS	HERINGTON	55	5096	18068
IA	SPENCER 1 N	45	7845	6148	KS	HILL CITY FAA AIRPOR	53	5683	15764
IA	STORM LAKE 2 E	45	7751	17	KS	HOLTON 4 NE	54	5397	15027
IA	TIPTON	49	6729	8809	KS	HORTON	53	5472	14061
IA	TOLEDO	47	7141	7152	KS	HOWARD 5 NE	57	4509	20139
IA	TRIPOLI	47	7320	6040	KS	HOXIE	54	5422	14656
IA	VINTON	48	6856	7884	KS	HUDSON	56	4824	19677
IA	WASHINGTON	51	6111	10812	KS	HUGOTON	56	4764	16207
IA	WATERLOO WSO	46	7542	6641	KS	INDEPENDENCE	58	4288	20312
IA	WAUKON	45	7663	3577	KS	JETMORE	56	4814	18726
IA	WEBSTER CITY	47	7175	7296	KS	JOHN REDMOND DAM	56	4923	19348
IA	WILLIAMSBURG	49	6576	8047	KS	JOHNSON 11 ESE	55	4996	14573
IA	WINTERSET 3 NW	49	6685	8689	KS	KANOPOLIS DAM	54	5429	18528
					KS	KINGMAN	57	4560	21859
KS	ABILENE 2 S	55	5309	20240	KS	KINSLEY	55	5078	18404
KS	ALTON 6 E	54	5392	17440	KS	KIRWIN	52	5904	15423
KS	ANTHONY	58	4288	23640	KS	LAKIN	54	5243	16519
KS	ASHLAND	56	4778	19344	KS	LARNED	56	4780	20049
KS	ABILENE 2 S ALTON 6 E ANTHONY ASHLAND ATCHISON ATWOOD BELLEVILLE BISON CENTRALIA CHANUTE FAA AIRPORT CIMARRON CLAY CENTER COLBY 1 SW	54	5270	14261	KS	HERINGION HILL CITY FAA AIRPOR HOLTON 4 NE HORTON HOWARD 5 NE HOXIE HUDSON HUGOTON INDEPENDENCE JETMORE JOHN REDMOND DAM JOHNSON 11 ESE KANOPOLIS DAM KINGMAN KINSLEY KIRWIN LAKIN LARNED LAWRENCE LEAVENWORTH 3 S LEOTI LIBERAL LINCOLN 1 ESE MANHATTAN MARYSVILLE MCPHERSON 2 S MEADE MEDLCINE LODCE	56	4822	18744
KS	ATWOOD	52	5757	11467	KS	LEAVENWORTH 3 S	54	5191	15843
KS	BELLEVILLE	53	5671	17076	KS	LEOTI	53	5575	12503
KS	BISON	55	5079	19033	KS	LIBERAL.	58	4319	20343
KS	CENTRALIA	53	5524	15041	KS	LINCOIN 1 FSF	55	5102	20545
KC	CHANITE FAA ATRPORT	56	4690	19767	NO NO	MANHATTAN	55	5122	18826
VC	CIMADDON	55	4050	16/01	VC	MADVOUTIIE	53	5023	15500
VC	CLAV CENTED	55	5156	19772	VC	MCDUEDCON 2 C	56	6010	21162
VC	COLDENTER COLDENTER COLDWATER COLUMBUS 6 NNW CONCORDIA WSO COTTONWOOD FALLS COUNCIL GROVE DAM DODGE CITY WSO	51	2157	11927	NO NC	MEADE	50	4910	21142
VC	COLDIIISW	57	6137	21771	NO NO	MEDICINE LODCE	57	44/4	18875
K9	COLDWATER	57	44/9	THE REPORT OF A DECK	KO	MEDICINE LODGE	56	4392	20917
KS	COLUMBUS 6 NNW	20	4237	19579	KS	MEDICINE LODGE MINNEAPOLIS 2 MOUND CITY	20	5021	20666
KS	CONCORDIA WSO	55	2021	16686	KS	MOUND CITY MOUND VALLEY 3 WSW NESS CITY	57	4622	19919
KS	COTTONWOOD FALLS	56	4809	19925	KS	MOUND VALLEY 3 WSW	58		21153
KS	COUNCIL GROVE DAM	54	53/9	17921		NESS CITY NEWTON 2 SW	55		18531
KS	DODGE CITY WSO	55	5069	18470	KS	NEWTON 2 SW	56		21973
KS	DODGE CITY WSO EL DORADO ELKHART ELLSWORTH EMPORIA FAA AIRPORT	57	4628	20038	KS	NORTON 8 SSE	. 53	5614	14262
KS	ELKHART	56	4514	15027	KS	OAKLEY OBERLIN	54		14031
KS	ELLSWORTH	55	5103	19273	KS	OBERLIN	53		14158
KS	EMPORIA FAA AIRPORT	55	5120	17385	KS	OLATHE 3 E	55		16010
K2	ESKRIDGE	55	5138	17003		OTTAWA			18363
	ESKRIDGE EUREKA	57	4549	20756		PARSONS	58		21956
KS	FALL RIVER DAM	56	4710	19843	KS	PHILLIPSBURG 1 SSE	54	5427	18144

ST CITY OR LOCATION

TAVG

<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>	<u>st</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
KS	PLAINVILLE PRATT 2 E QUINTER RUSSELL FAA AP SAINT FRANCIS SALINA FAA AIRPORT SCOTT CITY SEDAN SHARON SPRINGS SMITH CENTER SUBLETTE SYRACUSE 2 W TOPEKA WSO TORONTO DAM TRIBUNE 1 W TROY 3 SW WAKEENEY WAMEGO WASHINGTON WELLINGTON 2 S WICHITA WSO WINFIELD	54	5390	17492	КY	MAYFIELD RADIO WNGO	58	4015	15990
KS	PRATT 2 E	57	4600	19658	KY	MAYSVILLE SEWAGE PLA	53	5199	8230
KS	OUINTER	52	5884	13146	KY	MAYSVILLE SEWAGE PLA MIDDLESBORO MOUNT STERLING MURRAY OWENSBORO 2 W PADUCAH SEWAGE PLANT PRINCETON 1 SE RUSSELLVILLE SCOTTSVILLE 3 SSW SHELBYVILLE SOMERSET 2 N SUMMER SHADE VANCEBURG WEST LIBERTY WILLIAMSBURG 1 E WILLIAMSTOWN 3 NW	56	4439	9526
KS	RUSSELL FAA AP	54	5447	18481	KY	MOUNT STERLING	56	4485	9854
KS	SAINT FRANCIS	53	5475	12509	KY	MURRAY	58	3983	16939
KS	SALINA FAA AIRPORT	55	5195	19770	KY	OWENSBORO 2 W	57	4285	14515
KS	SCOTT CITY	54	5146	13810	KY	PADUCAH SEWAGE PLANT	58	4133	16718
KS	SEDAN	57	4413	21718	KY	PRINCETON 1 SE	58	4137	14877
KS	SHARON SPRINGS	54	5141	14045	КY	RUSSELLVILLE	57	4318	14432
KS	SMITH CENTER	54	5536	17597	КҮ	SCOTTSVILLE 3 SSW	58	3953	13918
KS	SUBLETTE	56	4742	16188	KY	SHELBYVILLE	54	5002	10996
KS	SYRACUSE 2 W	54	5255	15084	КҮ	SOMERSET 2 N	56	4441	9211
KS	TOPEKA WSO	54	5323	16640	KY	SUMMER SHADE	56	4329	11716
KS	TORONTO DAM	56	4795	20075	KY	VANCEBURG	54	4851	9476
KS	TRIBUNE 1 W	53	5569	10742	KY	WEST LIBERTY	53	5120	8110
KS	TROY 3 SW	54	5437	13942	KY	WILLIAMSBURG 1 E	57	4252	11397
KS	WAKEENEY	53	5587	14811	KY	WILLIAMSTOWN 3 NW	54	5040	9694
KS	WAMEGO	55	5000	18598					
KS	WASHINGTON	54	5366	16917	LA	ALEXANDRIA	67	1960	27315
KS	WELLINGTON 2 S	58	4455	22322	LA	AMITE	67	1842	25239
KS	WICHITA WSO	56	4791	21208	LA	BASTROP	66	2223	29505
KS	WINFIELD	58	4222	21992	LA	BATON ROUGE WSO	68	1673	26938
					LA	BELAH FIRE TOWER	66	2154	26203
KY .	ANCHORAGE ASHLAND BARBOURVILLE BARDSTOWN BAXTER BEAVER DAM BEREA COLLEGE BOULING CREEN FAA AR	55	4737	9729	LA	ALEXANDRIA AMITE BASTROP BATON ROUGE WSO BELAH FIRE TOWER BOGALUSA BUNKIE CALHOUN EXP STATION CARVILLE 2 SW COTTON VALLEY COVINGTON 4 NNW	67	1876	27094
KY .	ASHLAND	54	4911	11353	LA	BUNKIE	66	1979	26513
KY	BARBOURVILLE	56	4289	10998	LA	CALHOUN EXP STATION	65	2443	25695
KY	BARDSTOWN	56	4397	12071	LA	CARVILLE 2 SW	68	1554	27452
KY	BAXTER	55	4702	7839	LA	COTTON VALLEY	64	2557	24255
KY	BEAVER DAM	57	4234	13296	LA	COVINGTON 4 NNW	67	1668	24305
KY	BEREA COLLEGE	57	4242	11785	LA	COVINGTON VALLEY COVINGTON 4 NNW DONALDSONVILLE 3 E ELIZABETH FRANKLIN 3 NW GRAND COTEAU HACKBERRY 8 SSW HAMMOND 3 NW	69	1492	31237
V1	DOWLING GREEN FAA AF	57	4314	14/43	LA	ELIZABETH	66	1933	26835
	CAMPBELLSVILLE 2 SSW				LA	FRANKLIN 3 NW	68	1499	26851
	CARROLLTON LOCK 1	55	4597		LA	GRAND COTEAU	68	1567	26395
	COVINGTON WSO	53	5253		LA	HACKBERRY 8 SSW	68	1595	28901
	DILLIVIILLE		+025	10467	LA	HAMMOND 3 NW	67	1712	24661
	FARMERS 1 WNW				LA	HOMER EXP STATION	64	2497	23206
KY	FORDS FERRY DAM 50	57	4295	15863	LA	HOUMA JENNINGS	69	1315	27863
KY	FRANKFORT LOCK 4	54	5010	9672	LA	JENNINGS	68	1601	30016
KY	GREENSBURG	56	4563	11993	LA	LAFAYETTE FAA AIRPOR	68	1560	28543
KY	HENDERSON 7 SSW	57	4318	14216	LA	LAKE ARTHUR 10 SW	68	1680	28665
KY	HICKMAN 1 E	58	4014	16498	LA	LAKE CHARLES WSO	68	1580	28573
KY	HOPKINSVILLE	57	4365	14936		LAKE PROVIDENCE	65	2418	27652
KY	JACKSON WSO AP	53	5283	6253	LA	LEESVILLE	66	1980	23463
KY	LEITCHFIELD 2 N	56	4484	13551		LAFAILITE FAA AIRFOR LAKE ARTHUR 10 SW LAKE CHARLES WSO LAKE PROVIDENCE LEESVILLE LOGANSPORT 4 ENE MELVILLE MINDEN	65	2244	24650
KY	LEXINGTON WSO	55	4819	11208	LA	MELVILLE	67	1705	25375
KY	LOUISVILLE WSO	56	4529	13268	LA	MINDEN	64	2466	25381
KY	LOVELACEVILLE	58	4126	14982		MONROE FAA AIRPORT	65	2406	26604
KY	MADISONVILLE 1 SE	57	4163	13736	LA	MORGAN CITY	69	1402	30207
KY	MAMMOTH CAVE PARK	57	4248	11481		MONROE FAA AIRPORT MORGAN CITY NATCHITOCHES NEW IBERIA 5 NW	67	1934	28898
KY	MANCHESTER 4 SE	56	42/5	8452	LA	NEW IBERIA 5 NW	68	1226	27504

LA NEW ORLEANS MOISANT 68 1490 28605 MD LA PLATA 1 W 56 4389	3229
IA N O AUDUBON WSO 70 1311 32758 MD IAUREL 3 W 56 4497 1 IA OLLA 3 SSW 65 2248 25869 MD MILLINGTON 54 4841	
LA OLLA 3 SSW 65 2248 25869 MD MILLINGTON 54 4841	8458
LA PLAIN DEALING 63 2721 23503 MD NATIONAL ARBORETUM D 57 4270 1	
LA RESERVE 68 1624 28797 MD OAKLAND 1 SE 48 6602	1068
	8560
LA SAINT JOSEPH EXP STA 65 2247 24669 MD POCOMOKE CITY 57 4205 1	
LA SHREVEPORT WSO 65 2271 28295 MD PRINCESS ANNE 56 4303	8033
	9754
LA VERMILION LOCK 67 1751 24523 MD ROYAL OAK 57 4196 1	
LA VERMILION LOCK 67 1751 24523 MD ROYAL OAK 57 4196 1 LA WINNFIELD 2 W 65 2221 25308 MD SALISBURY 57 4021	9166
LA WINNSBORO 65 2338 26800 MD SALISBURY FAA AIRPOR 56 4415	8832
MD SAVAGE RIVER DAM 49 6340	2022
	B154
ME BANGOR FAA AP 44 7951 1232 MD SOLOMONS 58 3983 1	
ME BAR HARBOR 46 7227 980 MD UNIONVILLE 52 5422	5297
ME BELFAST 46 7303 1004 MD VIENNA 57 4149 1	
ME CARTBOIL WSO 39 9621 920 MD WESTMINSTER POLICE B 53 5254	6118
ME AUGUSTA FAA AIRPORT 45 7598 2236 MD SNOW HILL 4 N 56 4248 ME BANGOR FAA AP 44 7951 1232 MD SOLOMONS 58 3983 1 ME BAR HARBOR 46 7227 980 MD UNIONVILLE 52 5422 ME BELFAST 46 7303 1004 MD VIENNA 57 4149 1 ME CARIBOU WSO 39 9621 920 MD WESTMINSTER POLICE B 53 5254 ME CORINNA 43 8341 1212 MD WOODSTOCK 54 5031 ME EASTPORT 44 7846 67 MA AMHERST 48 6614 ME FARMINGTON 42 8639 1375 MA BIRCH HILL DAM 45 7454	6465
ME EASTPORT 44 7846 67 MA AMHERST 48 6614	2937
ME FARMINGTON 42 8639 1375 MA BIRCH HILL DAM 45 7454	1440
	2125
ME HOULTON FAA AP 40 9279 1393 MA BOSTON WSO 52 5596	5358
	797
ME JONESBORO 43 8222 257 MA CHESTNUT HILL 50 5947	4337
ME JONESBORO 43 8222 257 MA CHESTNUT HILL 50 5947 ME LEWISTON 46 7351 2302 MA CLINTON 48 6596	2796
ME MADISON 43 8234 1041 MA EAST WAREHAM 49 6297	2367
	1163
	3291
	4204
	5031
ME WATERVILLE PUMP STA 45 7514 1841 MA HYANNIS 2 NNE 50 5973	1977
ME WOODLAND 43 8101 1311 MA KNIGHTVILLE DAM 46 7397	1523
ME WOODLAND 43 8101 1311 MA KNIGHTVILLE DAM 46 7397 MD BALTIMORE WSO 55 4714 9504 MA MIDDLETON 50 6063	3615
MD BALTIMORE WSO 55 4714 9504 MA MIDDLETON 50 6063	2770
MD BALTIMORE CITY WSO 58 4086 15162 MA NANTUCKET FAA AP 49 5961	962
MD BALTIMORE WS0 55 4714 9504 MA MA MIDDLETON 50 6063 MD BALTIMORE CITY WS0 58 4086 15162 MA NANTUCKET FAA AP 49 5961 MD BELTSVILLE 54 5054 6529 MA NEW BEDFORD 52 5311 MD BENSON POLICE BARRAC 54 5002 7530 MA PLYMOUTH 50 6018 MD CAMBRIDGE 4 56 4334 9530 MA ROCHESTER 49 6324 MD CHESTERTOUN 56 4608 0400 MA ROCKEDERT 1 ESE	6369
MD BELTSVILLE 54 5054 6529 MA NEW BEDFORD 52 5311 MD BENSON POLICE BARRAC 54 5002 7530 MA PLYMOUTH 50 6018	3433
MD CAMBRIDGE 4 W 56 4334 9530 MA ROCHESTER 49 6324	2152
MD CAMBRIDGE 4 W 56 4334 9530 MA ROCHESTER 49 6324 MD CHESTERTOWN 56 4608 9490 MA ROCKPORT 1 ESE 49 6297	1056
MD COLLEGE PARK 56 4459 10034 MA SPRINGFIELD 51 5955	5205
MD CONOWINGO DAM 53 5206 6639 MA STOCKBRIDGE 46 7270	1217
MD CRISFIELD SOMERS COV 58 3905 12837 MA TAUNTON 49 6277	2395
MD CUMBERLAND 2 53 5108 7088 MA TULLY LAKE 45 7496	1539
MD DALECARLIA RESVR D C 56 4428 9755 MA WORCESTER WSO 47 6951	1504
MD DENTON 1 WNW 56 4453 9070	
MD DENTON 1 WNW 56 4453 9070 MD EASTON POLICE BARRAC 57 4217 11022 MI ADRIAN 2 NNE 48 6649	4341
MD GLENN DALE BELL STA 55 4655 7358 MI ALLEGAN SEWAGE PLANT 48 6642	4938
MD HAGERSTOWN 54 5092 7346 MI ALMA 47 6951	4286
MD GLENN DALE BELL STA5546557358MI ALLEGAN SEWAGE PLANT486642MD HAGERSTOWN5450927346MI ALMA476951MD HANCOCK FRUIT LAB5255784675MI ALPENA WSO428413	837

<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74	<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>
мт	ALPENA SEWAGE PLANT	44	7950	1161 📗	мт	LAKE CITY EXP FARM	43	8201	1545
	ANN ARBOR UNIV OF MI	50		6081		LANSING WSO	47		4070
	BAD AXE	46	7319	2962		LAPEER	47		3112
	BALDWIN	45	7603	3159		LUDINGTON 4 SE		7250	2116
	BATTLE CREEK	48	6723	4345		LUPTON 1 S	43	8254	1185
	BEECHWOOD 7 WNW			1693		MANISTEE	47		2678
	BENTON HARBOR AIRPOR			5536		MARQUETTE WSO			1364
	BERGLAND DAM	39		1322	мт	MARQUETTE FAA AP	39		903
	BIG RAPIDS WATERWORK		7635	2870	мт	MARQUETTE FAA AP MIDLAND	48		3811
	CADILLAC	43	8417	1512		MILFORD GM PROVING G			3600
	CARO	47		3000		MIO HYDRO PLANT	43		1729
	CHAMPION VAN RIPER P	39		956		MONROE SEWAGE PLANT			6028
	CHARLOTTE	47		3831		MONTAGUE	47		2126
	CHATHAM EXP FARM	42		1089		MT PLEASANT UNIVERSI			3502
	CHEBOYGAN RR LIGHT S	44		1950		MUSKEGON WSO	47		2869
	COLDWATER STATE SCHO		6747	3720		NEWBERRY STATE HOSP			906
	DETROIT METROPOLITAN	49				ONAWAY STATE PARK	44		2169
	DUNBAR FOREST EXP ST	41				OWOSSO WASTEWATER PL			3130
	EAST JORDAN	44		2587		PELLSTON FAA AIRPORT			1238
MT	EAST TAWAS	45	7686	1580		PONTIAC STATE HOSPIT			5057
MI	EAU CLAIRE 4 NE	49	6348	5843		PORT HURON WASTEWTR	49		5279
MI	EAU CLAIRE 4 NE ESCANABA EVART FAYETTE	42	8549	805		SAGINAW FAA AP	47		3262
MI	EVART	44	7885	2041		SAINT CHARLES	48		4777
MI	FAYETTE	43	8329	717		SAINT JOHNS	48		3791
MI	FLINT WSO	47	7067	2929		SANDUSKY	47		3264
	GAYLORD CON DEP	43	8182			SAULT STE MARIE WSO			844
MI	GLADWIN	45	7640	2368		SENEY NATL WLR	42	8574	1059
MI	GRAND HAVEN FIRE DEP	48	6543	3317		SOUTH HAVEN EXP FARM	49	6466	3865
MI	GRAND MARAIS 1 SSE	41	8939	1078	MI	STAMBAUGH 1 S	40	9178	1077
MI	GRAND RAPIDS KENT WS	48	6927	4555	MI	STANDISH 2 S	45	7640	1969
MI	GRAYLING	43	8188	2416	MI	STEPHENSON 5 W	43	8419	1490
MI	GREENVILLE 2 NNE	47	6983	3709	MI	THREE RIVERS	49	6462	5104
MI	GROSSE POINTE FARMS	50	6179	5859	MI	TRAVERSE CITY FAA AP	45	7800	2968
MI	GULL LAKE BIOL. STA.	49	6582	5048	MI	VANDERBILT TROUT STA	41	8823	1591
MI	HALE LOUD DAM	44	8025	1363	MI	WATERSMEET	40	9320	1628
MI	HARBOR BEACH 3NW	46	7346	1927	MI	WEST BRANCH 2 N	44	8006	1781
				2762	MI	WILLIS 5 SSW YPSILANTI EAST MICH	47	6849	2948
MI	HASTINGS	48	6788	4464	MI	YPSILANTI EAST MICH	49	6480	6403
MI	HESPERIA 4 E HILLSDALE HOLLAND WJBL	46	7399	3025					
MI	HILLSDALE	48	6791	3118	MN	I ADA	41	9194	5000
MI	HOLLAND WJBL	49	6570	5158	MIN	ALBERT LEA	45	7969	6354
MT	HOHOM DAL DAL AD	10	0105	10/0	MN	ALEXANDRIA FAA AIRPO	/ 1	0007	1100
MI	HOUGHTON FAA AP HOUGHTON LAKE 3 NW	44	8072	2499	MN	ARGYLE 4 E	38	10329	2667
MI	HOUGHTON LAKE WSO	43	8300	2148	MIN	ARTICHOKE LAKE	43	8516	5713
MI	IONIA 5 NW	48	6845	4553	MIN	AUSTIN 3 S	45	7985	4568
MI	IRON MOUNTAIN WTR WK	42	8695	1424	MN	BABBITT 2 SE	39	9829	1784
MI	IRONWOOD	40	9190	2155	MN	I BAUDETTE	38	10162	2091
MI	ISHPEMING	41	8940	1505	MIN	BEMIDJI AIRPORT	38	10207	2191
MI	JACKSON FAA AIRPORT	48	6836	4752	M	BIG FALLS	38	9964	2053
MI	KALAMAZOO STATE HOSP	50	6284	6262	MN	ALEXANDRIA FAA AIRPO ARGYLE 4 E ARTICHOKE LAKE AUSTIN 3 S BABBITT 2 SE BAUDETTE BAUDETTE BEMIDJI AIRPORT BIG FALLS CAMBRIDGE ST HOSPITA	42	8802	3577

<u>st</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>				HDD65	<u>CDH74</u>
MN	CAMPBELL	41	9293	4016	MN	TRACY TWO HARBORS VIRGINIA WADENA 3 S WARROAD	45	8133	7880
	CAMPBELL CANBY	45		8352	MN	TWO HARBORS	40	9233	957
	CLOQUET FOR RES CENT	39		1195	MN	VIRGINIA	39	9848	2189
	COLLEGEVILLE ST JOHN	43		4332	MN	WADENA 3 S	40	9378	3222
	CROOKSTON NW EXP STA	40		3621	MN	WARROAD	38	10282	2133
MNT	DETROTT LAVES 1 NNE	30	0850	2311	MN	WASECA EXP. STATION	- 44	8322	4851
MN	DULUTH WSO FAIRMONT FARIBAULT FARMINGTON 3 NW FERGUS FALLS FOSSTON GRAND MARAIS CRAND MEADOU	38	9906	849		WHEATON		8238	7406
MN	FATRMONT	45	7870	6923		WILLMAR STATE HOSPIT			4733
MN	FARTBAILT	45	7987	5977					7172
MN	FARMINGTON 3 NW	44	8107	4525	MN	WINDOM WINNEBAGO	44		5184
MN	FERGUS FALLS	42	8998	5125		WINNIBIGOSHISH DAM			2297
MN	FOSSTON	40	9471	3340	MN	WINONA	45	7824	6691
MN	GRAND MARAIS	39	9636	290	MN	WINONA ZUMBROTA	45	8003	4753
MN	GRAND MEADOW	43	8387	3603			45	0000	1700
	GRAND RAPIDS NC SCHO		9533	1691	MS	ABERDEEN	63	2713	21555
MN	GULL LAKE DAM	41	8995	2903	MS	BATESVILLE 2 SW	61	3213	20555
MN	HALLOCK	38	10310	3472	MS	BAY SAINT LOUIS	67	1767	27189
MN	HINCKLEY	41	9104	2028	MS	BAY SPRINGS	65	2282	23924
MN	GULL LAKE DAM HALLOCK HINCKLEY INTNL FALLS WSO	36	10607	1614	MS	BELZONT	64	2714	25261
MN	ITASCA STATE PARK SC	39	9774	2143	MS	BILOXI CITY	68	1499	28079
				3868	MS	BOONEVILLE	60	3443	19626
MN	JORDAN 1 S LEECH LAKE DAM LITCHFIELD	40	9395	2166	MS	BROOKHAVEN	65	2070	22818
MN	LITCHFIELD	44	8224	6334	MS	CANTON	64	2568	23553
MN	LITTLE FALLS 1 N	42	8829	3761	MS	CHARLESTON	62	3075	22152
MN	LITTLE FALLS 1 N LONG PRAIRIE	41	9024	3543	MS	CLARKSDALE	63	2972	27450
MN	MADISON SEUACE DIANT	45	8051	7079	MS	CLEVELAND	63	2922	24451
MN	MAPLE PLAIN	44	8328	5505	MS	COLLINS	65	2164	21080
MN	MARSHALL	44	8126	6819	MS	COLUMBIA	66	1882	25247
MN	MAPLE PLAIN MARSHALL MEADOWLANDS MILACA MILAN MINN-ST PAUL WSO MONTEVIDEO 1 SW	39	9751	1352	MS	COLUMBUS	63	2868	21829
MIN	MILACA	42	8819	2997	MS	CORINTH 5 WSW	61	3216	21340
MN	MILAN	43	8518	5393	MS	EUPORA 1 E	63	2789	19843
MIN	MINN-ST PAUL WSO	45	8010	6806	MS	FOREST 3 S	63	2589	20203
MN	MONTEVIDEO 1 SW	44	8298	6022	MS	GREENVILLE	64	2636	25519
MN	MOOSE LAKE I SSE	40	9406	1695	MS	ABERDEEN BATESVILLE 2 SW BAY SAINT LOUIS BAY SPRINGS BELZONI BILOXI CITY BOONEVILLE BROOKHAVEN CANTON CHARLESTON CLARKSDALE CLEVELAND COLLINS COLUMBIA COLUMBIA COLUMBUS CORINTH 5 WSW EUPORA 1 E FOREST 3 S GREENVILLE GREENWOOD FAA AP GULFPORT NAVAL CENTE	64	2720	26043
MN	MORA MORRIS W C SCHOOL NEW ULM 2 SE	42	8755	3632	MS	GULFPORT NAVAL CENTE	68	1540	27468
MN	MORRIS W C SCHOOL	42	9009	4338	MS	HATTIESBURG	66	2026	
MN	NEW ULM 2 SE	46	7703	6803	MS	HATTIESBURG HERNANDO	62	3213	22171
MN	PARK RAPIDS PINE RIVER DAM PIPESTONE POKEGAMA DAM	40	9602	2452	MS	HOLLY SPRINGS 4 N	60	3556	19200
MN	PINE RIVER DAM	41	9191	2262	MS	HOUSTON 2 NE	61	3282	17172
MN	PIPESTONE	43	8542	5395	MS	JACKSON WSO	65	2390	25152
MN	POKEGAMA DAM	40	9462	1962	MS	KIPLING	63	2623	19107
MN	RED LAKE FALLS	39	9715	3026	MS	KOSCIUSKO	62	2896	21352
	RED LAKE INDIAN AGEN			2210	MS	LAUREL	65	2295	24917
				3901	MS	HERNANDO HOLLY SPRINGS 4 N HOUSTON 2 NE JACKSON WSO KIPLING KOSCIUSKO LAUREL LIBERTY 1 W MERIDIAN USO	65	2238	22015
MN	ROSEAU 1 E	37	8279 10467	2124	MS	MERIDIAN WSO	64	2478	23827
	ROSEMOUNT AGRI EXP S			4546	MS	MONTICELLO	65	2345	23206
				3000	MS	MOORHEAD	64	2636	25056
MN	ST PETER 2 SW	45	7972	6754	MS	NATCHEZ	66	1941	26518
MN	SANDY LAKE DAM LIBBY	40	9278	2104	MS	MERIDIAN WSO MONTICELLO MOORHEAD NATCHEZ NEWTON EXP STATION PHILADELPHIA 1 WSW	64	2480	19886
MN	ST CLOUD WSO ST PETER 2 SW SANDY LAKE DAM LIBBY SPRINGFIELD 1 NW	45	8011	5477	MS	MOORHEAD NATCHEZ NEWTON EXP STATION PHILADELPHIA 1 WSW	63	2750	19765

ST	CITY OR LOCATION	TAVG	HDD65	срн74	ST	CITY OR LOCATION	TAVG	HDD65	CDH74
91	UTT OK LOOKITON	11110	<u>110005</u>		0,	<u>OTTI OK DOUATION</u>	11110	110000	
MS	PICAYUNE	67	1609	25461	MC) JEFFERSON CITY L U		4901	
MS	PICKENS	63	2586	21831	MC) JOPLIN FAA AIRPORT	58	4329	20836
MS	POPLARVILLE EXP STA	67	1639	25410	MC) KANSAS CITY WSO		5292	
MS	PORT GIBSON	64	2534	20743	MC) KANSAS CITY FAA AP	56	4814	
	ROSEDALE	62	2982	22170	MC) KIRKSVILLE RADIO KIR	52		9936
MS	RUSSELL 2 WNW	64	2395	22247	MC) LAKESIDE	55	4901	12642
MS	STATE UNIVERSITY	63	2749	23235	MC) LAKESIDE) LAMAR) LEBANON) LEXINGTON	56	4789	17478
MS	STONEVILLE EXP STA	63	2775	23629	MC	LEBANON	56	4549	15769
MS	TUPELO 2 WNW	62	3097	22982	MC	LEXINGTON	54	5312	17298
MS	TYLERTOWN 2 WNW	66	1916	22364	MC) LEXINGION) LICKING 4 N) LOCKWOOD	54	5072	13875
MS	UNIVERSITY	61	3387	20875	MC) LOCKWOOD	57	4314	19346
MS	VICKSBURG MILITARY P	65	2200	24595	M	D LOUISIANA STARKS NUR	54	5209	12728
MS	WATER VALLEY 1 NNE	61	3146	20148		MACON	52	5785	11712
MS	WIGGINS 4 SE	66	1923	25378	M	MARBLE HILL	56	4469	13381
MS	WOODVILLE 4 ESE	66	1919	22190	M	MARSHFIELD	56	4632	16052
MS	YAZOO CITY 5 NNE	64	2485	26185	M	MARYVILLE 2 E MEXICO	50	6357	11608
								5608	14122
MO	ANDERSON APPLETON CITY ARCADIA BETHANY BOLIVAR 1NE	57	4383	13808		MOBERLY RADIO KWIX		5294	13278
MO	APPLETON CITY	56	4636	18273	M	MOUNTAIN GROVE 2 N	56	4453	14656
MO	ARCADIA	56	4490	12149		MOUNT VERNON MU FARM		4616	17167
MO	BETHANY	52	5739	13125	M) NEOSHO	58	4079	16834
MO	BOLIVAR 1NE	56	4607	17505	M	NEVADA SEWAGE PLANT	57	4458	20314
MO	BOONVILLE WATERWORKS	54	5310	14932	M	NEW FLORENCE	55	5040	14348
MO	BROOKFIELD	54	5248	16577	M	D NEW FLORENCE D OREGON D OZARK BEACH D POPLAR BLUFF R S D SAINT CHARLES	52	5759	13721
MO	BRUNSWICK	55	5185	14931	M	O OZARK BEACH	56	4461	15739
MO	CAMDENTON	57	4373	17749	M	O POPLAR BLUFF R S	58	4105	17201
MO	CANTON LOCK AND DAM	53	5556	13003	M	O SAINT CHARLES	55		17113
MO	CARROLLTON	54	5277	14187	M	O ST. JOSEPH WBAP	54	5462	16142
MO	CARTHAGE	58	4260	19209		SAINT LOUIS WSO	55	4948	17843
MO	CARIHAGE CARUTHERSVILLE CHARLESTON	60		19924) SALEM	55		12853
MO	CHARLESTON	58	4082	19054) SALISBURY	54		14513
	CHILLICOTHE RADIO KC	54	5353	14370	M	D SAVERTON L AND D 22	55		14609
	CLEARWATER DAM	57		14518		O SEDALIA	55		17206
	CLINTON 3 NW	54		15442		O SELIGMAN	57		15120
	COLUMBIA REGION WSO			14475		O SHELBINA			12356
	CONCEPTION	52		13542		D SIKESTON PWR PLT			16870
	DONIPHAN	57		16276		O SPRINGFIELD WSO			16262
	EDGERTON	54		13608		O STEFFENVILLE 1 E	53		11577
	ELDON	57		17011		O SWEET SPRINGS	55		15480
	ELSBERRY 1 S	54		12934		O TARKIO	52		12662
	FARMINGTON	55		12237		D TRENTON	53		13324
	FAYETTE	54		13569		O UNION	55		13945
	FOUNTAIN GROVE WL	54		13062		D UNIONVILLE	51		10488
	FULTON 4 SW	54		14230		O VICHY FAA AIRPORT	55		14639
	GRANT CITY	52		12504		O WAPPAPELLO DAM	57		16723
	GREENVILLE 4 NNW	- 56		14111		O WARRENSBURG	56		19328
	HAMILTON 2 W	52		12851		D WARKENSBORG	56		17850
	HANNIBAL WATERWORKS			11775		D WASOLA	57		15993
	HARRISONVILLE	56		17376		O WAYNESVILLE 2 W	56		13652
	JACKSON			16806					13652
no	JACKOUN	57	42//	10000	r	O WEST PLAINS	56	4302	13480

<u>st</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74		TAVG HDD65 CD	<u>174</u>
MO	WILLOW SPRINGS	55	4694	12690	I M	AT GIBSON DAM 42 8569 6 AT GLASGOW WSO 42 8952 47 AT GLENDIVE 46 7704 92 AT GOLDBUTTE 7 N 42 8659 17 AT GRASSRANGE 45 7765 27 AT GREAT FALLS WSO 45 7784 32 AT HAMILTON 46 7256 12 AT HARLEM 42 8759 32 AT HARLEM 42 8759 32 AT HARLOWTON 44 8050 1 AT HAVRE WSO 42 8684 32 AT HAXBY 18 50 43 8451	627
MO	WILLOW SPRINGS WINDSOR	55	5048	16004	M	IT GLASGOW WSO 42 8952 4	762
					M	IT GLENDIVE 46 7704 92	206
MT	AUGUSTA AUSTIN 1 W BALLANTINE BARBER BELGRADE AP BIGFORK 13 S BIG SANDY BIG TIMBER BILLINGS WATER PLANT	44	7879	1782	M	IT GOLDBUTTE 7 N 42 8659 1	742
MT	AUSTIN 1 W	42	8652	1323	M	IT GRASSRANGE 45 7765 2	784
MT	BALLANTINE	47	7311	7218	M	IT GREAT FALLS WSO 45 7784 3	574
MT	BARBER	44	7829	1768	M	IT HAMILTON 46 7256 12	274
MT	BELGRADE AP	42	8702	1577	M	IT HARDIN 46 7649 63	318
MT	BIGFORK 13 S	46	7334	1788	M	IT HARLEM 42 8759 3	541
MT	BIG SANDY	44	8211	4619	M	IT HARLOWTON 44 8050 1	774
MT	BIG TIMBER	47	6973	3388	M	IT HAUGAN 3 E 43 8094	342
MT	BILLINGS WATER PLANT	48	6875	5230	M	IT HAVRE WSO 42 8684 3	997
MT	BILLINGS WSO	47	7220	6167	M	IT HAXBY 18 SW 43 8451 3	885
MT	BOULDER STATE SCHOOL	42	8510	1303	M	IT HEBGEN DAM 36 10569	311
MT	BOZEMAN MONT ST UNIV	44	8002	1771	M	IT HELENA WSO 43 8186 2	547
MT	BOZEMAN 12 NE	38	9876	407	M	1T HERON 2 NW 44 7734	569
MT	BRADY AZNOE	43	8439	1781	M	IT HAXBY 18 SW 42 8004 34 IT HAXBY 18 SW 43 8451 34 IT HEBGEN DAM 36 10569 34 IT HELENA WSO 43 8186 24 IT HERON 2 NW 44 7734 34 IT HOLTER DAM 47 6844 33 IT HUNGRY HORSE DAM 43 8221 14	399
MT	BREDETTE	40	9360	4097	M	IT HUNGRY HORSE DAM 43 8221 1	545
MT	BOZEMAN MONT ST UNIV BOZEMAN 12 NE BRADY AZNOE BREDETTE BRIDGER BROADUS BROWNING BUTTE FAA AP CASCADE 5 S CHESTER CHINOOK CHOTEAU AIRPORT CIRCLE COLSTRIP COLUMBUS CONRAD AIRPORT COOKE CITY CRESTON CROW AGENCY CULBERTSON CUT BANK FAA AP DARBY	47	7138	3941	M	T HUNTLEY EXP STATION 45 7558 3	710
MT	BROADUS	45	7944	5400	M	1T HYSHAM 46 7343 6	714
MT	BROWNING	40	9119	1291	M	1T JOPLIN 1 N 41 9080 2	327
MT	BUTTE FAA AP	39	9613	945	M	AT HYSHAM 46 7343 6 AT JOPLIN 1 N 41 9080 2 AT JORDAN 44 8105 54 AT KALISPELL WSO 43 8363 1 AT LAKEVIEW 35 10921 3 AT LEWISTOWN FAA AP 42 8623 2	414
MT	CASCADE 5 S	45	7489	2500	M	T KALISPELL WSO 43 8363 1	210
MT	CHESTER	41	8981	2033	M	T KALISPELL 44 7712 1	650
MT	CHINOOK	43	8441	3622	M	IT LAKEVIEW 35 10921	255
MT	CHOTEAU AIRPORT	44	7906	2394	M	IT LEWISTOWN FAA AP 42 8623 2	127
MT	CIRCLE	42	8675	4514	M	T LIBBY 1 NE RANGER ST 45 7410 1	299
MT	COLSTRIP	46	7377	5833	M	MT LIMA 39 9427	293
MT	COLUMBUS	46	7353	3168	M	AT LINCOLN RANGER STATI 40 9107	618
MT	CONRAD AIRPORT	43	8332	2617	M	IT LIVINGSTON 46 7246 2	660
MT	COOKE CITY	34	11406	91	M	IT LIVINGSTON FAA AIRPO 45 7675 2	323
MT	CRESTON	43	8036	662	M	IT LOMA 1 WNW 44 8043 5	173
MT	CROW AGENCY	46	7373	4885	M	IT LONESOME LAKE4286922IT LUSTRE 4 NNW4093693	635
MT	CULBERTSON	41	9212	3883	M	1T LUSTRE 4 NNW 40 9369 3	640
MT	CUT BANK FAA AP	40	9161	1378	M	AT MARTINSDALE 3 NNW 42 8377	764
MT	DARBY	45	7308	893	M		908
MT	DILLON FAA AP	43	83/5	1690	M	AT MELSTONE 46 7361 5	600
MT	DILLON WMCE	44	7923	670	M		664
MT	DIVIDE 2 NW	41	8930	594		AT MILES CITY FAA AP 45 7907 10	094
MT	EAST ANACONDA	42	8439	2298			068
MT	EKALAKA	44	8205	5612			306
MT	ENNIS	44	7961	608	M	AT MYSTIC LAKE 42 8646 1	233
MT	EAST ANACONDA EKALAKA ENNIS FAIRFIELD	44	7881	2535			078
MT	FLATUITIOU 4 ENF	45	7650	4642	M	AT NORRIS MADISON PH 47 7004 3	740
MT	FORKS 4 NNE	40	9514	3260	M		062
MT	FORKS 4 NNE FORT ASSINNIBOINE FORT BENTON FORTINE 1 N	43	8520	4030	M	T PHILIPSBURG RANGER S 41 8856	582
MT	FORT BENTON	45	7674	2965	M	AT PLEVNA 43 8463 5 AT POLEBRIDGE 39 9374	697
MT	FORTINE 1 N	43	8319	863	M	AT POLEBRIDGE 39 9374	635
MT	FORT PECK POWER PLAN	44	8282	6826	M	T POLSON KERR DAM 46 7312 1	776
MT	GERALDINE	45	7797	3034	M	IT POLSON KERR DAM 46 7312 1 IT POPLAR 43 8733 6	057

ST CITY OR LOCATION	<u>TAVĢ</u>	HDD65	<u>CDH74</u>	<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>
MT RAPELIE 4 S	45	7792	3875 📗	NE	CENTRAL CITY	51	6163	12113
MT RAPELJE 4 S MT RAYMOND BORDER STAT	гт 39	9680	3801	NE	CENTRAL CITY CHADRON FAA AIRPORT	48	7039	8725
MT RAIMOND BORDER STA. MT RED LODGE MT REDSTONE MT ROCK SPRINGS MT ROUNDUP MT ROY 8 NE MT SAINT IGNATIUS MT SAVAGE MT SCOBEY MT SEELEY LAKE RANGER	43	8385	1685	NE	CLARKSON	49	6643	10230
MT REDSTONE	40	9552		NE	CLARKSON COLUMBUS 3 NE	50	6507	12668
MT ROCK SPRINGS	43	8454	5741	NE	CRESCENT LAKE NATL W	48	6863	5055
MT ROUNDUP	47	7115	5528	NE	CRETE	52	5940	13269
MT ROY 8 NE	44	8098	3940	NE	CULBERTSON	50	6328	12101
MT SAINT IGNATIUS	46	7270	1439	NE	CURTIS	51	6209	10726
MT SAVAGE	43	8459	5400	NE	DAVID CITY	50	6400	11730
MT SCOBEY	41	9081	4778	NE	EWING	49	6845	9485
MT SEELEY LAKE RANGER	s 41	8684	315	NE	FAIRBURY 2 SSE	51	6187	13924
MI SEELEI LAKE RANGER MT SIDNEY MT SIMPSON 6 NW MT STANFORD 1 WNW MT STEVENSVILLE MT SUPERIOR MT TERRY MT THOMPSON FALLS PH MT TOWNSEND MT TRIDENT MT TROUT CREEK DANCER	42	8815	3075	NE	FAIRMONT	52	5951	13763
MT SIMPSON 6 NW	40	9265	2505	NE	FALLS CITY	53	5462	14719
MT STANFORD 1 WNW	43	8168	1981	NE	FRANKLIN	52	5845	15585
MT STEVENSVILLE	45	7576	587	NE	FREMONT	51	6162	12265
MT SUPERIOR	46	7065	1719	NE	GENEVA	52	6034	13002
MT TERRY	43	8425	6066	NE	GENOA 2 W	50	6454	11437
MT THOMPSON FALLS PH	47	6743	2160	NE	GOTHENBURG	51	6192	10940
MT TOWNSEND	44	7998	1382	NE	GRAND ISLAND WSO	50	6491	11957
MT TRIDENT	46	7429	2465	NE	HALSEY 2 W	49	6668	9634
			1125	NE	HARLAN COUNTY DAM	50	6356	13403
MT TURNER	41	9163	2659	NE	HARRISON	44	7958	3955
MT VALIER	43	8404	1934	NE	HARTINGTON	49	6834	11772
MT VIDA	43	8605	5732	NE	HASTINGS	51	6102	12581
MT VIRGINIA CITY	42	8469	1423	NE	HAYES CENTER	50	6366	11221
MT WESTBY	40	9526	4170	NE	HAY SPRINGS	47	7175	6581
MT TURNER MT VALIER MT VIDA MT VIRGINIA CITY MT WESTBY MT WEST GLACIER	42	8518	547	NE	HEBRON	52	6023	14766
MT WEST YELLOWSTONE	35	10981	301	NE	HOLDREGE 3 SW	51	6082	13113
MT WIBAUX 2 E	42	8944	3783	NE	IMPERIAL	51	6026	10039
MT WINIFRED	43	8310	2913	NE	KEARNEY	50	6567	11704
MT WEST VELLOWSTONE MT WIBAUX 2 E MT WINIFRED MT WISDOM MT WYOLA	35	10871	124	NE	KIMBALL	48	6855	4005
MT WYOLA	45	7523	3292	NE	KINGSLEY DAM	51	6103	9530
				NE	COLUMBUS 3 NE CRESCENT LAKE NATL W CRETE CULBERTSON CURTIS DAVID CITY EWING FAIRBURY 2 SSE FAIRMONT FALLS CITY FRANKLIN FREMONT GENEVA GENOA 2 W GOTHENBURG GRAND ISLAND WSO HALSEY 2 W HARLAN COUNTY DAM HARRISON HARTINGTON HASTINGS HAYES CENTER HAY SPRINGS HEBRON HOLDREGE 3 SW IMPERIAL KEARNEY KIMBALL KINGSLEY DAM LINCOLN WSO AP LINCOLN WSO CITY LODGEPOLE LOUP CITY MADISON MADRID	51	6379	12760
NE AINSWORTH NE ALBION	49	6694	9442	NE	LINCOLN WSO CITY	52	5974	14607
NE ALBION	48	6974	9419	NE	LODGEPOLE	50	6261	8101
NE ALLIANCE	47	7079	6435	NE	LOUP CITY	49	6621	10961
NE ALBION NE ALLIANCE NE ARTHUR NE ASHLAND 3 NE NE ATKINSON NE AUBURN NE BEATRICE NO 1 NE BEAUED CITY	48	6993	6859	NE	MADISON MADRID MCCOOK	49	6650	10750
NE ASHLAND 3 NE	51	6394	14342	NE	MADRID	51	6177	10782
NE ATKINSON	48	6910	8333	NE	MCCOOK	52	5792	13594
NE AUBURN	53	5735	13562	NE	MEDICINE CREEK DAM	50	6445	10988
NE BEATRICE NO 1	53	5724	15622	NE	MERRIMAN	48	6986	7904
NE BEAVER CITY NE BENKELMAN	53	5713	14489	NE	MINDEN MITCHELL 5 E	51	6061	12555
NE BENKELMAN	51	6017	12771	NE	MITCHELL 5 E	47	6971	4584
NE BIG SPRINGS	50	6365	8696	NE	MULLEN	49	6585	8423
NE BLAIR	50	6541	10292	NE	NENZEL 20 S	48	6920	7234
NE BOX BUTTE EXP STAT	10 46	7309	5802	NE	NIOBRARA	49	6808	11243
NE BRIDGEPORT	50	6384	7413	NE	NORFOLK WSO	48	7011	10565
NE BROKEN BOW 2 W	49	6678	8882	NE	NORTH LOUP	49	6551	9789
NE BUTTE	49	6923	10389	NE	NORTH PLATTE WSO	48	6914	8492
NE BENKELMAN NE BIG SPRINGS NE BLAIR NE BOX BUTTE EXP STAT NE BRIDGEPORT NE BROKEN BOW 2 W NE BUTTE NE CAMBRIDGE	52	5837	13457	NE	OAKDALE	48	6954	9996

<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>		<u>st</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
NE	OGALLALA 3 W	49	6667	9066	1	NV	RYE PATCH DAM	51	5811	5628
NE	OGALLALA 3 W OMAHA WSO EPPLEY	51	6201	13180		NV	RYE PATCH DAM SEARCHLIGHT	63	2874	27701
NE	OMAHA NORTH OMAHA WS	50	6602	10509		NV	SMOKEY VALLEY	49	6186	3399
NE	OMAHA NORTH OMAHA WS O NEILL OSCEOLA OSHKOSH OSMOND PAWNEE CITY PURDUM RAVENNA RED CLOUD SAINT PAUL SCOTTSBLUFF WSO SEWARD SIDNEY 6 NNW SIDNEY FAA AIRPORT SPRINGVIEW STANTON STAPLETON 5 SSE SYRACUSE TECUMSEH TEKAMAH TRENTON DAM VALENTINE LKS GAME R	48	6993	9586		NV	SUNRISE MANR LAS VEG	64	2731	32737
NE	OSCEOLA	50	6366	11961		NV	TONOPAH AP	51	5754	5888
NE	OSHKOSH	49	6610	6535		NV	WELLS	44	7794	1371
NE	OSMOND	49	6914	10572		NV	TONOPAH AP WELLS WINNEMUCCA WSO YERINGTON	49	6417	4284
NE	PAWNEE CITY	54	5410	16121		NV	YERINGTON	51	5600	4812
NE	PURDUM	49	6711	7557						
NE	RAVENNA	50	6345	11799		NH	BETHLEHEM BLACKWATER DAM CONCORD WSO DURHAM FIRST CONN LAKE HANOVER KEENE LAKEPORT LEBANON FAA AIRPORT	42	8588	1226
NE	RED CLOUD	52	5972	14089		NH	BLACKWATER DAM	45	7722	1399
NE	SAINT PAUL	50	6536	10586		NH	CONCORD WSO	45	7483	1993
NE	SCOTTSBLUFF WSO	49	6711	7339		NH	DURHAM	47	6919	2239
NE	SEWARD	51	6110	13089		NH	FIRST CONN LAKE	37	10237	388
NE	SIDNEY 6 NNW	48	6760	6225		NH	HANOVER	45	7648	1880
NE	SIDNEY FAA AIRPORT	47	7061	5324		NH	KEENE	47	7037	2169
NE	SPRINGVIEW	48	7014	10937		NH	LAKEPORT	46	7445	2207
NE	STANTON	49	6686	10622		NH	LEBANON FAA AIRPORT	44	7940	1721
NE	STAPLETON 5 SSE	49	6760	9283		NH	MASSABESIC LAKE	46	7101	1779
NE	SYRACUSE	51	6153	13565		NH	MT. WASHINGTON WSO	27	13961	2
NE	TECUMSEH	51	6040	12540		NH	NASHUA 2 NNW	46	7082	1604
NE	ТЕКАМАН	51	6335	11851		NH	MT. WASHINGTON WSO NASHUA 2 NNW PETERBORO 2 S	45	7436	1210
NE	TRENTON DAM	51	6208	12184		NH	PINKHAM NOTCH	40	9247	401
NE	VALENTINE LKS GAME R	49	6662	8695		NH	SURRY MOUNTAIN DAM WOODSTOCK	44	7792	1126
NE	VALENTINE WSO	47	7366	8238		NH	WOODSTOCK	44	7921	1334
NE	WAKEFIELD	48	6969	8922						
NE	VALENTINE WSO WAKEFIELD WEEPING WATER WEST POINT YORK	51	6095	12376		ŊJ	ATLANTIC CITY WSO	53	5089	6175
NE	WEST POINT	49	6712	12018			ATLANTIC CITY MARINA			
NE	YORK	51	6156	13042		NT	BELLEPLAIN ST FOREST	5/	4794	6248
						NJ	BELVIDERE	51	5932	6278
NV	BATTLE MOUNTAIN AP	49	6424	3632		NJ	BOONTON 1 SE	50	5921	3861
NV	BOULDER CITY	67	2292	41394		NJ	CANOE BROOK	51	5877	4554
NV	CALIENTE	53	5100	8149		NJ	CAPE MAY 1 NW	55	4542	6683
NV	BATTLE MOUNTAIN AP BOULDER CITY CALIENTE CARSON CITY CONTACT	50	5770	2041		NJ	BELLETIATIN ST FOREST BELVIDERE BOONTON 1 SE CANOE BROOK CAPE MAY 1 NW CHARLOTTEBURG	48	6505	1549
NV	CONTACT	46	7098	1615		NJ	ESSEX FELLS SERV BLD	51	5821	4692
NV	DESERT NATL WL RANGE	63	2973	25354		NJ	FLEMINGTON 1 NE	51	5785	5405
NV	DYER 4 SE Elko wso Ely wso	51	5727	5275		NJ	FREEHOLD	53	5260	5380
NV	ELKO WSO	46	7252	3840		NJ	GLASSBORO	54	4983	6968
NV	ELY WSO	44	7705	659		ŊJ	HAMMONTON 2 NNE	54	4994	7616
NV	FALLON EXPERIMENT ST	52	5530	6443		NJ	HIGHTSTOWN 1 N	53	5239	5516
NV	GLENBROOK	47	6856	1496		NJ	INDIAN MILLS 2 W	53	5220	5650
NV	GLENBROOK LAS VEGAS WSO	66	2535	43153		NJ	JERSEY CITY	53	5286	7018
						ŊJ	LAMBERTVILLE	53	5201	6492
NV	LOVELOCK FAA AP	51	5843	7845		NJ	LITTLE FALLS	52	5400	6053
NV	MC GILL	47	7037	2692		ŊJ	LONG BRANCH 2 S	53	5159	5247
NV	MINA	54	5087	11635		NJ	LONG VALLEY	49	6279	3071
NV	MINDEN	49	6198	1413		NJ	ESSEX FELLS SERV BLD FLEMINGTON 1 NE FREEHOLD GLASSBORO HAMMONTON 2 NNE HIGHTSTOWN 1 N INDIAN MILLS 2 W JERSEY CITY LAMBERTVILLE LITTLE FALLS LONG BRANCH 2 S LONG VALLEY MILLVILLE FAA AIRPOR MOORESTOWN	54	4949	7365
NV	OWYHEE	46	7206	1969		NJ	MOORESTOWN	53	5175	7907
NV	PIOCHE	51	5851	4946		ŊJ	MORRIS PLAINS 1 W	50	5935	3952
NV	LEHMAN CAVES NAT MON LOVELOCK FAA AP MC GILL MINA MINDEN OWYHEE PIOCHE RENO WSO	49	6032	2192		ŊJ	MOORESTOWN MORRIS PLAINS 1 W NEWARK WSO	54	4977	9107

NJ NEW BRUNSWICK 53 5239 S239 NM HATCH 2 W 60 3364 12646 NJ PENBERTON 3 E 53 5056 554 NM JAL 64 2611 26257 NJ PELAINFTELD 53 5255 618 NM JENEZ SPRINCS 52 5287 3637 NJ SHILOH 55 4761 7346 NM JORDA EXP RANCE 58 3704 13125 NJ SOMERVILLE 3 NN 52 5613 5725 NM LACUNA 53 5049 4960 NJ TSRNTON WSO 54 4953 7339 NM LAS VEGAS 64 NM 1058 1436 1216 NM 1261 1216 NM 1261 1216 NM 1218 1218 1218 1218 1218 1218 1218 1218 1218 1218 1218 1218 1218 1218						ST CITY OR LOCATION TAVE HDD65 CDH7	<u>4</u>
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NM CLAYTON WSO 53 5172 6793 NM TAJIQUE 49 5997 939 NM CLIFF 10 SE 56 4131 7272 NM TAJIQUE 49 5997 939 NM CLOVIS 57 4082 11437 NM TOHATCHI 1 ESE 52 5474 7645 NM CLOVIS 57 4082 11437 NM TRUTH OR CONSEQUENCE 60 3408 14599 NM CLOVIS 57 4073 9236 NM TUCUMCARI FAA AP 58 3938 14754 NM COLMBUS 62 2951 18428 NM TUCUMCARI AP 59 3647 14481 NM CONCHAS DAM 59 3652 16768 NM VALMORA 49 6097 1307 NM CUBA 46 7098 1355 NM WINSTON 52 5054 2337 NM EL MORRO NAT MON 47 6647 467 147 NM WOLF CANYON 41 8806 11 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM ELIDA 57 4039 135	IN N	M CERRO (NE	20	4332		NM SAN JUN 59 3836 1/42	
NM CLAYTON WSO 53 5172 6793 NM TAJIQUE 49 5997 939 NM CLIFF 10 SE 56 4131 7272 NM TAJIQUE 49 5997 939 NM CLOVIS 57 4082 11437 NM TOHATCHI 1 ESE 52 5474 7645 NM CLOVIS 57 4082 11437 NM TRUTH OR CONSEQUENCE 60 3408 14599 NM CLOVIS 57 4073 9236 NM TUCUMCARI FAA AP 58 3938 14754 NM COLMBUS 62 2951 18428 NM TUCUMCARI AP 59 3647 14481 NM CONCHAS DAM 59 3652 16768 NM VALMORA 49 6097 1307 NM CUBA 46 7098 1355 NM WINSTON 52 5054 2337 NM EL MORRO NAT MON 47 6647 467 147 NM WOLF CANYON 41 8806 11 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM ELIDA 57 4039 135	NT	THE OTHER OF THE MONTH AND	10	1010	0700	NM SANTA RUSA 58 3/24 1081	
NM CLAYTON WSO 53 5172 6793 NM TAJIQUE 49 5997 939 NM CLIFF 10 SE 56 4131 7272 NM TAJIQUE 49 5997 939 NM CLOVIS 57 4082 11437 NM TOHATCHI 1 ESE 52 5474 7645 NM CLOVIS 57 4082 11437 NM TRUTH OR CONSEQUENCE 60 3408 14599 NM CLOVIS 57 4073 9236 NM TUCUMCARI FAA AP 58 3938 14754 NM COLMBUS 62 2951 18428 NM TUCUMCARI AP 59 3647 14481 NM CONCHAS DAM 59 3652 16768 NM VALMORA 49 6097 1307 NM CUBA 46 7098 1355 NM WINSTON 52 5054 2337 NM EL MORRO NAT MON 47 6647 467 147 NM WOLF CANYON 41 8806 11 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM ELIDA 57 4039 135	N	M CHACO CANYON NAT MON	49	6313	3/99	NM SUCORRO 57 4105 1095	
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NM ELROED NEET 40 5301 147 NM WOLF CANTON 41 6000 111 NM EL MORRO NAT MON 47 6647 467 NY ALBANY WSO 47 6929 2998 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM ELEPHANT BUTTE DAM 61 3136 16813 NY ALCOVE DAM 46 7410 2203 NM ELIDA 57 4039 13527 NY ALFRED 45 7467 1145 NM ELK 3 E 54 4502 1868 NY ALLEGANY STATE PARK 45 7380 1322 NM ESTANCIA 51 5638 1756 NY ANGELICA 46 7349 1305 NM FORT BAYARD 55 4493 5370 NY BAINBRIDGE 47 6947 1927 NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM FRUITLAND 2 F 52 5566 8480 NY BOONVILLE 2 SSU 42 8607 918	N	M CLOVIS	57	4082	11437	NM TRUTH OR CONSEQUENCE 60 3408 1459	19
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NM EL MORRO NAT MON 47 6647 467 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM ELEPHANT BUTTE DAM 61 3136 16813 NY ALCOVE DAM 46 7410 2203 NM ELIDA 57 4039 13527 NY ALFRED 45 7467 1145 NM ELK 3 E 54 4502 1868 NY ALLEGANY STATE PARK 45 7380 1322 NM ESTANCIA 51 5638 1756 NY ANGELICA 46 7349 1305 NM FLORIDA 59 3564 13001 NY BAINBRIDGE 47 6947 1927 NM FORT BAYARD 55 4493 5370 NY BATAVIA 48 6810 2945 NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM	N	M COLUMBUS	62	2951	18428	NM TUCUMCARI 3 NE 59 3647 1448	11
NM EL MORRO NAT MON 47 6647 467 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM ELEPHANT BUTTE DAM 61 3136 16813 NY ALCOVE DAM 46 7410 2203 NM ELIDA 57 4039 13527 NY ALFRED 45 7467 1145 NM ELK 3 E 54 4502 1868 NY ALLEGANY STATE PARK 45 7380 1322 NM ESTANCIA 51 5638 1756 NY ANGELICA 46 7349 1305 NM FLORIDA 59 3564 13001 NY BAINBRIDGE 47 6947 1927 NM FORT BAYARD 55 4493 5370 NY BATAVIA 48 6810 2945 NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM	N	IM CONCHAS DAM	59	3652	16768	NM VALMORA 49 6097 130	17
NM EL MORRO NAT MON 47 6647 467 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM ELEPHANT BUTTE DAM 61 3136 16813 NY ALCOVE DAM 46 7410 2203 NM ELIDA 57 4039 13527 NY ALFRED 45 7467 1145 NM ELK 3 E 54 4502 1868 NY ALLEGANY STATE PARK 45 7380 1322 NM ESTANCIA 51 5638 1756 NY ANGELICA 46 7349 1305 NM FLORIDA 59 3564 13001 NY BAINBRIDGE 47 6947 1927 NM FORT BAYARD 55 4493 5370 NY BATAVIA 48 6810 2945 NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM	N	M CUBA	46	7098	1355		
NM ELROED NEET 40 5301 147 NM WOLF CANTON 41 6000 111 NM EL MORRO NAT MON 47 6647 467 NY ALBANY WSO 47 6929 2998 NM EL VADO DAM 44 7729 426 NY ALBANY WSO 47 6929 2998 NM ELEPHANT BUTTE DAM 61 3136 16813 NY ALCOVE DAM 46 7410 2203 NM ELIDA 57 4039 13527 NY ALFRED 45 7467 1145 NM ELK 3 E 54 4502 1868 NY ALLEGANY STATE PARK 45 7380 1322 NM ESTANCIA 51 5638 1756 NY ANGELICA 46 7349 1305 NM FORT BAYARD 55 4493 5370 NY BAINBRIDGE 47 6947 1927 NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM FRUITLAND 2 F 52 5566 8480 NY BOONVILLE 2 SSU 42 8607 918	N	MM DES MOINES	50	6047	2613	NM WINSTON 52 5054 233	17
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NM ELK 3 E 54 4502 1868 NY ALLEGANY STATE PARK 45 7380 1322 NM ESTANCIA 51 5638 1756 NY ANGELICA 46 7349 1305 NM FLORIDA 59 3564 13001 NY BAINBRIDGE 47 6947 1927 NM FORT BAYARD 55 4493 5370 NY BATAVIA 48 6810 2945 NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM FRUITLAND 2 52 5566 8480 NY BOONVILLE 2 SSU 42 8407 918						NY ALCOVE DAM 46 7410 220)3
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NM FORT BAYARD 55 4493 5370 NY BATAVIA 48 6810 2945 NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM FRUITLAND 2 52 5566 8480 NY BOONVILLE 2 SSU 42 8407 918	N	VM ELK 3 E	54	4502		NY ALLEGANY STATE PARK 45 7380 132	22
NM FORT BAYARD 55 4493 5370 NY BATAVIA 48 6810 2945 NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM FRUITLAND 2 52 5566 8480 NY BOONVILLE 2 SSU 42 8407 918	N	NM ESTANCIA	51	5638		NY ANGELICA 46 7349 130)5
NM FORT BAYARD 55 4493 5370 NY BATAVIA 48 6810 2945 NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM FRUITLAND 2 52 5566 8480 NY BOONVILLE 2 SSU 42 8407 918	N	M FLORIDA	59	3564		NY BAINBRIDGE 47 6947 192	27
NM FORT SUMNER 58 3841 13822 NY BINGHAMTON WSO 46 7346 1646 NM FRUITLAND 2 F 52 5566 8480 NY BOONVILLE 2 SSU 42 8407 918	N	M FORT BAYARD	55	4493	5370	NY BATAVIA 48 6810 294	+5
NM FRUITLAND 2 F 52 5566 $8/80 \parallel$ NV BOONVILLE 2 SSU 42 $8/07$ 019	N	IM FORT SUMNER	58	3841	13822	NY BINGHAMTON WSO 46 7346 164	+6
NM GALLUP 5 E 49 6162 1941 NY BRIDGEHAMPTON 51 5631 2285 NM GRAN QUIVIRA NAT MON 53 4991 3382 NY BROCKPORT 2 NW 48 6785 2994 NM GRENVILLE 50 5819 3435 NY BUFFALO WSO 48 6799 3044	N	MM FRUITLAND 2 E	52	5566	8480	NY BOONVILLE 2 SSU 42 8407 01	8
NM GRAN QUIVIRA NAT MON 53 4991 3382 NY BROCKPORT 2 NW 48 6785 2994 NM GRENVILLE 50 5819 3435 NY BUFFALO WSO 48 6799 3044	N	VM GALLUP 5 E	49	6162	1941	NY BRIDGEHAMPTON 51 5631 228	35
NM GRENVILLE 50 5819 3435 NY BUFFALO WSO 48 6799 3044	N	M GRAN QUIVIRA NAT MON	53	4991	3382	NY BROCKPORT 2 NW 48 6785 299	4
	N	M GRENVILLE	50	5819	3435	NY BUFFALO WSO 48 6799 304	4

<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>		<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>
NY	CANANDAIGUA 3 S	48	6747	3341	1	NY	SALEM	45	7682	1673
		44		2087		NY	SALEM SCARSDALE	52		5387
	CARMEL 1 SW	49		2652		NY	SETAUKET	53		4212
	CHASM FALLS			1584			SODUS CENTER			3346
	CHAZY	44	7936	2467			SPENCER 3 W			1357
NV	CHERRY VALLEY 2 NNE	45	7710	1110			STILLWATER RESERVOIR			704
NY	COOPERSTOWN CORTLAND DANNEMORA DANSVILLE DOBBS FERRY ELIZABETHTOWN ELMIRA	45	7456	1034			SYRACUSE WSO	48		3516
NY	CORTLAND	46	7357	1998			TUPPER LAKE SUNMOUNT			733
NY	DANNEMORA	44	7981	2233			UTICA FAA AP			2706
NY	DANSVILLE	48	6655	3837			WANAKENA RANGER SCHO			672
NY	DOBBS FERRY	53	5242	6313						
NY	ELIZABETHTOWN	43	8232	2170		NY	WATERTOWN WESTFIELD 3 SW WEST POINT	48	6535	3123
NY	ELMTRA	47	6931	2480		NY	WEST POINT	52	5693	
NY	FRANKLINVILLE	44	7871	1164		NY	WHITEHALL	47	7028	4285
NY	FRANKLINVILLE FREDONIA	49		3716						
	GENEVA RESEARCH FARM			2638		NC	ALBEMARLE 4 N	60	3321	12546
	GLENHAM	51		5993			ANDREWS 2 E			
	GLENS FALLS FAA AP	45	7549	2047			ASHEBORO 2 W	60		12067
	GLOVERSVILLE	46	7305	1813		NC	ASHEVILLE WSO	56		
	GOUVERNEUR	44	7829	1621	l	NC	ASHEVILLE WSO ASHEVILLE	56		
	GRAFTON	45	7554	1157	L	NC	BANNER ELK	49		
	GLOVERSVILLE GOUVERNEUR GRAFTON HEMLOCK	47	7027	2700		NC	BENT CREEK	55	4458	
NY	INDIAN LAKE 2 SW	40	9276	425		NC	BLACK MOUNTAIN	55	4210	
	ITHACA CORNELL UNIV.			1583		NC	BLACK MOUNTAIN BOONE	51	5480	
		40		535		NC	BREVARD	55		4326
	LAWRENCEVILLE	44		1870			BURLINGTON FILTER PL			13566
	LIBERTY	45	7515	798			CANTON 1 SW	53		
	LITTLE FALLS CITY RE	45	7608	1811			CAPE HATTERAS WSO			12440
NTV	TTTTE VALLEY	44	7677	1018		NC	CELO 2 S	51		
NY	LOCKPORT 2 NE	48	6753	2913		NC	CHAPEL HILL 2 W	58		11524
NY	LOWVILLE	44	7892	1370	ŀ	NC	CHARLOTTE WSO CONCORD	60	3348	
NY	MASSENA FAA AP	43	8184	2012		NC	CONCORD	60	3445	14793
NY	LITTLE VALLET LOCKPORT 2 NE LOWVILLE MASSENA FAA AP MILLBROOK MINEOLA MOHONK LAKE	47	6768	1982		NC	COWEETA EXP STATION	54	4457	2281
NY	MINEOLA	53	5230	7378		NC	CULLOWHEE	56	4162	4523
NY	MOHONK LAKE	48	6576	2260	l	NC	DURHAM	59	3615	12547
NY	MOUNT MORRIS 2 W	47	6955	3019		NC	EDENTON	61	2998	15146
NY	NEW YORK CNTRL PK WS	55	4869	9537		NC	ELIZABETH CITY	60	3252	13956
NY	NEW YORK JFK INTL AP	53	5171	7634						
						NC	FAYETTEVILLE	61	3161	15618
NY	NY WESTERLEIGH STAT	53	5125	6531		NC	FLETCHER 2 NE	53	4970	5162
NY	NORWICH 1 NE	44	7749	1254	l	NC	FRANKLIN 1 SSW	56	4146	5686
NY	OGDENSBURG 3 NE	45	7832	2732		NC	GASTONIA	61	3166	15924
NY	OSWEGO EAST	47	6845	2456		NC	GOLDSBORO 1 SSW	61	3112	16545
NY	PATCHOGUE 2 N	51	5670	3693		NC	GREENSBORO WSO	58	3877	11020
NY	PENN YAN 2 SW	49	6418	5133		NC	HAMLET	61	3121	15851
NY	NEW YORK LA GUARDIA NY WESTERLEIGH STAT NORWICH 1 NE OGDENSBURG 3 NE OSWEGO EAST PATCHOGUE 2 N PENN YAN 2 SW PERU 2 WSW PORT JERVIS POUGHKEEPSIE FAA AP RIVERHEAD RESEARCH ROCHESTER WSO	45	7757	1947		NC	ELIZABETH CITY FAA A FAYETTEVILLE FLETCHER 2 NE FRANKLIN 1 SSW GASTONIA GOLDSBORO 1 SSW GREENSBORO WSO HAMLET HATTERAS HENDERSONVILLE 1 NE HICKORY FAA AP HIGHLANDS 2 S HIGH POINT	63	2482	15105
NY	PORT JERVIS	50	6175	3737		NC	HENDERSONVILLE 1 NE	55	4354	4757
NY	POUGHKEEPSIE FAA AP	49	6368	4260		NC	HICKORY FAA AP	58	3757	11090
NY	RIVERHEAD RESEARCH	52	5324	4706		NC	HIGHLANDS 2 S	53	4837	1367
NY	ROCHESTER WSO	48	6718	3764		NC	HIGH POINT	59	3428	11764
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ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74	<u>S1</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>
NC HOT SPRINGS 2	57	3952	9048	NI	BOWMAN COURT HOUSE	42	8660	4674
NC JACKSON	60		13157	NI	BUTTE	40	9397	4823
NO TAGUCON ODDINGO E IN	(0	2210	13908	NI	CARRINGTON	39	9877	2527
NC JACKSON SPRINGS 5 WN NC KINSTON 5 SE NC LAURINBURG NC LENOIR NC LEXINGTON NC LOUISBURG NC LUMBERTON 6 NW NC MARION NC MARSHALL NC MAYSVILLE 6 SW NC MONCURE 3 SE NC MONDOF 4 SE	61	3137	15656	NI	 DOWNER COORT HOUSE DEUTTE CARRINGTON CARSON CAVALIER CENTER COOPERSTOWN CROSBY DEVILS LAKE KDLR 	41	9175	4334
NC LAURINBURG	63	2678	17863	NI	CAVALIER	39	9870	3628
NC LENOIR	58	3663		NI) CENTER	41	9194	3446
NC LEXINGTON	61	3245	16209	NI	COOPERSTOWN	40	9456	4138
NC LOUISBURG	58	4005	11774	NI	CROSBY	40		3661
NC LUMBERTON 6 NW	61	3049	16783	NI	DEVILS LAKE KDLR	39	9891	3122
NC MARION	58	3591	9937	NI	DICKINSON FAA AIRPOR	42	8891	4507
NC MARSHALL	55	4519	5519	NI	DICKINSON EXP STATIO	41	9187	3506
NC MAYSVILLE 6 SW	61	2928	13152		DRAKE	39	9797	3450
NC MONCURE 3 SE	58	3814	12235	NI	D DUNN CENTER 2 SW	40	9354	3656
	0 T	3121	14129	NI	D EDMORE 1 N D ELLENDALE	37	10416	2098
NC MOREHEAD CITY 2 WNW	63	2522	17299	NI) ELLENDALE	43	8659	5707
NC MORGANTON	58	3632	11007	NI	FARGO WSO	41	9349	4284
NC MOUNT AIRY	57	4048	7967	NI) FESSENDEN	41	9299	4180
NC MORGANTON NC MOUNT AIRY NC NASHVILLE NC NEW BERN FAA AP NC NEW HOLLAND NC OXFORD 2 SW	60	3394	13851	N	FORMAN 5 SSE	42		5509
NC NEW BERN FAA AP	62	2765	16991	NI NI	D FORT YATES	44		7882
NC NEW HOLLAND	62	2713	14113	N	D FOXHOLM 7 N	40		3874
NC OXFORD 2 SW	59	3436	12132	N) FULLERTON 1 ESE) GACKLE) GARRISON) GRAFTON	42		5570
NC PISGAH FOREST 1 N	54	4562		N) GACKLE	41		5490
NC PLYMOUTH 5 E	60		12138	N	GARRISON	40		3829
NC RALEIGH DURHAM WSO			11845					4364
NC RALEIGH-N C STATE UN			15054		O GRAND FORKS FAA AP			4123
NC REIDSVILLE 2 NW	58		12852) GRAND FORKS UNIVERSI			
NC SALISBURY	60		13384) GRANVILLE) GRENORA	40		
NC SHELBY 2 NNE	59	3649	13267					3422
NC SILER CITY 2 NW NC SLOAN 3 S NC SMITHFIELD NC SOUTHPORT 5 N	57	3971	11592) HANKINSON R R STATIC	41		
NC SLOAN 3 S	62	2827	13408		D HANNAH 2 N	36	10770	
NC SMITHFIELD	61	3112	15891		D HANSBORO 3 W	37	10389	
NC SOUTHPORT 5 N	63	2510	16096		D HANNAH 2 N D HANSBORO 3 W D HETTINGER D HILLSBORO	43		
NC STATESVILLE 2 NNE NC TARBORO 1 S	28	3800	11448					
NC TARBORO I S	51	5220	14957		D JAMESTOWN FAA AIRPOR			3790 4939
NG IRANGOO	1	7713	1 220) JAMESTOWN ST HOSPITA) KENMARE 1 WSW		904Z 9945	
NC TRYON NC WADESBORO	60 61		11196 15707		J KENMARE I WSW	רנ דנ	10591	
NC WADESDORU	54		1935		D LANGDON EXP FARM D LARIMORE	57	9596	
NC WAYNESVILLE 1 E NC WILLARD 4 SW	62	0000	14207		D LARIMORE D LEEDS	38		
NC WILLARD 4 SW NC WILMINGTON WSO NC WILSON 2 W	62	2030	17648	IN.	D LINTON	43		
NC WILSON 2 W	61	32475	15920		D LISBON	40	8907	
NG WILSON Z W	01	JZ41	13920		D MANDAN EXP STATION	42		
ND ALMONT 7 W	42	8737	5869		MAX	39		
ND AMENIA	41				D MAYVILLE	41		
ND AMERICA ND AMIDON		8767			D MCCLUSKY	41		
ND ASHLEY		9179			D MCHENRY 5 NNW		10042	
ND BELCOURT INDIAN RES				N	D MCLEOD 3 E			
ND BISMARCK WSO		9080		N	D MEDORA	43	8486	
ND BOTTINEAU		10509		N	D MEDORA D MINOT FAA AP D MINOT EXP STATION	42 43 40	9425	
ND BOWBELLS		10110		N	D MINOT EXP STATION	39		

<u>st</u>	CITY OR LOCATION MOHALL MOTT NAPOLEON NEW ENGLAND NEW SALEM 6 WNW OAKES PARK RIVER PARSHALL PEMBINA 1 S PETERSBURG 2 N PETTIBONE POWERS LAKE 1 N RICHARDTON ABBEY RIVERDALE ROLLA RUGBY SAN HAVEN SHARON STANLEY 3 NNW STEELE TOWNER TURTLE LAKE UPHAM 3 N VALLEY CITY VELVA WAHPETON WASHBURN WESTHOPE WILLISTON WSO WILLOW CITY WISHEK	<u>TAVG</u>	<u>HDD65</u>	CDH74		<u>5T</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
ND	MOHALL	39	9983	3009		ЭН	CLEVELAND WSO	50	6179	4772
ND	MOTT	42	8874	3625		ЭН	CLEVELAND WSO COLUMBUS SULLIVANT A	53	5457	9016
ND	NAPOLEON	41	9303	5077						6711
ND	NEW ENGLAND	42	8764	3846		ЭН	COLUMBUS WSO	52	5692	7490
ND	NEW SALEM 6 WNW	41	9106	4444		DH	COLUMBUS VALLEY CROS COLUMBUS WSO COSHOCTON SEWAGE PL DAYTON DAYTON WSO DEFIANCE DELAWARE ELYRIA 3 E FINDLAY FAA AP FINDLAY SEWAGE PLANT FREDERICKTOWN GALLIPOLIS 5 W GREENVILLE WATER PLT HAMILTON-FAIRFIELD	51	5841	6628
ND	OAKES	41	9224	4576		DH	DAYTON	54	5260	11400
ND	PARK RIVER	40	9462	5024		ЭН	DAYTON WSO	52	5696	8280
ND	PARSHALL	40	9462	3633		DH	DEFIANCE	49	6617	5935
ND	PEMBINA 1 S	38	10341	3506		ЭН	DELAWARE	50	6118	6266
ND	PETERSBURG 2 N	37	10336	2928		DH	ELYRIA 3 E	50	6022	5437
ND	PETTIBONE	40	9551	4065	C	ЭН	FINDLAY FAA AP	50	6265	6667
ND	POWERS LAKE 1 N	37	10333	2486		OH	FINDLAY SEWAGE PLANT	49	6379	5914
ND	RICHARDTON ABBEY	42	8688	5086		ЭН	FREDERICKTOWN	49	6481	4019
ND	RIVERDALE	40	9498	2927		ЭН	GALLIPOLIS 5 W	55	4736	8876
ND	ROLLA	37	10379	2085		DH	GREENVILLE WATER PLT	49	6301	5268
ND	RUGBY	40	9501	4737		DH	HAMILTON-FAIRFIELD	54	5061	9510
ND	SAN HAVEN	38	10259	2651		DH	HILLSBORO	52	5449	7060
ND	SHARON	39	9806	3086		DH	HIRAM	49	6299	3532
ND	STANLEY 3 NNW	38	10075	3179		ЭН	IRONTON	56	4501	11315
ND	STEELE	41	9122	5007		ЭН	IRWIN	51	5917	5749
ND	TOWNER	39	9830	3455		ЭН	JACKSON 2 NW	52	5603	6096
ND	TURTLE LAKE	41	9202	4678		ЭН	KENTON	50	6178	5564
ND	UPHAM 3 N	38	10076	3089		ЭН	LANCASTER 2 NW	51	5814	8213
ND	VALLEY CITY	40	9443	3764		ЭH	LIMA SEWAGE PLANT	51	5915	7541
ND	VELVA	41	9212	3971		ЭH	LONDON WATER WORKS	51	5738	5787
ND	WAHPETON	43	8696	6299		ЭН	MANSFIELD WSO	50	6254	4948
ND	WASHBURN	42	8879	5677	0	ЭH	MANSFIELD 6 W	48	6575	2614
ND	WESTHOPE	38	10112	2829	c	DH	MARYSVILLE	50	6127	5407
ND	WILLISTON WSO	41	9252	4034		ЭH	MC CONNELSVILLE LOCK	52	5577	6431
ND	WILLOW CITY	37	10442	2255	0	ЭH	MILFORD	53	5370	10849
ND	WISHEK	39	9714	3272		ЭН	MILLERSBURG 1 W	50	5945	4221
					0	ЭH	MILLPORT 2 NW	49	6357	3266
OH	AKRON CANTON WSO ASHLAND ASHTABULA	50	6248	4808	0	ЭН	HAMILTON-FAIRFIELD HILLSBORO HIRAM IRONTON IRWIN JACKSON 2 NW KENTON LANCASTER 2 NW LIMA SEWAGE PLANT LONDON WATER WORKS MANSFIELD WSO MANSFIELD 6 W MARYSVILLE MC CONNELSVILLE LOCK MILFORD MILLERSBURG 1 W MILLPORT 2 NW MINERAL RIDGE WTR WK	50	5928	4438
OH	ASHLAND	49	6320	4600	0	ЭH	MONTPELIER 1 WSW	49	6482	6616
OH	ASHTABULA	49	6302	4020			NAPOLEON WATER WORKS			7055
	ATHENS 5 NW	52	5493	5641	c	ЭH	NEWARK WATER WORKS	51	5693	6028
OH	BARNESVILLE WATER	WK 49	6394	4150			NEW LEXINGTON 2 NW			5689
OH	BELLEFONTAINE SEWA	GE 51	5964	6363			NORWALK SEWAGE PLANT			
OH	BOWLING GREEN SWG	PL 51	6026	6569			OBERLIN			5206
OH	BUCYRUS	49	6393	4217	0	ЭН	PAINESVILLE 4 NW	50	5989	4049
OH	BUCYRUS CADIZ CALDWELL 6 NW CAMBRIDGE SEWAGE P	51	5665	5468		ЭН	PAINESVILLE 4 NW PANDORA 2 NE	50	6239	5892
OH	CALDWELL 6 NW	52	5553	6504		ЭH	PAULDING	49	6461	6869
OH	CAMBRIDGE SEWAGE P	LA 52	5549	5520	0	DH	PEEBLES	54	4993	7399
	CANFIELD 1 S	49	6282	3385	0	ΟH	PAULDING PEEBLES PHILO 3 SW PLYMOUTH	52	5493	
OH	CANFIELD 1 S CHARDON	48	6729	3561	c	ЭН	PLYMOUTH	49	6335	6046
OH	CHARLES MILL DAM	48	6674	2626		DH	PORTSMOUTH	55	4710	9776
OH	CHILO MELDAHL DAM	54	5162				PUT IN BAY PERRY MON			
	CHIPPEWA LAKE	49	6274				SANDUSKY			
OH	CINCINNATI ABBE WS	MO 55	4958	10698	0	DH	SENECAVILLE DAM	50	6010	6699
	CIRCLEVILLE	54	5120	8619	0	ΟH	STEUBENVILLE WATER W	52	5597	5655
					11					

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Definition Diff Diff<	ST CITY OR LOCATION	TAVG	HDD65	СДН74 ∥	ST CITY OR LOCATION TAVE HDD65 CDH74
OH UPER SANDUSKY 52 5933 10406 OK HOBART FAA AIRPORT 60 3712 26662 OH UPER SANDUSKY 51 5886 641 OK HODENVILLE 62 3211 30834 OH WAR VERT 51 5967 6617 OK HOLENVILLE 63 3211 30834 OH WARKEN 3 5 49 6246 175 OK HULAN DAM 58 4247 22026 OH WASHINGTON COURT HOU 52 5673 8461 OK LEGENSON 60 3923 19900 OH WARERIY 53 5240 6774 86407 3163 OK KINFISHER 61 3767 26818 OH WONSTER EXP STATION 52 5563 6464 OK KINFISHER 61 3676 28818 3277 28050 OK ADA 62 3131 25883 0778 OK MANDLE 63 2877 28050 OK MARIETTA 3 NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MASCGEE 61 3362 22979 OK ARNET 57 <td< td=""><td></td><td></td><td></td><td></td><td></td></td<>					
OH UPER SANDUSKY 52 5933 10406 OK HOBART FAA AIRPORT 60 3712 26662 OH UPER SANDUSKY 51 5886 641 OK HODENVILLE 62 3211 30834 OH WAR VERT 51 5967 6617 OK HOLENVILLE 63 3211 30834 OH WARKEN 3 5 49 6246 175 OK HULAN DAM 58 4247 22026 OH WASHINGTON COURT HOU 52 5673 8461 OK LEGENSON 60 3923 19900 OH WARERIY 53 5240 6774 86407 3163 OK KINFISHER 61 3767 26818 OH WONSTER EXP STATION 52 5563 6464 OK KINFISHER 61 3676 28818 3277 28050 OK ADA 62 3131 25883 0778 OK MANDLE 63 2877 28050 OK MARIETTA 3 NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MASCGEE 61 3362 22979 OK ARNET 57 <td< td=""><td>OH TIFFIN</td><td>51</td><td>5911</td><td>6371</td><td>OK HAMMON 60 3876 25803</td></td<>	OH TIFFIN	51	5911	6371	OK HAMMON 60 3876 25803
DH WANSINTOLOUCT HOU 52 3496 6764 OK HULAH DAM 56 4247 22037 OH WAUKRLY 53 5240 7976 OK JAY 59 3923 19900 OH WILMINGTON 52 5673 8461 OK JEFFERSON 60 3447 26055 OH WOUSTER EXP STATION 49 6407 3163 OK KENTON 62 32437 26055 OH YOUNGSTONN WSO 48 6562 2975 OK LAWTON 62 32437 28077 OK ADA 62 3131 25883 OK MARIETTA JW 63 2877 28070 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 22297 OK ALTUS IRR. RESCH STN 63 3143 26402 CK MARIETTA JW 63 2877 2874 OK ARDAORE 61 3435 26400 OK MARIETTA JW 63 2872 28794 OK ARDHORE 61 3447 26624 OK MIMIL 59 3936 22999 OK ARDAORE 61 3447	OH TOLEDO EXPRESS WSO	49	6576	5081	OK HENNESSEY 1 N 60 3789 26772
DH WANSINTOLOUCT HOU 52 3496 6764 DK HULAH DAM 56 4247 22078 OH WAUKELX 53 5240 7976 OK JAY 59 3923 19900 OH WILMINGTON 52 5673 8461 OK JAY 59 3923 19900 OH WOISTER EXP STATION 49 6407 3163 OK KENTON 62 324378 OH XOUSTER EXP STATION 49 6407 3163 OK KENTON 62 32437143 OH XOUSGTONN WSO 48 6562 2975 OK LAWTON 63 2877 28070 OK ADA 62 3131 25883 OK MARIETTA SIN 63 2872 2874 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26297 OK ARDAORE 61 3435 26040 OK MARIETTA AIRPOR 61 3368 22979 OK ARDAORE 61 3447 2662 OK NIAMIL 59 3886 23403 OK ARDAORE 61 3541 24917 OK NOWATA	OH TOLEDO BLADE	52	5933	10406	OK HOBART FAA AIRPORT 60 3/12 26662
DH WANSINTOLOUCT HOU 52 3496 6764 DK HULAH DAM 56 4247 22078 OH WAUKELX 53 5240 7976 OK JAY 59 3923 19900 OH WILMINGTON 52 5673 8461 OK JAY 59 3923 19900 OH WOISTER EXP STATION 49 6407 3163 OK KENTON 62 324378 OH XOUSTER EXP STATION 49 6407 3163 OK KENTON 62 32437143 OH XOUSGTONN WSO 48 6562 2975 OK LAWTON 63 2877 28070 OK ADA 62 3131 25883 OK MARIETTA SIN 63 2872 2874 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26297 OK ARDAORE 61 3435 26040 OK MARIETTA AIRPOR 61 3368 22979 OK ARDAORE 61 3447 2662 OK NIAMIL 59 3886 23403 OK ARDAORE 61 3541 24917 OK NOWATA	OH UPPER SANDUSKY	51	5888	6461	OK HOLDENVILLE 62 3215 24766
DH WANSINTOLOUCT HOU 52 3496 6764 OK HULAH DAM 56 4247 22037 OH WAUKRLY 53 5240 7976 OK JAY 59 3923 19900 OH WILMINGTON 52 5673 8461 OK JEFFERSON 60 3447 26055 OH WOUSTER EXP STATION 49 6407 3163 OK KENTON 62 32437 26055 OH YOUNGSTONN WSO 48 6562 2975 OK LAWTON 62 32437 28077 OK ADA 62 3131 25883 OK MARIETTA JW 63 2877 28070 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 22297 OK ALTUS IRR. RESCH STN 63 3143 26402 CK MARIETTA JW 63 2877 2874 OK ARDAORE 61 3435 26400 OK MARIETTA JW 63 2872 28794 OK ARDHORE 61 3447 26624 OK MIMIL 59 3936 22999 OK ARDAORE 61 3447	OH URBANA SEWAGE PLANT	50	6176	5804	OK HOLLIS 63 3211 30834
DH WANSINTOLOUCT HOU 52 3496 6764 OK HULAH DAM 56 4247 22037 OH WAUKRLY 53 5240 7976 OK JAY 59 3923 19900 OH WILMINGTON 52 5673 8461 OK JEFFERSON 60 3447 26055 OH WOUSTER EXP STATION 49 6407 3163 OK KENTON 62 32437 26055 OH YOUNGSTONN WSO 48 6562 2975 OK LAWTON 62 32437 28077 OK ADA 62 3131 25883 OK MARIETTA JW 63 2877 28070 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 22297 OK ALTUS IRR. RESCH STN 63 3143 26402 CK MARIETTA JW 63 2877 2874 OK ARDAORE 61 3435 26400 OK MARIETTA JW 63 2872 28794 OK ARDHORE 61 3447 26624 OK MIMIL 59 3936 22999 OK ARDAORE 61 3447	OH VAN WERT	51	5967	6617	OK HOOKER 1 N 57 4503 18034
DH WANSINTOLOUCT HOU 52 3496 6764 DK HULAH DAM 56 4247 22078 OH WAUKELX 53 5240 7976 OK JAY 59 3923 19900 OH WILMINGTON 52 5673 8461 OK JAY 59 3923 19900 OH WOISTER EXP STATION 49 6407 3163 OK KENTON 62 324378 OH XOUSTER EXP STATION 49 6407 3163 OK KENTON 62 32437143 OH XOUSGTONN WSO 48 6562 2975 OK LAWTON 63 2877 28070 OK ADA 62 3131 25883 OK MARIETTA SIN 63 2872 2874 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26297 OK ARDAORE 61 3435 26040 OK MARIETTA AIRPOR 61 3368 22979 OK ARDAORE 61 3447 2662 OK NIAMIL 59 3886 23403 OK ARDAORE 61 3541 24917 OK NOWATA	OH WARREN 3 S	49	6246	4175	OK HUGO 64 2/20 26102
OK ADA 62 3131 25883 OK MARIETTA NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ALVA 59 4049 26480 OK MCALESTER FAA AIRPOR 61 3368 26299 OK ANTLERS 2 ENE 62 3079 23153 OK MUSKOGEE 61 3418 25709 OK ARDMORE 65 2613 31660 OK MUTUAL 59 4083 24373 OK BEAVER 1 SW 57 4486 21483 OK OKENEN 61 3617 27817 OK BEAVER 1 SW 57 4486 21483 OK OKENEN 61 3359 23965 OK BOISE CITY 2 E 56 4619 1224917 OK OKNULGEWATEW OKS 61 3393 23161 OK CANTON DAM 60	OH WASHINGTON COURT HOU	52	5498	6/64	OK HULAH DAM 58 424/ 22026
OK ADA 62 3131 25883 OK MARIETTA NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ALVA 59 4049 26480 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ANADARKO 61 3435 26084 OK MEEKER I E 61 3418 25709 OK ANTLERS 2 ENE 62 3079 23153 OK MUSKOGEE 61 3418 25709 OK ARDMORE 65 2613 31660 OK MUTUAL 59 4083 24373 OK BARTLESVILLE 2 W 60 3847 22662 OK NOWATA 59 3886 23403 OK BARTLESVILLE 2 W 60 3781 23506 OK OKLENENH 61 3617 27817 OK BARTLESVILLE 2 W 60 3781 24	OH WAUSEON WASTE WTR PL	49	6589	4215	OK IDABEL 63 2853 23/98
OK ADA 62 3131 25883 OK MARIETTA NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ALVA 59 4049 26480 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ANADARKO 61 3435 26084 OK MEEKER I E 61 3418 25709 OK ANTLERS 2 ENE 62 3079 23153 OK MUSKOGEE 61 3418 25709 OK ARDMORE 65 2613 31660 OK MUTUAL 59 4083 24373 OK BARTLESVILLE 2 W 60 3847 22662 OK NOWATA 59 3886 23403 OK BARTLESVILLE 2 W 60 3781 23506 OK OKLENENH 61 3617 27817 OK BARTLESVILLE 2 W 60 3781 24	OH WAVERLY	53	5240	7976	OK JAY 59 3923 19900
OK ADA 62 3131 25883 OK MARIETTA NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ALVA 59 4049 26480 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ANADARKO 61 3435 26084 OK MEEKER I E 61 3418 25709 OK ANTLERS 2 ENE 62 3079 23153 OK MUSKOGEE 61 3418 25709 OK ARDMORE 65 2613 31660 OK MUTUAL 59 4083 24373 OK BARTLESVILLE 2 W 60 3847 22662 OK NOWATA 59 3886 23403 OK BARTLESVILLE 2 W 60 3781 23506 OK OKLENENH 61 3617 27817 OK BARTLESVILLE 2 W 60 3781 24	OH WILMINGTON	52	5673	8461	OK JEFFERSON 60 394/ 26055
OK ADA 62 3131 25883 OK MARIETTA NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ALVA 59 4049 26480 OK MCALESTER FAA AIRPOR 61 3368 26299 OK ANTLERS 2 ENE 62 3079 23153 OK MUSKOGEE 61 3418 25709 OK ARDMORE 65 2613 31660 OK MUTUAL 59 4083 24373 OK BEAVER 1 SW 57 4486 21483 OK OKENEN 61 3617 27817 OK BEAVER 1 SW 57 4486 21483 OK OKENEN 61 3359 23965 OK BOISE CITY 2 E 56 4619 1224917 OK OKNULGEWATEW OKS 61 3393 23161 OK CANTON DAM 60	OH WOOSTER EXP STATION	49	6407	3163	OK KENTON 56 458/ 14092
OK ADA 62 3131 25883 OK MARIETTA NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ALVA 59 4049 26480 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ANADARKO 61 3435 26084 OK MEEKER I E 61 3418 25709 OK ANTLERS 2 ENE 62 3079 23153 OK MUSKOGEE 61 3418 25709 OK ARDMORE 65 2613 31660 OK MUTUAL 59 4083 24373 OK BARTLESVILLE 2 W 60 3847 22662 OK NOWATA 59 3886 23403 OK BARTLESVILLE 2 W 60 3781 23506 OK OKLENENH 61 3617 27817 OK BARTLESVILLE 2 W 60 3781 24	OH XENIA 5 SSE	52	5563	6464	OK KINGFISHER 61 36/6 26818
OK ADA 62 3131 25883 OK MARIETTA NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ALVA 59 4049 26480 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ANADARKO 61 3435 26084 OK MEEKER I E 61 3418 25709 OK ANTLERS 2 ENE 62 3079 23153 OK MUSKOGEE 61 3418 25709 OK ARDMORE 65 2613 31660 OK MUTUAL 59 4083 24373 OK BARTLESVILLE 2 W 60 3847 22662 OK NOWATA 59 3886 23403 OK BARTLESVILLE 2 W 60 3781 23506 OK OKLENENH 61 3617 27817 OK BARTLESVILLE 2 W 60 3781 24	OH YOUNGSTOWN WSO	48	6562	2975	OK LAWTON 62 3243 2/143
OK ADA 62 3131 25883 OK MARIETTA NW 63 2872 28794 OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ALVA 59 4049 26480 OK MCALESTER FAA AIRPOR 61 3368 26299 OK ANTLERS 2 ENE 62 3079 23153 OK MUSKOGEE 61 3418 25709 OK ARDMORE 65 2613 31660 OK MUTUAL 59 4083 24373 OK BEAVER 1 SW 57 4486 21483 OK OKENEN 61 3617 27817 OK BEAVER 1 SW 57 4486 21483 OK OKENEN 61 3359 23965 OK BOISE CITY 2 E 56 4619 1224917 OK OKNULGEWATEW OKS 61 3393 23161 OK CANTON DAM 60	OH ZANESVILLE FAA AP	51	5783	5407	OK MADILL 63 28/7 28050
OK ALTUS IRR. RESCH STN 63 3148 30121 OK MCALESTER FAA AIRPOR 61 3368 26247 OK ALVA 59 4049 26480 OK MEKKER 1 61 3596 24594 OK ANDARKO 61 3435 26084 OK MEKKER 1 59 3936 22999 OK ARDMORE 65 2613 31660 OK MUTUAL 59 4158 23583 OK ARNETT 58 4375 20119 OK NEWKIRK 59 4083 24373 OK BARTLESVILLE 2 W 60 3847 22662 OK NUTUAL 59 3886 24033 OK BARTLESVILLE 2 W 60 3847 22662 OK NUWATA 59 3886 24033 OK BLXBY 2 NE 60 3847 22650 OK OKLAHOMA CITY WSFO 60 3742 22978 OK BUFFALO 60 3764 24917 OK OKMULGEE WATER WORKS 61 3136 28777 OK CANTON DAM 60 3794 25497 OK PAULS VALLEY 63 3161 25079 OK CHANDLER NO 1 61 3					
OK ALVA 59 4049 26480 OK MEEKER 1 E 61 3596 24594 OK ANADARKO 61 3435 26084 OK MIAMI 59 3936 224999 OK ANTLERS 2 ENE 62 3079 23153 OK MUSKOGEE 61 3418 25709 OK ARNETT 58 4375 20119 OK NUTUAL 59 4158 23733 OK BARTLESVILLE 2 W 60 3847 22662 OK NOWATA 59 3886 24373 OK BLXBY 2 NE 60 3781 23506 OK OKEENE 61 3359 23965 OK BUSS CITY 2 E 56 4619 12249 OK OKLAHOMA CITY WSFO 60 3742 22978 OK CANTON DAM 60 3794 25497 OK PAULS VALLEY 63 3136 28777 OK CARNEGTE 4 ENE 61 3469 27447 OK POTEAU 62 3099 23161 OK CHEROKEE POWER PLANT 60 3953 26640 OK PRYOR 59 3906 23162 OK CHEROKEE POWER PLANT 60 3953					
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK ALTUS IRR. RESCH STN	63	3148	30121	OK MCALESTER FAA AIRPOR 61 3368 2624/
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK ALVA	59	4049	26480	OK MEEKER 1 E 61 3596 24594
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK ANADARKO	61	3435	26084	OK MIAMI 59 3936 22999
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK ANTLERS 2 ENE	62	3079	23153	OK MUSKOGEE 61 3418 25709
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK ARDMORE	65	2613	31660	OK MUTUAL 59 4158 23583
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK ARNETT	58	4375	20119	OK NEWKIRK 59 4083 24373
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK BARTLESVILLE 2 W	60	3847	22662	OK NOWATA 59 3886 23403
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK BEAVER 1 SW	57	4486	21483	OK OKEENE 61 3617 27817
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK BIXBY 2 NE	60	3781	23506	OK OKEMAH 61 3359 23965
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK BOISE CITY 2 E	56	4619	12249	OK OKLAHOMA CITY WSFO 60 3742 22978
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK BRISTOW	61	3541	24917	OK OKMULGEE WATER WORKS 61 3393 23161
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK BUFFALO	60	3969	26768	OK PAULS VALLEY 63 3136 28777
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK CANTON DAM	60	3794	25497	OK PAWHUSKA 59 3910 23079
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK CARNEGIE 4 ENE	61	3469	27447	OK PERRY 61 3601 26042
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK CHANDLER NO 1	61	3449	25856	
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK CHATTANOOGA 3 NE	63	3185	29117	OK POTEAU 62 3099 25318
OKCLAREMORE 2ENE59395423271OKSALLISAW61330723431OKCLEVELAND61357124750OKSEMINOLE62314827356OKCLINTON60370226410OKSTILLWATER 2W60380223621OKCUSHING60384125167OKTALLEQUAH 1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO 1N60369423603OKTIPTON 4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK 4E60365523319OKVINITA 3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWAYNOKA60386226794OKGRANDRIVER57454217545OKWEATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576	OK CHEROKEE POWER PLANT	60	3953	26640	OK PRYOR 59 3906 23162
OK CLEVELAND61357124750OK SEMINOLE62314827356OK CLINTON60370226410OK STILLWATER 2 W60380223621OK CUSHING60384125167OK TAHLEQUAH 1 SE60363522477OK DUNCAN63304928328OK TALOGA59395623030OK EL RENO 1 N60369423603OK TIPTON 4 S63311229986OK ERICK 4 E60365523319OK VINITA 3 NNE59397623192OK FORT SUPPLY DAM59406523032OK WAGONER61350225094OK GAGE FAA AIRPORT58435721395OK WAURIKA64286531724OK GODWELL57454217545OK WEATHERFORD61362525223OK GRAND RIVER DAM60377023938OK WEBBERS FALLS60369522576					OK PURCELL 61 3535 25095
OK CLINTON60370226410OK STILLWATER 2 W60380223621OK CUSHING60384125167OK TAHLEQUAH 1 SE60363522477OK DUNCAN63304928328OK TALOGA59395623030OK EL RENO 1 N60369423603OK TIPTON 4 S63311229986OK ENID60377326125OK TULSA WSO60374126468OK FORT SUPPLY DAM59406523032OK VINITA 3 NNE59397623192OK FREDERICK64295434200OK WAGONER61350225094OK GAGE FAA AIRPORT58435721395OK WAURIKA64286531724OK GODWELL57454217545OK WEATHERFORD61362525223OK GRAND RIVER DAM60377023938OK WEBBERS FALLS60369522576					
OKCUSHING60384125167OKTAHLEQUAH1SE60363522477OKDUNCAN63304928328OKTALOGA59395623030OKELRENO1N60369423603OKTIPTON4S63311229986OKENID60377326125OKTULSAWSO60374126468OKERICK4E60365523319OKVINITA3NNE59397623192OKFORTSUPPLYDAM59406523032OKWAGONER61350225094OKFREDERICK64295434200OKWALTERS63307932191OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGOODWELL57454217545OKWATHERFORD61362525223OKGRANDRIVER60377023938OKWEBBERS60369522576					
OK CUSHING 60 3841 25167 OK TAHLEQUAH 1 SE 60 3635 22477 OK DUNCAN 63 3049 28328 OK TALOGA 59 3956 23030 OK EL RENO 1 N 60 3694 23603 OK TIPTON 4 S 63 3112 29986 OK ENID 60 3655 23319 OK TULSA WSO 60 3741 26468 OK FORT SUPPLY DAM 59 4065 23032 OK WAGONER 61 3502 25094 OK FREDERICK 64 2954 34200 OK WALTERS 63 3079 32191 OK GEARY 60 3693 25928 OK WAYNOKA 64 2865 31724 OK GOODWELL 57 4542 17545 OK WEATHERFORD 61 3625 25223 OK GRAND RIVER DAM 60 3770 23938 OK WEBBERS FALLS 60 3695 22576					
OK EL RENO 1 N603694 23603OK TIPTON 4 S633112 29986OK ENID603773 26125OK TULSA WSO603741 26468OK ERICK 4 E603655 23319OK VINITA 3 NNE593976 23192OK FORT SUPPLY DAM594065 23032OK WAGONER613502 25094OK FREDERICK642954 34200OK WALTERS633079 32191OK GAGE FAA AIRPORT584357 21395OK WAURIKA642865 31724OK GODWELL574542 17545OK WAYNOKA603862 26794OK GRAND RIVER DAM603770 23938OK WEBBERS FALLS603695 22576					OK TAHLEQUAH 1 SE 60 3635 22477
OKENID60377326125OKTULSAWSO60374126468OKERICK 4 E60365523319OKVINITA 3 NNE59397623192OKFORT SUPPLY DAM59406523032OKVINITA 3 NNE59397623192OKFREDERICK64295434200OKWAGONER61350225094OKGAGEFAAAIRPORT58435721395OKWAURIKA64286531724OKGEARY60369325928OKWAYNOKA60386226794OKGODWELL57454217545OKWEATHERFORD61362525223OKGRAND RIVER DAM60377023938OKWEBBERS FALLS60369522576					
OKERICK 4 E60365523319OK VINITA 3 NNE59397623192OKFORT SUPPLY DAM59406523032OK WAGONER61350225094OKFREDERICK64295434200OK WALTERS63307932191OKGAGE FAA AIRPORT58435721395OK WAURIKA64286531724OKGEARY60369325928OK WAYNOKA60386226794OKGODWELL57454217545OK WEATHERFORD61362525223OKGRAND RIVER DAM60377023938OK WEBBERS FALLS60369522576					
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OK GAGE FAA AIRPORT 58 4357 21395 OK WAURIKA 64 2865 31724 OK GEARY 60 3693 25928 OK WAURIKA 60 3862 26794 OK GOODWELL 57 4542 17545 OK WEATHERFORD 61 3625 25223 OK GRAND RIVER DAM 60 3770 23938 OK WEBBERS FALLS 60 3695 22576					
OK GEARY 60 3693 25928 OK WAYNOKA 60 3862 26794 OK GOODWELL 57 4542 17545 OK WEATHERFORD 61 3625 25223 OK GRAND RIVER DAM 60 3770 23938 OK WEBBERS FALLS 60 3695 22576					OK WALTERS 63 3079 32191
OK GEARY 60 3693 25928 OK WAYNOKA 60 3862 26794 OK GOODWELL 57 4542 17545 OK WEATHERFORD 61 3625 25223 OK GRAND RIVER DAM 60 3770 23938 OK WEBBERS FALLS 60 3695 22576	OK GAGE FAA AIRPORT				OK WAURIKA 64 2865 31724
OK GRAND RIVER DAM 60 3770 23938 OK WEBBERS FALLS 60 3695 22576					OK WAYNOKA 60 3862 26794
OK GUTHRIE 2 WNW 61 3647 25894 OK WICHITA MT WL REF 61 3462 24361					
	OK GUTHRIE 2 WNW	61	3647	25894	OK WICHITA MT WL REF 61 3462 24361

<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>			CITY OR LOCATION			
ок	WILBURTON 9 ENE WISTER DAM WOODWARD FIELD STATI	61	3268	24110	1	OR	LA GRANDE LAKEVIEW LEABURG 1 SW MADRAS MALHEUR BRANCH EXP S	50	6059	3694
ок	WISTER DAM	62	3204	25633		OR	LAKEVIEW	46	7037	2027
OK	WOODWARD FIELD STATI	58	4353	23232		OR	LEABURG 1 SW	53	4763	883
						OR	MADRAS	49	6263	1658
OR	ANTELOPE 1 N ARLINGTON ASHLAND 1 N ASTORIA WSO BAKER FAA AIRPORT BAKER KBKR BANDON 1 E-BATES BOG BEND	49	6155	3672		OR	MALHEUR BRANCH EXP S	51	5885	7882
OR	ARLINGTON	55	4798	10887	1	OR	MALHEUR BRANCH EAT 5 MALHEUR REFUGE HDQ MARION FRKS FISH HAT MC MINNVILLE MEDFORD WSO METOLIUS 1 W MIKKALO 6 W MILTON FREEWATER 4 N	47	6985	1473
OR	ASHLAND 1 N	52	5145	2838		OR	MARION FRKS FISH HAT	46	6975	797
OR	ASTORIA WSO	51	5250	30		OR	MC MINNVILLE	52	4981	1055
OR	BAKER FAA AIRPORT	46	7291	1491		OR	MEDFORD WSO	54	4803	6151
OR	BAKER KBKR	47	6787	2173		OR	METOLIUS 1 W	47	6579	813
OR	BANDON 1 E-BATES BOG	51	4955	51		OR	MIKKALO 6 W	52	5500	7387
OR	BANDON 1 E-BATES BOG BEND BEULAH BONNEVILLE DAM BROOKINGS BURNS WSO AP CAPE BLANCO CHEMULT CHERRY GROVE 2 S CLATSKANIE 3 W CLOVERDALE 1 NW CONDON CORVALLIS ST COLLEGE COTTAGE GROVE 1 S	46	7082	647		OR	MILTON FREEWATER 4 N	54	4828	7538
OR	BEULAH	49	6351	5064		OR	MORO	49	6268	2705
OR	BONNEVILLE DAM	52	4946	1597		OR	NEWPORT	50	5353	24
OR	BROOKINGS	53	4295	97		OR	NORTH BEND FAA AP	52	4664	58
OR	BURNS WSO AP	47	7024	2599		OR	NYSSA	51	5822	7080
OR	CAPE BLANCO	50	5342	9		OR	OCHOCO RANGER STATIO	43	8134	744
OR	CHEMULT	42	8390	537		OR	ONTARIO KSRV	52	5712	10182
OR	CHERRY GROVE 2 S	51	5482	1200		OR	OREGON CITY	54	4417	2105
OR	CLATSKANIE 3 W	51	5228	192		OR	OTIS 2 NE	51	5255	95
OR	CLOVERDALE 1 NW	52	4857	44		OR	OWYHEE DAM	52	5404	6461
OR	CONDON	48	6592	1872		OR	PAISLEY	48	6404	2276
OR	CORVALLIS ST COLLEGE	52	4990	760		OR	PENDLETON WSO	53	5275	8121
OR	COTTAGE GROVE 1 S	52	4926	363		OR	PILOT ROCK 1 SE	51	5612	3919
OR	COTTAGE GROVE DAM	52	5058	646		OR	PORTLAND WSO	53	4693	1851
OR	CRATER LAKE NP HQ	38	9939	856		OR	POWERS	53	4366	127
OR	DALLAS	52	4988	896		OR	PRINEVILLE 4 NW	4/	6638	889
OR	DORENA DAM	51	51/1	450		OR	PROSPECT 2 SW	51	5581	1858
OR	DRAIN	53	454/	743		OR	REDMOND 2 W	48	64/5	1101
OR	DUFUR	49	5987	1898		OR	REDMOND FAA AP	4/	6/46	19/2
OR	CORVALLIS ST COLLEGE COTTAGE GROVE 1 S COTTAGE GROVE DAM CRATER LAKE NP HQ DALLAS DORENA DAM DRAIN DUFUR ELGIN ELKTON 3 SW ENTERPRISE ESTACADA 2 SE EUGENE WSO FERN RIDGE DAM	48	6042	1536		OR	MILTON FREEWATER 4 N MORO NEWPORT NORTH BEND FAA AP NYSSA OCHOCO RANGER STATIO ONTARIO KSRV OREGON CITY OTIS 2 NE OWYHEE DAM PAISLEY PENDLETON WSO PILOT ROCK 1 SE PORTLAND WSO POWERS PRINEVILLE 4 NW PROSPECT 2 SW REDMOND FAA AP REEDSPORT RICHLAND RIDDLE 2 NNE ROSEBURG KQEN ROUND GROVE SALEM WSO	52	4684	49
OR	ELKTON 3 SW	54	4219	1474		OR	RICHLAND	51	5660	/689
OR	ENTERPRISE	43	7943	522		OR	RIDDLE 2 NNE	54	4383	1/10
OR	ESTACADA 2 SE	52	5032	756		OR	ROSEBURG KQEN	54	4454	2227
OR	EUGENE WSO	53	4803	1296		OR	ROUND GROVE	44	/684	542
~+~				000		OR	SALEM WSO SEASIDE SENECA	52	49/8	1081
OR	FOREST GROVE FOSSIL	23	4828	1965		OR	SEASIDE	52	4892	82
OR	FUSSIL	48	6497	1318		OR	SENECA SEXTON SUMMIT WSO	40	9145	562
OR	GOLD BEACH RANGER ST	55	4400	58 5241						
OR	GRANTS PASS GRIZZLY	55	4329	931			SILVER CREEK FALLS SQUAW BUTTE EXP STA			
OR	HALFWAY	40	7120	1469		OR	SUAW BUILL EAF SIA	40	1294	2572
	HART MOUNTAIN REFUGE			687		OR	STAYTON THREE LYNX TILLAMOOK 1 W	52	4030	1083
	HEADWORKS PTLD WATER			876		OR	TILLANOOV 1 U	50	5742	850
						OR	IILLAMOUK I W	50	5548	73
OP	HEPPNER HERMISTON 2 S	52	5010	7181		OR	UNION VALE	40 E1	5700	1168
OR	NOOD DIVED EVD CTATT	50	5571	1352			WICKIUP DAM	77	J/89 7017	8550
OR	HOOD RIVER EXP STATI	50	5550	1353		OK	WICKIUP DAM	44	1911	564
OR	VENT	.0	2222	2010		D٨	ALLENTOWN WSO BAKERSTOWN 3 WNW	C 1	5015	500/
OR	VIAMATH FAITS 2 COLL	40	6502	2012			RAREDGLUTNI 5 THIT	51	5200	5804
UK	NUMBER OF THE PARTY AND A DOM	40	0.000	2444	1	rA	DUVERDIONN 2 MIM	21	2/20	6461

<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>		<u>CITY OR LOCATION</u>			
PΔ	BRADFORD FAA AP BRADFORD 4 W RES BURGETTSTOWN 2 W CARLISLE CHAMBERSBURG 1 ESE CLABION 3 SH	1.1.	7956	612	P	A SLIPPERY ROCK 1 SSW A STATE COLLEGE A STROUDSBURG A TIONESTA 2 SE DAM A TOWANDA 1 ESE A UNIONTOWN 1 NE A WARREN A WAYNESBURG 1 E A WELLSBORO 3 S A WEST CHESTER 1 W A W-BARRE-SCRANTON WSO A WILLIAMSPORT WSO	49	6536	4702
PA	BRADFORD 4 W RES	45	7575	813		A STATE COLLEGE	49	6252	3484
PA	BURGETTSTOWN 2 W	48	6601	2276	P	A STROUDSBURG	50	6235	5333
PA	CARLISLE	53	5323	9598		A TIONESTA 2 SE DAM	46	7100	1693
PA	CARLISLE CHAMBERSBURG 1 ESE CLARION 3 SW COATESVILLE 1 SW CONFLUENCE 1 SW DAM CORRY DEVAULT 1 W DONEGAL DONORA 1 SW DREXEL UNIVERSITY EPHRATA ERIE WSO EVERETT 1 SW FARRELL SHARON FORD CITY 4 S DAM FRANKLIN FREELAND GETTYSBURG GREENVILLE HANOVER HARRISBURG WSO HOLTWOOD INDIANA 3 SE JAMESTOWN 2 NW JOHNSTOWN KANE 1 NNE LANDISVILLE 2 NW LEWISTOWN MADERA MARCUS HOOK MEADVILLE 1 S MONTGOMERY L AND D	52	5600	5369	P	A TOWANDA 1 ESE	40	6399	2496
PA	CLARION 3 SW	47	6791	2466	P	A UNTONTOWN 1 NE	52	5393	6151
PA	COATESVILLE 1 SW	52	5633	5045	P	A WARREN	48	6634	2323
PA	CONFLUENCE 1 SW DAM	49	6356	2151	P	A WAYNESBIRG 1 F	50	5920	3882
PA	CORRY	47	6908	2008	P	A WELLSBORD 3 S	45	7691	1368
PA	DEVALUT 1 W	52	5666	6369	P	A WEST CHESTER 1 W	53	5375	8083
PA	DONEGAL	47	7038	2438	P	A WEST CHESTER I W	49	6332	3774
PA	DONORA 1 SW	53	5174	8433		A WILLIAMSPORT WSO	50	6053	4996
PA	DREVEL UNIVERSITY	56	4552	11366		A YORK 3 SSW PUMP STA	20	0000	6555
ΣΔ	FDHDATA	52	5412	5693	_	A TORK 5 55W TOHT STA	55	5207	0555
PΔ	FRIF WSO	18	6768	2222	R R	T BLOCK ISLAND WSO	50	5759	1145
ΡΔ	ENIL WOO FVFPFTT 1 SW	50	5971	6132		I BLOCK ISLAND WSO I KINGSTON I PROVIDENCE WSO	70	6122	1682
DA	FARRELL SHARON	52	5680	8283		I PROVIDENCE WSO	50	5909	
PA	FORD CITY 4 S DAM	/10	6437	2734		I IROVIDENCE WSC	50	3909	JUJI
PΔ	FRANKI IN	49	6558	2788	l c	CATVEN	64	2387	20347
DA		40	6915	1742	C C	C ANDERSON	61 61	2060	16014
	CETTVSBIDC	4/	5369	7230		C ANDERSON EAA AD	62	2900	18849
ΦΔ	CREENVILLE	50	6230	3977		C RAMBEDO	64	2020	20130
	VANOVED	53	5339	7229	l o	C BEAUEODT 7 SU	64	1017	21498
		53	5339	9071		C AIKEN C ANDERSON C ANDERSON FAA AP C BAMBERG C BEAUFORT 7 SW C BLACKVILLE 3 W	64	2205	18725
DA DA	HARTISDURG WSC	54	5155	8433		O DIMORVILLE J W	04	2373	
	TNDIANA 3 SE	.0	6164	2588		C CAESARS HEAD 1 NE C CALHOUN FALLS	61	3007	17525
TA DA	INDIANA 5 SE	49	6878	1864		C CAMDEN 2 WSW	61		16215
	JAMESIOWN Z NW	4/ 51	5772	5650					20315
	VANE 1 NNE	51	7902	576		C CHARLESTON AP WSO C CHARLESTON CITY WSO	66		23283
	LANDTOUTLE 2 NUL	44 51	5715	5890					
	LANDISVILLE Z NW	51	5708	5333		C CHERAW	61		17621
		71	7461			C CHESTER C CLEMSON UNIVERSITY	61		15753
PA	MADEKA	45	/401	1468					14743
PA	MARCUS HOOK MEADVILLE 1 S	20	6883	11351		C COLUMBIA WSO	63		21805
PA	MEADVILLE 1 S	47 52	5623	1666		C COLUMBIA UNI OF S C			22814
			2010	5981		C CONWAY	63		19693
	MONTROSE	44	7699	1148		C DARLINGTON	63		17843
	MORGANTOWN	51	5784	4003		C DILLON 4 SW	61		16557
	NEW CASTLE 1 N	51	5892	4756		C FLORENCE FAA AP	63		20810
	NEWELL	53	5263	9130		C FLORENCE 2 N	62		17858
	NEWPORT	51	5814	5348		C GEORGETOWN 2 E	65		20264
	PALMERTON	50	5960	5542		C GRNVLE-SPTNBRG WSO	60		14069
	PHILADELPHIA WSO	54		8896		C GREENWOOD 3 ESE	61		16962
	PHILIPSBURG FAA AP	45		1657		C HAMPTON	65		21707
	PHOENIXVILLE 1 E	53	5198	5959		C KINGSTREE 1 SE	63		19911
	PITTSBURGH AP WSO 2	50	5957	5009		C LAKE CITY	64		20965
	PLEASANT MOUNT 1 W	43	8174	610		C LAURENS	61		17232
	PORT CLINTON	49	6407	3023		C LITTLE MOUNTAIN	63		20902
	PUTNEYVILLE 2 SE DAM		6825	2045		C LONGCREEK 1 N	58		8791
	RIDGWAY	46	7208	1822		C LORIS 1 S	62		15807
PA	SHIPPENSBURG	52	5407	6615	∥ S	C MARION	63	2511	18465

ST CITY OR LOCATION TAVE HDD65 CDH24 ST CITY OR LOCATION TAVE HDD65 CDH24 SC AC COLL 63 2662 191.68 SD HOTHORE 1 W 45 7944 9848 SC NEWBERRY 62 2864 17339 SD HOT SPRINCS 48 6947 6846 SC PARR 62 2792 17622 SD HURON WSO 45 8109 8677 SC PICKENS 5 5 61 3035 13606 SD RUNDON 42 8600 4842 SC RIARDAN LAKE 60 3354 1241.4 SD LEMON 42 8660 4842 SC RAINON LAKE 60 1962 25570 SD MARIN 48 7071 1984 SC SUMTER 64 2461 19860 SD MICHON 48 71677 SC SUMTER 64 2461	ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>		<u>st</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC MC COLL	63	2662	19168		SD	HIGHMORE 1 W	45	7944	9848
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC NEWBERRY	62	2803	17339	Ľ	SD	HOT SPRINGS	48	6947	6846
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC ORANGEBURG 2	63	2584	20406		SD	HOWARD	46	7819	8768
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC PARR	62	2792	17682		SD	HURON WSO	45	8109	8677
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC PICKENS 5 SE	61	3035	13806		SD	KENNEBEC	47	7397	11704
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC PINOPOLIS DAM	64	2449	19755		SD	LEAD 1 SE	44	7931	3708
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC RAINBOW LAKE	60	3354	12414		SD	LEMMON	42	8680	4842
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC RIDGELAND 5 NE	65	2044	20244		SD	LONGVALLEY	49	6854	10517
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC SALUDA	62	2950	19600		SD	LUDLOW	43	8347	5434
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC SANTUCK	62	2902	16554		SD	MARION	46	7606	8772
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC SULLIVANS ISLAND	66	1996	22570		SD	MARTIN	48	7071	8984
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC SUMMERVILLE 2 WNW	64	2372	19034		SD	MCINTOSH	44	8428	7677
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC SUMTER	64	2481	19860		SD	MENNO	48	7207	10131
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC TILGHMAN FOR NURSERY	64	2396	22126		SD	MIDLAND	48	7167	10954
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC UNION 8 SW	60	3438	14465		SD	MILBANK	44	8215	7327
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC WALHALLA	59	3357	11147		SD	MILESVILLE 5 NE	46	7609	10172
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC WALTERBORO 2 SW	64	2242	20147		SD	MILLER	46	7676	9463
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC WINNSBORO 1 W	61	3016	16842		SD	MITCHELL 2 SSE	47	7397	10278
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC WINTHROP COLLEGE	61	3013	16080		SD	MOBRIDGE	44	8243	7808
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SC YEMASSEE 4 W	64	2267	20432		SD	MURDO	47	7266	10320
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957						SD	NEWELL 2 NW	45	7938	6856
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD ABERDEEN WSO	43	8577	6526		SD	OELRICHS	48	6951	9145
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD ACADEMY	48	7049	11160		SD	PHILIP	47	7468	10277
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD ALEXANDRIA	47	7285	9895		SD	PICKSTOWN	49	6883	11213
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD ARDMORE 2 N	46	7425	7403		SD	PIERRE FAA AP	46	7580	10444
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD ARMOUR	48	7168	10084		SD	POLLOCK	43	8636	8230
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD BELLE FOURCHE	47	7247	6528		SD	RALPH	42	8622	4181
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD BONESTEEL	48	7141	10583		SD	RAPID CITY WSO	47	7308	8286
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD BRIDGEWATER	47	7413	9534		SD	RAPID CITY	48	6822	8155
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD BRITTON	43	8701	7623		SD	REDFIELD 6 E	44	8327	7362
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD BROOKINGS 2 NE	43	8653	4422		SD	REDIG 11 NE	44	8280	4550
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD CAMP CROOK	44	8107	5493		SD	SIOUX FALLS WSO	45	7890	8638
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD CANTON	47	7404	9891		SD	SISSETON	44	8284	7515
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD CASTLEWOOD	43	8444	5955		SD	SPEARFISH	47	7153	7227
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD CENTERVILLE 6 SE	47	7380	11492		SD	TIMBER LAKE	44	8239	7359
SD CUSTER 41 8769 1006 SD WAGNER 49 6844 12670 SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 7148 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD CLARK	44	8415	6887		SD	TYNDALL	48	7010	10421
SD DEADWOOD 44 8111 2617 SD WASTA 48 7067 9694 SD DE SMET 45 8034 7199 SD WASTA 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WEBSTER 42 8784 5270 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6770 12249 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 728 TN ALLARDT 55 4496 7038 SD GANN VALLEY 46 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD COLUMBIA 8 N	43	8619	6271		SD	VERMILLION 2 SE	49	6902	11530
SD DE SMET 45 8034 7199 SD WATERTOWN FAA AIRPOR 42 8826 4886 SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WEBSTER 42 8784 5270 SD FAITH 2 W 45 7895 8577 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6770 12249 SD FLANDREAU 44 8282 6614 SD WOOD 49 6667 11854 SD FORT MEADE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 TN ALLARDT 55 4496 7038 SD GANN VALLEY 46 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR		41	8769	1006		SD				
SD DUPREE 45 7892 8984 SD WEBSTER 42 8784 5270 SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6770 12249 SD FLANDREAU 44 8282 6614 SD WOOD 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 55 4496 7038 SD GANN VALLEY 46 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD DEADWOOD	44	8111	2617		SD	WASTA	48	7067	9694
SD EUREKA 42 8785 5478 SD WENTWORTH 2 WNW 45 7949 6887 SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6770 12249 SD FLANDREAU 44 8282 6614 SD WOOD 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 TN ALLARDT 55 4496 7038 SD GANN VALLEY 46 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD DE SMET	45	8034	7199		SD	WATERTOWN FAA AIRPOR	42	8826	4886
SD FAITH 2 W 45 7895 8577 SD WHITE LAKE 47 7415 10080 SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6770 12249 SD FLANDREAU 44 8282 6614 SD WOOD 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902	SD DUPREE	45	7892	8984						5270
SD FAULKTON 1 NW 45 8148 8124 SD WINNER 49 6770 12249 SD FLANDREAU 44 8282 6614 SD WOOD 49 6667 11854 SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 55 4496 7038 SD GANN VALLEY 46 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD EUREKA	42	8785	5478		SD	WENTWORTH 2 WNW	45	7949	6887
SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 702 702 7038 SD GANN VALLEY 46 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957				8577		SD	WHITE LAKE	47	7415	10080
SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 702 702 7038 SD GANN VALLEY 46 7759 9917 TN ALLARDT 55 54496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD FAULKTON 1 NW	45	8148	8124		SD	WINNER	49	6770	12249
SD FORESTBURG 3 NE 46 7677 8615 SD YANKTON 3 N 47 7480 8966 SD FORT MEADE 48 6943 7902 702 702 7038 SD GANN VALLEY 46 7759 9917 TN ALLARDT 55 54496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD FLANDREAU	44	8282	6614		SD	WOOD	49	6667	11854
SD FORT MEADE 48 6943 7902 SD GANN VALLEY 46 7759 9917 TN ALLARDT 55 4496 7038 SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD FORESTBURG 3 NE	46	7677			SD	YANKTON 3 N	47	7480	8966
SD GETTYSBURG 44 8276 7728 TN BOLIVAR WTR WKS 60 3614 17957	SD FORT MEADE	48	6943							
		46								
SD GREGORY 48 6997 10093 TN BRISTOL WSO 56 4367 8954								60		
	SD GREGORY	48	6997	10093		TN	BRISTOL WSO	56	4367	8954

ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74	<u>S7</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
TN BROWNSVILLE	61	3371	20567	ТХ	BAY CITY WATERWORKS	69	1338	33001
TN BROWNSVILLE TN CELINA TN CHATTANOOGA WSO TN CLARKSVILLE SEW PLT	57	4149	12032	TX	<pre>4 BAY CITY WATERWORKS 5 BEEVILLE 5 NE 5 BIG SPRING 5 BLANCO 5 BOERNE 5 BONHAM 5 BORGER 3 W 5 BRADY 2 NNW 5 BRENHAM 5 BRIDGEPORT 5 BROWNSVILLE WSO 5 BROWNWOOD 5 CAMERON 5 CANYON 5 CENTER 5 CENTER 5 CENTERVILLE 5 CHILDRESS FAA AIRPOR</pre>	70	1343	36605
TN CHATTANOOGA WSO	59	3591	17017	ТΣ	BIG SPRING	64	2665	28486
TN CLARKSVILLE SEW PLT	58	4027	16885	TΣ	BLANCO	65	2250	27262
TN COLUMBIA SEWAGE PLAN	59	3770	16035 0	TΣ	BOERNE	65	2067	23535
TN COPPERHILL	57	4083	8921	TΣ	BONHAM	64	2701	27837
TN COVINGTON 1 W	60	3716	19389	TΣ	BORGER 3 W	59	3760	17509
TN CROSSVILLE EXP STA	54	4904	6579	TΣ	BRADY 2 NNW	64	2562	28160
TN DICKSON	59	3766	15813	TΣ	BRENHAM	68	1744	34197
TN COPPERHILL TN COVINGTON 1 W TN CROSSVILLE EXP STA TN DICKSON TN DOVER 1 W TN DYERSBURG FAA AP TN FRANKLIN SEWAGE PLAN	57	4127	13917	TΣ	BRIDGEPORT	64	2839	33311
TN DYERSBURG FAA AP	60	3568	20160	TΣ	BROWNSVILLE WSO	74	607	42529
TN FRANKLIN SEWAGE PLAN	I 59	3676	14592	TΣ	BROWNWOOD	65	2476	32404
TN GATLINBURG 2 SW	56	4271	6630	TΣ	CAMERON	68	1741	34518
TN GREENEVILLE EXP STA	57	4076	9536	ТΣ	CANYON	59	3722	14787
TN JACKSON FAA AP	60	3550	20011	ТΣ	CENTER	65	2380	26797
TN GATLINBURG 2 SW TN GREENEVILLE EXP STA TN JACKSON FAA AP TN JACKSON EXP STA TN KINGSPORT TN KNOXVILLE WSO TN KNOXVILLE U OF TENN TN LENOIR CITY	59	3719	17276	ТΣ	CENTERVILLE	66	2150	30308
TN KINGSPORT	57	3932	8821	ТΣ	CHILDRESS FAA AIRPOR	62	3330	27100
TN KNOXVILLE WSO	59	3666	14214	ТΣ	CHISOS BASIN	62	2298	12003
TN KNOXVILLE U OF TENN	59	3585	15720	ТΣ	CLARENDON	59	3914	21067
TN LENOIR CITY	58	4031	12350	TΣ	K CLARKSVILLE 2 NE	63	2917	25154
TN LEWISBURG EXP STA	58	4064	14560	TΣ	CLEBURNE	66	2238	32719
TN MARTIN U OF T BRANCH	i 59	3793	18647	TΣ	C CHISOS BASIN C CLARENDON C CLARKSVILLE 2 NE C CLEBURNE C COLEMAN	65	2312	28781
TN MC MINNVILLE	59	3676	13239	ТΣ	COLLEGE STATION FAA	68	1784	33178
TN MEMPHIS WSO	62	3214	24504	TΣ	CONROE	68	1774	30521
TN MILAN	59	3921	18565	TΣ	K CORPUS CHRISTI	72	944	42138
TN KNOXVILLE U OF TENN TN LENOIR CITY TN LEWISBURG EXP STA TN MARTIN U OF T BRANCH TN MC MINNVILLE TN MEMPHIS WSO TN MILAN TN MONTEAGLE TN MURFREESBORO 5 N TN NASHVILLE WSO TN NEWBERN TN NEWPORT 1 NW TN OAK RIDGE WSO TN PARIS 5 E TN ROGERSVILLE 1 NE	57	4039	8715	TX	COLLEGE STATION FAA CONROE CORPUS CHRISTI CORPUS CHRISTI WSO	72	970	42515
TN MURFREESBORO 5 N	59	3742	16824	T	K CORSICANA	65	2402	32495
TN NASHVILLE WSO	59	3767	18543	T2	CORSICANA COTULLA FAA AIRPORT	71	1237	46404
TN NEWBERN	59	3843	18705	T	C COTULLA FAA AIRPORT C CROCKETT C CROSBYTON C CRYSTAL CITY C DALHART FAA AIRPORT C DALLAS FORT WORTH PE	65	2235	26424
TN NEWPORT 1 NW	57	4095	12630		CROSBYTON	60	3651	18825
TN OAK RIDGE WSO	58	4013	12340		CRYSTAL CITY	71	1225	44032
TN PARIS 5 E	58	4088	15608	TX	C DALHART FAA AIRPORT	55	4680	
			12 THE REAL PARTY	14	V DALLAS-FORT WORTH RE	00	2420	36294
TN SAMBURG WILDLIFE REP			18440		K DALLAS FAA K DANEVANG 2 SE	66		36697
TN SAVANNAH	61	3338	19194		A DANEVANG 2 SE	70		32594
TN SHELBYVILLE 3	59	3618	14565		K DEL RIO WSO K DENISON DAM	/0	1511	42032
TN SPRINGFIELD EXP STA	57	4315			C DENISON DAM	63	2852	27698
TN TULLAHOMA	59	3630	12662		K DENTON 2 SE	65	2468	31530
TN TULLAHOMA TN UNION CITY TN WATAUGA DAM	57	4229	14984		K DENTON 2 SE K DILLEY K DUBLIN	/0	1446	41431
TN WATAUGA DAM TN WAYNESBORO	55	44/2	7410		K DUBLIN	64	2680	27443
IN WAINESBORD	57	41//	12327		K EAGLE PASS K Eden 1	70		45563
TV ADTIENE LICO	<i>C</i> F	0600	2100/		K EDEN I K EL PASO WSO	66		30667
IN ADILLENE WOU	C0 21	2020	31904 31583		A EL PASU WSU	63 71		22966 46331
TA ALDANI TV ALLCE	04 70	202/	43668		K ENCINAL 3 NW	71		
TX ABILENE WSO TX ALBANY TX ALICE TX ALPINE TX AMARILLO WSO TX ANGLETON 2 W	12	2072	43668		K FALFURRIAS	72		45885 34360
TY AMADITIO USO	57	23/4	15718		K FLATONIA 2 W K FOLLETT	69 57		34360 18387
TY ANCI FTON 2 1	20	4240	27244		K FOLLEII K FT STOCKTON KFST RAD			
	00	T-T-2	35180					24222
TX AUSTIN WSO TX BALLINGER 1 SW	60	2739	30894		K FREDERICKSBURG K GAINESVILLE	63		30334
IN DALLINGER I DW	05	2521	30074	1 14	X OUTIODATTE	05	5047	50334

ST CITY OR LOCATION	<u>TAVG</u>	HDD65	CDH74	<u>S'</u>	<u>CITY OR LOCATION</u>	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
TX GALVESTON WSO	70	1252	31911	ТУ	MUNDAY	65	2660	33492
TX GATESVILLE	66		36066		NEW BRAUNFELS			36849
TX GILMER 2 W	64		27160					31384
TX GOLIAD	71		38945		K NEW GULF K NIXON	70		37694
TX GRAHAM	64		32076		A PALACIOS FAA AIRPORT		_	34022
TX GREENVILLE 7 NW			27674					28542
TX HALLETTSVILLE	70		35451	T	X PALESTINE X PARIS X PECOS X PIERCE 1 E X PLAINS	63		27949
TX HARLINGEN	73		44491	T	C PECOS	65		31555
TX HASKELL	64		31926	ΤX	V PIERCE 1 E	68		30858
TX HENDERSON	65		26209	ΤX	PLAINS	59		15648
TX HENRIETTA	63		34335	TZ	PLAINVIEW	59	3811	
TX HEREFORD	56	4365	11190	ΤX	YORT ARTHUR WSO	69	1476	31667
TX HICO	66	2280	32374	ΤX	Y PORT LAVACA NO 2	71	1185	38389
TX HILLSBORO	66	2403	33407	ΤX	PORT O CONNOR	70	1212	36919
TX HOUSTON INCONT AP	68	1548	30474	TX	V POTEET	70	1399	38569
TX HUNTSVILLE	67	1879	30713	ΤX	V PRESIDIO	70	1567	44935
TX JACKSBORO	66	2380	33621	TX	QUANAH 5 SE	62	3457	29967
TX JUNCTION	66	2182	30062	TX	RAYMONDVILLE	73	836	45541
TX KAUFMAN 3 SE	65	2601	30980	ΤX	K RIO GRANDE CITY 3 W	73	940	51621
TX KINGSVILLE	72	868	42877	TX	K RISING STAR	63	2816	26827
TX LA TUNA 1 S	63	2762	24144	TX	K ROSCOE	64	2665	26740
TX LAMESA 1 SSE	61	3201	20253	T	K RUSK	65	2276	24942
TX LAMPASAS	65	2506	28997	ΤX	SAN ANGELO WSO	66	2325	32735
TX LAREDO NO 2	74	927	52560	ΤX	X SAN ANTONIO WSO	69	1605	36179
TX LEVELLAND	59	3616	17229	TX	SAN MARCOS	67	1891	31176
TX LIBERTY	68	1648	30458	ΤX	SEMINOLE	61	3158	18993
TX LIVINGSTON 2 NNE	66	2000	28020	T	SEYMOUR	63	3199	31960
TX LLANO	66	2250	34269		SHERMAN PUMP STATION		2943	29686
TX LUBBOCK WSO	60		18218	TX	SNYDER	62	3133	25820
TX LUFKIN FAA AP	67	1929	30370	T	SONORA	66	2151	26347
TX LULING	68	1775	33736	ΤX	K SNYDER K SONORA K SPEARMAN	58	4285	17152
TX MADISONVILLE	68		32716	T	I STRATFORD	55	4748	13162
TX MARLIN 3 NE	67		32960		SUGAR LAND			32769
TX MARSHALL	64		28744		SULPHUR SPRINGS			25395
TX MATADOR	62	3211	26630	TΣ	TAYLOR .	67	2071	33719
TX MATAGORDA NO 2 TX MC ALLEN TX MC CAMEY	71	1127	35758	TΣ	K TAYLOR K TEMPLE	67	2128	33107
TX MC ALLEN	73	754	45165	ΤX	THENTLE THROCKMORTON TULIA UVALDE VEGA VERNON	64	2959	33936
TX MC CAMEY	66	2261	33109	ΤX	TULIA	58	4075	13529
TX MC COOK	73	880	45559	ΤX	UVALDE	69	1556	37142
TX MCKINNEY 3 S	65	2481	30281	TΣ	K VEGA	56	4582	13492
TX MEMPHIS	61	3473	26098	TΣ	VERNON	64	2791	34589
TX MEXIA	66	2294	31112	TΣ	VICTORIA WSO WACO WSO	70	1274	37344
TX MIAMI	57	4387	18282	ТΣ	WACO WSO	67	2128	36671
TX MIDLAND WSO	64	2664	24201	TΣ	WAXAHACHIE	66	2372	32801
TX MC CAMEY TX MC COOK TX MCKINNEY 3 S TX MEMPHIS TX MEXIA TX MIAMI TX MIDLAND WSO TX MIDLAND 4 ENE TY MINERAL WELLS FAA AR	64	2558	25185	TΣ	WEATHERFORD	64	2903	30148
TX MINERAL WELLS FAA AP	65	2471	32950	TΣ	WESLACO 2 E	74	630	45851
TX MISSION 4 W	73	826	46978	TΣ	WHITNEY DAM	65	2444	31463
TX MOUNT LOCKE	57	3491	5368	TΣ	WICHITA FALLS WSO	64	3017	34510
TX MOUNT PLEASANT	63	2898	24127	TΣ	WILLS POINT	65	2624	31563
TX MIAMI TX MIDLAND WSO TX MIDLAND 4 ENE TX MINERAL WELLS FAA AP TX MISSION 4 W TX MOUNT LOCKE TX MOUNT PLEASANT TX MULESHOE 1	57	4188	12643	TΣ	WINK FAA AIRPORT	64	2628	28903

TX YOAKUM 70 1278 38796 UT NEPHI 51 5982 \$580 TX YULETA 63 2804 1997 UT OLCRE PIONEER PH 51 5673 11618 UT ALTON 46 7180 551 UT OCDEN PIONEER PH 51 5876 7702 UT BEAR RIVER REFUGE 50 6176 7735 UT ORDER VILLE 51 5858 6487 UT BLANCK RCK 49 6223 7379 UT PAROMAN 40 6661 6424 UT BLANDING 50 6149 4198 UT FINE VIEW DAM 44 7866 1842 UT CAPITOL REFE NAT. 53 5169 9608 UT RICHONDN 47 7027 3701 UT CAPITOL REFE NAT. 53 5020 15021 UT ROSENELT 47 7219 3937 UT COEDAR CITY FAA AP 50 6002 5036 UT SAINT GEORGE 62 225 8059 9810 UT DEER CREEK DAM 44 757 360 UT SAINT ACUIN 50 6202 8022 UT DEGEN CREEK PH 45	<u>S7</u>	<u>CITY OR LOCATION</u>	<u>TAVG</u>	HDD65	<u>CDH74</u>		<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
UT ALTON 46 7180 551. UT OCEEN SUGAR FACTORY 51 5976 7702 UT BEAR RIVER REFUGE 50 6176 735. UT ORDERVILLE 51 5858 4867 UT BLACK ROCK 49 6237 3759 UT PARTOUN 50 6212 3123 UT BLANDING 50 6149 4198 UT PARTOUN 50 6237 6251 UT BLYF 54 5169 9604 UT RICHIPIED DAM 44 7866 1842 UT CAPITOL REF NALL MO 53 5302 10521 UT ROGEVELT 47 7072 3701 UT CAPITOL REF NALL MO 53 5302 10521 UT ROGEVELT 47 7129 3937 UT COEDAR CITY FAA AP 50 6002 5036 UT SAINT GEORGE 62 2556 25555 UT DESERT 49 6447 3330 UT SAINT GEORGE 52 5805 9898 UT DESERT EXP RANCE 49 6442 4359 UT SAINT GEORGE 52 5805 9898 UT DESERT EXP RANCE 49 <td< td=""><td>тΣ</td><td>YOAKUM</td><td>70</td><td>1278</td><td>38796</td><td>Ĩ</td><td>UT</td><td>NEPHT</td><td>51</td><td>5982</td><td>8580</td></td<>	тΣ	YOAKUM	70	1278	38796	Ĩ	UT	NEPHT	51	5982	8580
UT ALTON 46 7180 551. UT OCEEN SUGAR FACTORY 51 5976 7702 UT BEAR RIVER REFUGE 50 6176 735. UT ORDERVILLE 51 5858 4867 UT BLACK ROCK 49 6237 3759 UT PARTOUN 50 6212 3123 UT BLANDING 50 6149 4198 UT PARTOUN 50 6237 6251 UT BLYF 54 5169 9604 UT RICHIPIED DAM 44 7866 1842 UT CAPITOL REF NALL MO 53 5302 10521 UT ROGEVELT 47 7072 3701 UT CAPITOL REF NALL MO 53 5302 10521 UT ROGEVELT 47 7129 3937 UT COEDAR CITY FAA AP 50 6002 5036 UT SAINT GEORGE 62 2556 25555 UT DESERT 49 6447 3330 UT SAINT GEORGE 52 5805 9898 UT DESERT EXP RANCE 49 6442 4359 UT SAINT GEORGE 52 5805 9898 UT DESERT EXP RANCE 49 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>UT</td><td>OAK CITY</td><td>53</td><td>5623</td><td>11618</td></td<>							UT	OAK CITY	53	5623	11618
UT ALTON 46 7180 551 UT OCDERN SUGAR FACTORY 51 5976 7702 UT BEAR RIVER REFUGE 50 6176 7735 UT ORDERVILLE 51 5858 4887 UT BLACK ROCK 49 6217 3759 UT PAROWAN 49 6212 3123 UT BLACK ROCK 49 6237 3759 UT PARTOUN 50 6237 6237 UT BLACK ROCK 49 6237 3759 UT PARTOUN 50 6237 6251 UT BLACK ROCK 49 6149 418 UT PIRE VIEW DAM 44 7866 1842 UT BRYCE CANYON FAA AP 50 6149 418 1727 41 UT RICHFIELD RADIO KSVC 49 6335 1050 UT SALTA KERNER HOUS 51 6009 7931 UT COTONNOOD WEIR 54 5399 15101 UT SALTA KE CITY SASO 6232 6235 5988 UT DESERT 48 6747 330 UT SALT LAKE CITY SASO 56 6283 1007 1017 111 10077				2001	_,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		UT	OGDEN PIONEER PH	51	5870	9586
UT BEAR RIVER REFUGE 50 6176 7735 UT ORDERVILLE 51 5858 4887 UT BEARK RIVER REFUGE 60 6149 6198 UT PAROVAN 49 6212 3123 UT BLACK ROCK 49 6237 3759 UT PAROVAN 50 6237 6237 6251 UT BLARDING 50 6149 418 UT PINE VIEW DAM 44 7866 1842 UT BLYER 54 5169 608 UT RICHFIEL DADIO KSVC 49 6335 1575 UT BRYCE CANYON NA AP 40 9064 31 UT RICHFIEL PADIO KSVC 47 7219 3937 UT CAPHTOL REEF NATL MO 53 5302 10521 UT ROUSEVELT 47 7219 3937 UT CONFONDOD WEIR 54 5399 110 UT SALTNA 50 6202 8022 UT DESERT 48 6747 3300 UT SALT LAKE CITY WSFO 52 5805 9898 UT DESERT EXP RANGE 49 6424 4359 UT SALT LAKE CITY WSFO 52 5805 9895	U	ALTON	46	7180	551						
DI BLARDINO 50 6149 4120 01 FILE VIEW DRM 7600 1622 UT BLUFF 54 5169 9608 UT RICHFIELD RADIO KSVC 44 7600 1632 UT BRYCE CANYON FAA AP 40 9064 31 UT RICHFIELD RADIO KSVC 44 6029 7931 UT CAPATIOL REEF NATL MO 53 5002 10521 UT RICHFIELD POWER HOUS 51 6009 7931 UT CADAR CITY FAA AP 50 6002 5036 UT SAITN GEORCE 62 2256 25555 UT COTONWOOD WEIR 54 6477 330 UT SAITNACEORCE 62 2256 25555 UT DESERT EXP RANGE 49 6424 4359 UT SAITAQUIN 50 6202 8022 UT DESERT EXP RANGE 49 6424 4359 UT SCOFIELD DAM 37 10077 141 UT DESERT EXP RANGE 49 6424 4359 UT SUARCREEK PH 43 801616 43 UT EBERAT S0 6084 5670 UT SNAKE CREEK PH 43 8012 1981 7826 <		BEAR RIVER REFUGE	50	6176			UT	ORDERVILLE	51	5858	
DI BLARDINO 50 6149 4120 01 FILE VIEW DRM 7600 1622 UT BLUFF 54 5169 9608 UT RICHFIELD RADIO KSVC 44 7600 1632 UT BRYCE CANYON FAA AP 40 9064 31 UT RICHFIELD RADIO KSVC 44 6029 7931 UT CAPATIOL REEF NATL MO 53 5002 10521 UT RICHFIELD POWER HOUS 51 6009 7931 UT CADAR CITY FAA AP 50 6002 5036 UT SAITN GEORCE 62 2256 25555 UT COTONWOOD WEIR 54 6477 330 UT SAITNACEORCE 62 2256 25555 UT DESERT EXP RANGE 49 6424 4359 UT SAITAQUIN 50 6202 8022 UT DESERT EXP RANGE 49 6424 4359 UT SCOFIELD DAM 37 10077 141 UT DESERT EXP RANGE 49 6424 4359 UT SUARCREEK PH 43 801616 43 UT EBERAT S0 6084 5670 UT SNAKE CREEK PH 43 8012 1981 7826 <	U	BEAVER	48	6701			UT	PAROWAN	49	6212	
DI BLARDINO 50 6149 4120 01 FILE VIEW DRM 7600 1622 UT BLUFF 54 5169 9608 UT RICHFIELD RADIO KSVC 44 7600 1632 UT BRYCE CANYON FAA AP 40 9064 31 UT RICHFIELD RADIO KSVC 44 6029 7931 UT CAPATIOL REEF NATL MO 53 5002 10521 UT RICHFIELD POWER HOUS 51 6009 7931 UT CADAR CITY FAA AP 50 6002 5036 UT SAITN GEORCE 62 2256 25555 UT COTONWOOD WEIR 54 6477 330 UT SAITNACEORCE 62 2256 25555 UT DESERT EXP RANGE 49 6424 4359 UT SAITAQUIN 50 6202 8022 UT DESERT EXP RANGE 49 6424 4359 UT SCOFIELD DAM 37 10077 141 UT DESERT EXP RANGE 49 6424 4359 UT SUARCREEK PH 43 801616 43 UT EBERAT S0 6084 5670 UT SNAKE CREEK PH 43 8012 1981 7826 <	U	BLACK ROCK	49	6237			UT	PARTOUN	50	6237	
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UT BRYCE CANYON FAA AP 40 9064 31 UT RICHMOND 47 7072 3701 UT BRYCE CANYON NP HDQ 41 8727 41 UT RIVERDALE POWER HOUS 51 6009 7931 UT CAPITOL REEF NATL MO 50 502 10521 UT ROVERDEW HOUS 51 6009 7931 UT CEDAR CTTY FAA AP 50 6002 5036 UT SAINT GEORGE 62 3256 2555 UT COTONWOOD WEIR 54 5399 15101 UT SAINT GEORGE 50 6224 4335 UT DESERT EXP RANGE 49 6435 5791 UT SCIFIELD DAM 37 10077 141 UT DUGWAY 51 5974 10704 UT SILVER LAKE BICHTON 36 10416 43 UT ELBERTA 50 6084 5670 UT SANISH FORK PWR HOU 52 5740 7345 UT ELBERTA 50 6084 2657 UT TOPIC 47 6728 1937 UT ELBERTA 50 6084 5670 UT TMPANOGOS CAVE 49 6460 8814 UT ELBERTA		BLUFF	54	5169							
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UT COVE FORT 48 6747 3330 UT SALT LAKE CITY WSF0 52 5805 9898 UT DEER CREEK DAM 44 7957 366 UT SANTAQUIN 50 6202 8022 UT DESERTET 49 6424 435 571 UT SCIPIO 47 6856 2931 UT DUGWAY 51 5974 10704 UT SILVER LAKE BRIGHTON 36 10416 43 UT ECHO DAM 45 7546 997 UT SNAKE CREEK PH 43 8073 219 UT ELEBERTA 50 6084 5670 UT SNAKE CREEK PH 43 8073 219 UT ELEBERTA 50 6084 5670 UT SNAKE CREEK PH 43 8073 219 UT EARNINGTON USU FLD 51 5849 8067 UT TOOELE 51 5881 7826 UT FARNINCTON USU FLD S 51 5867 13866 101 UT WENDOVER WS0 52 5791 2678 UT FORT DUCHESNE 45 7552 13896 UT VERNAL AIRPORT 45 7671 2678 UT GARFIELD	11	COTTONWOOD WEIR	54	5399			UT	SATINA	50		
UT EFRRAIM SORENSENS FL 47 6994 2233 UT HIMPANOGUS CAVE 49 6460 5814 UT ESCALANTE 49 6164 2457 UT TOOELE 51 5981 7826 UT FAIRFIELD 47 7019 1280 UT TROPIC 47 6728 1937 UT FARMINGTON USU FLD S 51 5849 8067 UT WARNAL AIRPORT 45 7671 2678 UT FILMORE 51 5868 7731 UT WENDOVER WSO 52 5798 13377 UT GARIAND 48 6813 5230 UT WENDOVER WSO 52 5798 13377 UT GREEN RIVER AVN 52 5914 9390 VT BELLOWS FALLS 46 7402 2198 UT HANKSVILLE 53 5557 13896 UT CONNATIONAL PARK 61 3465 24863 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HEAR 45 7552 2358 VT CORNWALL 46 7452 2659 UT KANAB 55 4705 8414	117	COVE FORT	48	6747			UT	SALT LAKE CITY WSED	52		
UT EFRRAIM SORENSENS FL 47 6994 2233 UT HIMPANOGUS CAVE 49 6460 5814 UT ESCALANTE 49 6164 2457 UT TOOELE 51 5981 7826 UT FAIRFIELD 47 7019 1280 UT TROPIC 47 6728 1937 UT FARMINGTON USU FLD S 51 5849 8067 UT WARNAL AIRPORT 45 7671 2678 UT FILMORE 51 5868 7731 UT WENDOVER WSO 52 5798 13377 UT GARIAND 48 6813 5230 UT WENDOVER WSO 52 5798 13377 UT GREEN RIVER AVN 52 5914 9390 VT BELLOWS FALLS 46 7402 2198 UT HANKSVILLE 53 5557 13896 UT CONNATIONAL PARK 61 3465 24863 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HEAR 45 7552 2358 VT CORNWALL 46 7452 2659 UT KANAB 55 4705 8414	11	DEFR CREEK DAM	40	7957			UT	SANTAOUIN	50		
UT EFRRAIM SORENSENS FL 47 6994 2233 UT HIMPANOGUS CAVE 49 6460 5814 UT ESCALANTE 49 6164 2457 UT TOOELE 51 5981 7826 UT FAIRFIELD 47 7019 1280 UT TROPIC 47 6728 1937 UT FARMINGTON USU FLD S 51 5849 8067 UT WARNAL AIRPORT 45 7671 2678 UT FILMORE 51 5868 7731 UT WENDOVER WSO 52 5798 13377 UT GARIAND 48 6813 5230 UT WENDOVER WSO 52 5798 13377 UT GREEN RIVER AVN 52 5914 9390 VT BELLOWS FALLS 46 7402 2198 UT HANKSVILLE 53 5557 13896 UT CONNATIONAL PARK 61 3465 24863 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HEAR 45 7552 2358 VT CORNWALL 46 7452 2659 UT KANAB 55 4705 8414	UT	DESERT	49	6435		1	UT	SCIPIO	47		
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UT EFRRAIM SORENSENS FL 47 6994 2233 UT HIMPANOGUS CAVE 49 6460 5814 UT ESCALANTE 49 6164 2457 UT TOOELE 51 5981 7826 UT FAIRFIELD 47 7019 1280 UT TROPIC 47 6728 1937 UT FARMINGTON USU FLD S 51 5849 8067 UT WARNAL AIRPORT 45 7671 2678 UT FILMORE 51 5868 7731 UT WENDOVER WSO 52 5798 13377 UT GARIAND 48 6813 5230 UT WENDOVER WSO 52 5798 13377 UT GREEN RIVER AVN 52 5914 9390 VT BELLOWS FALLS 46 7402 2198 UT HANKSVILLE 53 5557 13896 UT CONNATIONAL PARK 61 3465 24863 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HEAR 45 7552 2358 VT CORNWALL 46 7452 2659 UT KANAB 55 4705 8414	117	DICUAY	51	5074		1	UT	STIVED LAVE BDICHTON	36		
UT EFRRAIM SORENSENS FL 47 6994 2233 UT HIMPANOGUS CAVE 49 6460 5814 UT ESCALANTE 49 6164 2457 UT TOOELE 51 5981 7826 UT FAIRFIELD 47 7019 1280 UT TROPIC 47 6728 1937 UT FARMINGTON USU FLD S 51 5849 8067 UT WARNAL AIRPORT 45 7671 2678 UT FILMORE 51 5868 7731 UT WENDOVER WSO 52 5798 13377 UT GARIAND 48 6813 5230 UT WENDOVER WSO 52 5798 13377 UT GREEN RIVER AVN 52 5914 9390 VT BELLOWS FALLS 46 7402 2198 UT HANKSVILLE 53 5557 13896 UT CONNATIONAL PARK 61 3465 24863 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HEAR 45 7552 2358 VT CORNWALL 46 7452 2659 UT KANAB 55 4705 8414	117	F ECHO DAM	45	75/6							
UT EFRRAIM SORENSENS FL 47 6994 2233 UT HIMPANOGUS CAVE 49 6460 5814 UT ESCALANTE 49 6164 2457 UT TOOELE 51 5981 7826 UT FAIRFIELD 47 7019 1280 UT TROPIC 47 6728 1937 UT FARMINGTON USU FLD S 51 5849 8067 UT WARNAL AIRPORT 45 7671 2678 UT FILMORE 51 5868 7731 UT WENDOVER WSO 52 5798 13377 UT GARIAND 48 6813 5230 UT WENDOVER WSO 52 5798 13377 UT GREEN RIVER AVN 52 5914 9390 VT BELLOWS FALLS 46 7402 2198 UT HANKSVILLE 53 5557 13896 UT CONNATIONAL PARK 61 3465 24863 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HEAR 45 7552 2358 VT CORNWALL 46 7452 2659 UT KANAB 55 4705 8414	117	FIREPTA	50	608/			TIT	CDANTON FORV DUD HOU	52	5740	7345
UT GARLAND 53 5373 13896 UT ZION NATIONAL PARK 61 3463 24863 UT GARLAND 48 6813 5230 VT BELLOWS FALLS 46 7402 2198 UT GREEN RIVER AVN 52 5914 9390 VT BURLINGTON WSO 44 7956 2562 UT HANKSVILLE 53 5597 13002 VT BURLINGTON WSO 44 7956 2562 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HIAWATHA 45 7552 2358 VT CHELSEA 41 8851 989 UT JENSEN 45 7606 2801 VT CORNWALL 46 7425 2659 UT KANAB 55 4705 8414 VT DORSET 1 S 45 7605 790 UT LAKETOWN 42 8456 344 VT ENOSBURG FALLS 43 8117 1299 UT LAVERKIN 59 3807 15299 VT MONTPELIER FAA AIRPO 42 8529 1377 UT LOGAN UTAH STATE UNI 48 6756 <td>117</td> <td>FPHPATM SOPENSENS FI</td> <td>47</td> <td>6004</td> <td></td> <td></td> <td>UT</td> <td>TIMPANOCOS CAVE</td> <td>10</td> <td>6460</td> <td>5814</td>	117	FPHPATM SOPENSENS FI	47	6004			UT	TIMPANOCOS CAVE	10	6460	5814
UT GARLAND 53 5373 13896 UT ZION NATIONAL PARK 61 3463 24863 UT GARLAND 48 6813 5230 VT BELLOWS FALLS 46 7402 2198 UT GREEN RIVER AVN 52 5914 9390 VT BURLINGTON WSO 44 7956 2562 UT HANKSVILLE 53 5597 13002 VT BURLINGTON WSO 44 7956 2562 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HIAWATHA 45 7552 2358 VT CHELSEA 41 8851 989 UT JENSEN 45 7606 2801 VT CORNWALL 46 7425 2659 UT KANAB 55 4705 8414 VT DORSET 1 S 45 7605 790 UT LAKETOWN 42 8456 344 VT ENOSBURG FALLS 43 8117 1299 UT LAVERKIN 59 3807 15299 VT MONTPELIER FAA AIRPO 42 8529 1377 UT LOGAN UTAH STATE UNI 48 6756 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>UT</td> <td>TOOFIE</td> <td>51</td> <td>5081</td> <td>7826</td>							UT	TOOFIE	51	5081	7826
UT GARLAND 53 5373 13896 UT ZION NATIONAL PARK 61 3463 24863 UT GARLAND 48 6813 5230 VT BELLOWS FALLS 46 7402 2198 UT GREEN RIVER AVN 52 5914 9390 VT BURLINGTON WSO 44 7956 2562 UT HANKSVILLE 53 5597 13002 VT BURLINGTON WSO 44 7956 2562 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HIAWATHA 45 7552 2358 VT CHELSEA 41 8851 989 UT JENSEN 45 7606 2801 VT CORNWALL 46 7425 2659 UT KANAB 55 4705 8414 VT DORSET 1 S 45 7605 790 UT LAKETOWN 42 8456 344 VT ENOSBURG FALLS 43 8117 1299 UT LAVERKIN 59 3807 15299 VT MONTPELIER FAA AIRPO 42 8529 1377 UT LOGAN UTAH STATE UNI 48 6756 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>TROPIC</td> <td>47</td> <td>6728</td> <td>1020</td>								TROPIC	47	6728	1020
UT GARLAND 53 5373 13896 UT ZION NATIONAL PARK 61 3463 24863 UT GARLAND 48 6813 5230 VT BELLOWS FALLS 46 7402 2198 UT GREEN RIVER AVN 52 5914 9390 VT BURLINGTON WSO 44 7956 2562 UT HANKSVILLE 53 5597 13002 VT BURLINGTON WSO 44 7956 2562 UT HEBER 44 7682 527 VT CAVENDISH 44 7989 999 UT HIAWATHA 45 7552 2358 VT CHELSEA 41 8851 989 UT JENSEN 45 7606 2801 VT CORNWALL 46 7425 2659 UT KANAB 55 4705 8414 VT DORSET 1 S 45 7605 790 UT LAKETOWN 42 8456 344 VT ENOSBURG FALLS 43 8117 1299 UT LAVERKIN 59 3807 15299 VT MONTPELIER FAA AIRPO 42 8529 1377 UT LOGAN UTAH STATE UNI 48 6756 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>UI</td> <td>INDELG</td> <td>4/</td> <td>6/.70</td> <td>1937</td>							UI	INDELG	4/	6/.70	1937
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	U.	MEXICAN HAT	56				VT	VERNON	46	/229	2200
							VT	WEST BURKE	39	9561	783
UT MODENA4962534149UT MONTICELLO467155972VA BEDFORD5740728587UT MORGAN4672941513VA BIG MEADOWS476687881UT MORONI4671111583VA BLACKSBURG 3 SE5155154512UT MOUNTAIN DELL DAM4770401658VA BUCHANAN5642177833	U'.	MODENA	57	4622			VT	WOODSTOCK 2 WSW	43	8287	1143
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UT MORONI 46 7111 1583 VA BLACKSBURG 3 SE 51 5515 4512 UT MOUNTAIN DELL DAM 47 7040 1658 VA BUCHANAN 56 4217 7833	U.	T MORGAN	46	7294	1513		VA	BIG MEADOWS	47	6687	881
UT MOUNTAIN DELL DAM 4/ /040 1658 VA BUCHANAN 56 4217 7833	07	MOKONI	46	/111	1583		VA	BLACKSBURG 3 SE	51	5515	4512
	01	MOUNTAIN DELL DAM	47	7040	1628	l	VA	BUCHANAN	56	4217	/833

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VA BURKES GARDEN 49 5975 777 VA BELLINGHAM FAA AIRPO 50 5726 185 VA CHARLOTTE COURT HOUS 56 4316 10104 WA BICKLETON 47 6921 3573 VA CHARLOTTESVILLE Z 57 4354 10033 WA BEAMERTON 51 5194 50 5512 434 VA CULPEPER 56 4423 8859 WA CEDAR LAKE 47 6571 461 VA DANVILLE-BRIDGES 53 5062 5536 WA CEDAR LAKE 47 6571 461 VA DANVILLE-BRIDGES 59 3462 1237 WA CHEWLAH 4 SSW 46 714 1494 VA ELXNOOD 6 SE 54 4367 10249 WA CLEARMARTER 49 5692 189 VA FLOYD 2 NE 52 3670 11277 WA CLEARMARTER 49 5692 189 VA HOPENELL 60 378 1546 WA CLEARMARTER 40 631 1440 VA HOPENELL 636 1227	<u>st</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>		<u>st</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>
YA CHARLOTTE COURT HOUS 56 4316 10104 WA BICKLETON 47 6921 3573 YA CHARLOTTE SVILLE 2 57 4195 1028 WA BICKLETON 51 5194 503 VA CHATHAM 2 NE 56 4441 9015 WA BUCKLEY 1 NE 50 5512 434 VA CULPEPR 56 4441 9015 WA EDRAFLAKE 47 6571 461 VA CULPEPR 56 3664 12737 WA CENTRALIA 52 5083 733 VA DALE ENTERPERISE 53 3664 12737 WA CENTRALIA 550 609 6406 VA FARWYLLE 2 57 4599 7302 WA CHEARWATER 49 5642 187 VA FARWYLLE 2 57 4579 2610 WA CLEARWATER 49 5642 187 VA FARWYLLE 2 57 3670 11277 WA CLEARWATER 49 5622 189 VA FARWYLLE 2 50 3670 1277 WA CLEARWATER 40 56114 140 VA HOPEVELL 6037	37.6	BIRVES CARDEN	40	5975	777	11	IJΔ	BELLINCHAM FAA ATDDO	50	5726	185
YA CHARLOTTESVILLE 2 W 57 4195 10287 YA BLAINE 1 ENE 49 5777 55 YA CHATHAM 2 NE 56 4541 1031 YA BREMERTON 51 5144 5443 YA COLUMBIA 56 4421 8859 WA CEDAR LAKE 47 6571 461 YA DALE ENTERPRISE 53 5062 536 WA CEDAR LAKE 47 6571 461 YA DALE ENTERPRISE 53 5062 534 WA CEDAR LAKE 47 6571 461 YA DLAMOND SPRINGS 59 3864 12715 WA CHEARNALLE 50 6089 6406 YA FLOYD 2 NE 57 4011 9361 WA CLEARNOCK 49 5842 187 YA FLOYD 2 NE 52 3500 3779 WA CLEARNATER 49 5622 180 YA FLOYD 1 NE 56 4367 10249 WA CLEARNATER 49 5622 180 YA FLOYD 2 NE 56 4370 1124 4404 46 7114 1494 40114 1494 40114 1494 40114											
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VA DIAMORS SPRINCS 59 3642 12/13 WA CHELAN 50 6059 6406 VA DIAMORS SPRINCS 59 3462 12357 WA CHEALAN 50 6059 6406 VA ELARNOD 6 SE 55 4599 7302 WA CHEALAN 50 6145 6958 VA FLOYD 2 NE 52 5300 3779 WA CLEARWATER 49 56422 189 VA FLOYD 2 NE 52 5300 3779 WA CLEARWATER 49 5692 189 VA HOLTAN 1 E 59 3670 11277 WA COLFAX 1 NW 48 6361 1440 VA HOPEWELL 60 3378 14564 WA COLFAX 1 NW 48 6361 1408 VA JOIN H KERR DAM 58 3966 15272 WA COLEANA 1 SW 50 6517 50 6457 6897 WA DAVENPORT 46 7205 2676 VA LUNCIN 56 4542 9172 WA DAVENPORT 46 7205 2676 VA LUNCIN 56 4322 9174 NACOUNET NAMA 51 560 4520	VA	DALE ENTERPRISE	53	5062	5536		WA	CENTRALIA	52	5083	733
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WA ANACORTES 51 5314 59 WA NEWPORT 45 7437 1002 WA BATTLE GROUND 51 5226 722 WA NORTHPORT 48 6605 3843	WA	ABERDEEN	51	5321	106						
WA BATTLE GROUND 51 5226 722 WA NORTHPORT 48 6605 3843											
	WA	BELLINGHAM 2 N	50	5640	174		WA	OAKVILLE	50		

<u>st</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74		<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
IJΔ	ODESSA	49	6272	5396	1	w	BLUESTONE DAM	53	5167	6442
	OLGA 2 SE	49	5711	62			BRANDONVILLE	48	6484	1698
	OLYMPIA WSO	50	5710	341			BUCKHANNON 2 W	52		4042
	OMAK 2 NW	48	6818	3236			CAIRO 3 S	53	5060	6572
	OTHELLO 6 ESE	50	5951	7034			CANAAN VALLEY	46	7076	939
	PALMER 3 ESE	49	5868	759			CHARLESTON WSO	55	4705	8790
	POMEROY	51	5692	5051			CLARKSBURG 1	52	5464	6368
	PORT ANGELES	49		238			ELKINS WSO	49	6051	1601
	PROSSER 4 NE	51	5614	3353			FAIRMONT	52	5359	6103
	PULLMAN 2 NW	47		1821			FLAT TOP	48	6472	1171
WA	PUYALLUP 2 W EXP STA	51	5145	346			FRANKLIN 2 NE	52	5389	3302
	QUILCENE 2 SW	50		531			GASSAWAY	54		6272
	QUILLAYUTE WSO	49	5945	392		WV	GLENVILLE 2 NE	53	5277	7821
	QUINCY 1 S	50	6191	5999		WV	GRANTSVILLE 2 NW	53	5200	7231
	-	38	10002	1263		WV	HAMLIN	53	5120	7504
WA	REPUBLIC	43	8272	747		WV	HOGSETT GALLIPOLIS D	53	5203	7373
WA	RICHLAND	55	4710	9832		WV	HUNTINGTON WSO	55	4687	11185
WA	RITZVILLE 1 SSE	48	6527	4079		WV	KEARNEYSVILLE 1 NW W	53	5294	6420
WA	ROSALIA	47	6898	1882		WV	LEWISBURG 2 SSW	52	5332	3688
	SEATTLE EMSU WSO	53	4684	897		WV	LONDON LOCKS	54	4846	9598
	SEATTLE-TACOMA WSO	51		1050		WV	MADISON	54	4865	8682
WA	SEATTLE U OF W	53		1113		WV	MANNINGTON 1 N	52		5495
WA	SEDRO WOOLLEY	50	5420	171			MARTINSBURG FAA AP	53	5201	8196
	SEQUIM	50	5580	153			MCROSS	50		1853
	SHELTON	51		574			MIDDLEBOURNE 2 ESE	52		5879
	SNOQUALMIE FALLS			412			MORGANTOWN FAA AIRPO			7157
	SPOKANE WSO	47		3453			MORGANTOWN L AND D	52		6675
	SPRAGUE	48	6706	2913			NEW CUMBERLAND	53		6642
	STAMPEDE PASS WSO	39	9400	1446			OAK HILL	51		4055
	STARTUP 1 E	51		532			PARKERSBURG FAA AP	54		8439
	STEHEKIN 3 NW	47		2331			PARKERSBURG WSO	54		9083
	SUNNYSIDE	52	5323	5682			PICKENS 1	48		1045
	TACOMA CITY HALL			471			PINEVILLE	53		7878
	VANCOUVER 4 NNE	52	5031	1749		WV	RAVENSWOOD LOCK PARK	55	4728	9160
WA	WALLA-WALLA FAA AP WALLA WALLA WSO WAPATO	53	5057	9511		WV	ROWLESBURG I	52	55//	5674
WA	WALLA WALLA WSU	54	4822	9439		WV	SPENCER ODDUGE WNOD	54	4911	6252
WA TTA	WAPATO WATERVILLE	23	5238 7503	9471		WV	RAVENSWOOD LOCK FAR ROWLESBURG 1 SPENCER SPRUCE KNOB UNION	4/ 51	6//9	2320
WA.	WAIERVILLE	45	7505	2615		WV	WARDENSVILLE R M FAR	51	2023	2885
LIA		JI 47	500%	2806		W V LTT	WARDENSVILLE K M FAR	52	22/2	4136 5356
UTA	WILDOR UTIIADA HADROD	4/ 51	5079	2090		W V	WEDSIER SPRINGS I E	50	4940	5560
ΨA	WENATCHEE WILBUR WILLAPA HARBOR WILSON CREEK	70	6006	4570		W V LTT	WERSTER SPRINGS 1 E WELLSBURG 3 NE WESTON WHEELING FILT PLANT WHITE SULPHUR SPRING WINFIELD LOCKS	50	2720	5568 6210
UΔ	WILSON OKEEK	49	7746	2023		W V LTT	WESTON UNFEITNO ETTT DIANT	52	5420	6793
ΨA	WINTHROP 1 WSW YAKIMA WSO	50	6035	4118		LT1	WHITE SII DUID CDINC	52	5086	4870
WA	Incline #50	50	0033	4110		1.717	WHILE SOLFHOR STRING	54	4806	8806
w	ATHENS CONCORD COLLE	52	5235	2379						
WV	BAYARD	47	6755	909		WT	AMERY	42	8760	3448
WV	BAYARD BECKLEY V A HOSPITAL BECKLEY WSO BLUEFIELD FAA AP	50	5680	1816		WT	ANTIGO 1 SSW	42	8626	1862
WV	BECKLEY WSO	51	5585	2408		WT	APPLETON	45	7729	3721
WV	BLUEFIELD FAA AP	52	5229	2615		WT	ASHLAND EXP FARM	41	9067	1288
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<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>	<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	HDD65	<u>CDH74</u>
WT	BARABOO	45	7878	3625	WT	MILWAUKEE MT MARY CO	48	6986	5965
WT	BARABOO BAYFIELD 6 N BELOIT BLAIR BLOOMER BRODHEAD BRULE ISLAND BURLINGTON CHILTON CODDINGTON 1 E CRIVITZ HIGH FALLS CUMBERLAND	42	8770	1275	TTT	MILLIAIRE UCO	1.0	7207	3313
WI	BELOIT	49	6616	7157	WI	MILWAOKEE WSO MINOCQUA DAM MONDOVI MONTELLO NEILLSVILLE 3 SW	40 40 44 45 43	9329	1602
WI	BLAIR	44	8113	4232	WI	MONDOVI	44	7991	4238
WI	BLOOMER	43	8378	3528	WI	MONTELLO	45	7811	4540
WI	BRODHEAD	46	7371	4863	WI	NEILLSVILLE 3 SW	45 43 45	8402	2106
WI	BRULE ISLAND	39	9589	791	WI	NEW LONDON	45	7780	3764
WI	BURLINGTON	46	7367	3696	WI	NORTH PELICAN	40		1502
WI	CHILTON	46	7544	3544	WI	NEW LONDON NORTH PELICAN OCONOMOWOC OCONTO 4 W OSHKOSH OWEN PARK FALLS PINE RIVER 3 NE PITTSVILLE PLATTEVILLE PLATTEVILLE PLYMOUTH PORTAGE PRAIBLE DU CHIEN	47	7286	5385
WI	CODDINGTON 1 E	42	8597	1640	WI	OCONTO 4 W	44	8025	2671
WI	CRIVITZ HIGH FALLS CUMBERLAND DALTON DANBURY DARLINGTON DODGEVILLE 1 NE EAU CLAIRE FAA AP EL DORADO	43	8476	2448	WI	OSHKOSH	45	7692	3717
WI	CUMBERLAND	43	8543	3924	WI	OWEN	40	9217	1815
WI	DALTON	45	7638	3745	WI	PARK FALLS	41	9152	1576
WI	DANBURY	41	9061	2310	WI	PINE RIVER 3 NE	45	7814	3719
WI	DARLINGTON	46	7288	4093	WI	PITTSVILLE	44	8193	2449
WI	DODGEVILLE 1 NE	46	7485	3847	WI	PLATTEVILLE	47	7180	5613
WI	EAU CLAIRE FAA AP	43	8466	3886	WI	PLYMOUTH	46	7544	3377
WI	EL DORADO	45	7675	3233	WI	PORTAGE	46	7401	5455
WI	FOND DU LAC	46	7570	3798	WI	PRAIRIE DU CHIEN	48	6932	7866
WI	FORT ATKINSON	47	7113	5917	WI	PRAIRIE DU SAC 2 N	46	7471	5427
WI	GENOA DAM 8	47	7259	6258	WI	PRENTICE 1 N	40	9355	1101
WI	GERMANTOWN	46	7528	2802	WI	RACINE	48	6920	5239
WI	GORDON	40	9274	2455	WI	RAINBOW RESERVOIR	40		1412
	GRANTSBURG	41	9031	2498	WI	REEDSBURG REST LAKE RHINELANDER RICE LAKE RICHLAND CENTER BIVER FALLS	46		3740
WI	GREEN BAY WSO AP	44	8146	2453	WI	REST LAKE	40		1479
WI	HANCOCK EXP FARM	44	8017	3658	WI	RHINELANDER	41		2287
WI	HATFIELD HYDRO PLANT	44	8164	3202	WI	RICE LAKE	42		2585
WI	HILLSBORO	45	7700	4807	WI	RICHLAND CENTER	46		5396
WI	HOLCOMBE	43	8346	2667	WI	KIVER FALLS			4568
WI	JANESVILLE	49	6765	7045	WI	ROSHOLT	43		2744
WI	HANCOCK EXP FARM HATFIELD HYDRO PLANT HILLSBORO HOLCOMBE JANESVILLE KENOSHA KEWAUNEE LA CROSSE FAA AP	47	7089	4173	WI	ST CROIX FALLS	43		4471
WI	KEWAUNEE	44	7873	1370	WI	SHAWANO	44		3606
WI	LA CROSSE FAA AP LADYSMITH LAKE GENEVA	46	7544	6795	WI	ROSHOLT ST CROIX FALLS SHAWANO SHEBOYGAN SOLON SPRINGS SPARTA	46		2656
WI	LADYSMITH	42	8570	2081	WI	SOLON SPRINGS	41	8988	2074
WI	LAKE GENEVA	48	6895	6169	WI	SPARTA	45	7804	4207
WI	LAKE MILLS LANCASTER LONE ROCK FAA AIRPOR	47	7152	5321	WI	SPOONER EXP FARM STANLEY STEVENS POINT STOUGHTON	42	8816	2546
WI	LANCASTER	47	7281	5674	WI	STANLEY	43	8510	2540
WI	LONE ROCK FAA AIRPOR	45	7717	4050	WI	STEVENS POINT	44	8108	2847
WI	LONG LAKE DAM	39	9532	1062	WI	STOUGHTON	47	7205	4227
WI	LYNXVILLE DAM 9	47	7110	6326	WI	STURGEON BAY EXP FAR	44	7901	1536
WI	MADELINE ISLAND	41	8961	823	WI	SUPERIOR	40	9381	1265
WI	MADISON WSO	45	7643	3343	WI	TREMPEALEAU DAM 6	46	7550	5343
WI	MANITOWOC	45	7520	2233	WI	TWO RIVERS	44	7802	1116
WI	MARINETTE	46	/455	3676	WI	VIROQUA	45	7851	3625
WI	MARSHFIELD EXP FARM	42	8536	2102	WI	SIURGEON DAI EAF FAR SUPERIOR TREMPEALEAU DAM 6 TWO RIVERS VIROQUA WASHINGTON ISLAND WATERTOWN WAUKESHA WAUPACA WAUSAU FAA AIRPORT	43	8244	974
WI	MATHER D NW	43	8311	2566	WI	WATERTOWN	47	/168	5269
WI	MEDFORD	41	8916	1486	WI	WAUKESHA	47	/196	4782
WI	MENONONIE	40	9261	1741	WI	WAUPAGA	45	//24	4014
WL	MENUMUNIE	45	/912	4425			74	0303	2471
WI	LONE ROCK FAA AIRPOR LONG LAKE DAM LYNXVILLE DAM 9 MADELINE ISLAND MADISON WSO MANITOWOC MARINETTE MARSHFIELD EXP FARM MATHER 5 NW MEDFORD MELLEN MENOMONIE MERRILL	42	0/00	2491	WI	WEST ALLIS	48	6855	6499

ST CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>		<u>ST</u>	CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	<u>CDH74</u>
WI WEST BEND	46	7523	3381	11	LTV	NEWCASTLE	. 7	720/	0000
WI WEYERHAUSER 2 SSE	40		1742				47 45		8096 4242
WI WHITEWATER	41		5658			PATHFINDER DAM PAVILLION	45		2204
WI WILLOW RESERVOIR		10-000 000000	1418			PHILLIPS			3678
WI WILLOW RESERVOIR WI WINTER 6 NNW	38		1013		WI	PRILLIPS	40		
WI WINTER O NNW WI WISCONSIN DELLS			3857		WI	POWELL REDBIRD 1 NW	47		7132
WI WISCONSIN BELLS WI WISCONSIN RAPIDS			3042		WI	RIVERTON	46		8025
WI WISCONSIN RAFIDS	45	0200	3042				43		2586
LIV A FTON	20	0(00	000			ROCHELLE 3 E	45		6658
WI AFION	39	9608	266			ROCK SPRINGS	44		1391
WY AFTON WY ALBIN WY ALTA 1 NNW	4/	7081	4514			ROCK SPRINGS FAA AP		8358	1043
WI ALIA I NNW	40	9302	723			SARATOGA	43		480
WY ALVA 5 SE WY ARCHER WY BASIN	42	8646	1482			SEMINOE DAM	43		1851
WY ARCHER	46	7276	2574			SHERIDAN WSO	45		4115
WY BASIN WY BONDURANT 3 NW	46	7560	6328			SHERIDAN FIELD STA			5341
		11549	29			SUNDANCE	44		3647
WY BORDER 3 N	38		124			THERMOPOLIS	47		5210
WY BOYSEN DAM	48		9257			TORRINGTON EXP FARM			4903
WY BUFFALO BILL DAM	4/	6870	2050			UPTON	43		5184
WY CARPENTER 3 E	47	6942	2930		WY	WHALEN DAM	48		6876
WY CASPER 2 E	47	6913	4799		WY	WHEATLAND 4 N WORLAND	49		5427
WY CASPER WSO	45	7649	4370		WY	WORLAND	44		4846
WY CHEYENNE WSO	46	7315	2087			YELLOWSTONE PARK			517
WY CHUGWATER	47	6993	2098		WY	YODER	48	6594	53 83
WY CODY	46	7339	3759						
WY CASPER WSO WY CHEYENNE WSO WY CHEYENNE WSO WY CHUGWATER WY CODY WY COLONY WY CRANDALL CREEK WY DEAVER	46	7499	7934		PR	ARECIBO 2 SE BARRANQUITAS 1 S COLOSO	78	0	39944
WY CRANDALL CREEK	38	9767	475		PR	BARRANQUITAS 1 S	72	43	10456
WY DEAVER	45	7856	4035						34423
WY DILLINGER	44	8165	5234			COROZAL SUBSTATION			27319
WY DIVERSION DAM	44	7787	1378			FAJARDO HUMACAO	79		50350
WY DIXON	41		351						40448
WY DULL CENTER 1 SE			7619			ISABELA SUBSTATION	76	0	28727
WY ELK MOUNTAIN	42		296			JUNCOS 1 NNE			32597
WY ENCAMPMENT 10 ESE	42		358			LAJAS SUB STA	77		34918
WY EVANSTON 1 E	40		216			MAYAGUEZ NUCLEAR CTR			36591
WY FARSON	37	10146	193				79	0	50452
WY GILLETTE 2 E					PR	SAN JUAN WSO	80	0	55224
WY GILLETTE 18 SW									
WY GLENROCK 5 ESE	48	6814			VI	CHARLOTTE AMALIE 2	80	0	55139
	43		1361						
WY HEART MOUNTAIN	44	7824	3047		PN	GUAM - ANDERSEN	80	0	53974
WY JACKSON	38		122		PN	GUAM-ANDERSEN GUAM WSO JOHNSTON WSO AP KOROR WSO	79	0	46342
WY KAYCEE			2534		PN	JOHNSTON WSO AP	79	0	47839
WY LAGRANGE			4501		PN	KOROR WSO	82	0	70454
WY LANDER WSO			3940		PN	KOROR WSO KWAJALEIN WSO AP MAJURO WSO AP PAGO PAGO WSO AP PONAPE WSO	82	0	72338
WY LARAMIE FAA AIRPORT	41	8933	428		PN	MAJURO WSO AP	81	0	66114
WY LOVELL	45	7860	4609		PN	PAGO PAGO WSO AP	80	0	57287
WY MEDICINE BOW	42	8597	291		PN	PONAPE WSO	81	0	62331
WY MIDWEST 1 SW	47		5541			TRUK, MOEN I, WSO AP			68407
WY MOORCROFT		8081	5822		PN	WAKE WSO AP	80		57637
WY MORAN 5 WNW	36	10704				YAP WSO AP	81		66153
				**					

WI WEST BEND 46 7523 3381 WY NEWCASTLE 47 7384 8096 WI WYTERHAUSER 2 255 41 8924 1742 WY PATHFINDER DAM 45 7766 62204 WI WILLOW RESERVOIR 40 9315 1418 WY PMILLIPS 48 6745 3676 WI WINTER 6 7749 3857 WY ROUBLL 47 7269 7132 WI WISCONSIN DELLS 45 7749 3857 WY ROUBLE 3 E 47 7384 8423 2568 WY ALDIN 47 7661 4514 WY ROUCK SPRINCS 44 7879 1391 WY ALTA 1 NW 40 9302 723 WY SHERIDAN WSO 45 7852 4115 WY ALTA 1 NW 40 9302 YZ3 WY SHERIDAN WSO 45 7852 4115 WY ALTA 1 NW 43 1264 WY SHERIDAN WSO 45 7852 4115	<u>ST</u> (CITY OR LOCATION	<u>TAVG</u>	<u>HDD65</u>	CDH74			ITY OR LOCATION			<u>CDH74</u>
M1 ALDIN 47 7011 474 WI ROCK FRANCE FRANCE FRANCE FRANCE 43 8273 1480 WY ALTA 1 NNW 40 9302 723 WY SARATOCA 43 8274 480 WY ALTA 5 SE 42 8646 1482 WY SEMINOE DAM 43 8204 1851 WY ARCHER 46 7266 2574 WY SHERIDAN WSO 45 7852 4115 WY BORDER 3 N 38 9785 124 WY THERMOPOLIS 47 7261 5210 WY BUFFALO BILL DAM 48 7680 0250 WY UPTON 43 8347 5184 WY CASPER 2 E 47 6912 2050 WY WHEATLAND 4 48 6931 6876 WY CASPER 2 E 47 6912 2084 WY WORLAND 44 8040 6825 WY COLVATER 47 6932 2084 WY WELLOWSTONE PARK 44 8047 5184 WY COLVATER 47 6932 2084 WY YOLDER 48 6931 517 WY COLVATER 47 7813 7764 775	WT L	WEST BEND	46	7523	3381	W	Y NI	EWCASTLE	47	7384	8096
M1 ALDIN 47 7011 414 WI ROCK SPRINGS FRAMES FRAMES FRAME 43 8273 1043 WY ALTA 1 NNW 40 9302 723 WY SARATOCA 43 8274 480 WY ALTA 5 SE 42 8646 1482 WY SEMINOE DAM 43 8204 1851 WY ARCHER 46 7266 6328 WY SHERIDAN WSO 45 7852 4115 WY BORDER 3 N 38 9785 124 WY HERMOPOLIS 47 7261 5210 WY BUFFALO BILL DAM 48 7687 0250 WY UPTON 43 8347 5184 WY CASPER 2 E 47 6913 4790 WY WHALEN DAM 48 6931 6479 WY CASPER WSO 46 7315 2087 WY WUPTON 48 6941 5427 WY COLV 46 7315 2087 WY WUPTON 48 6931 5157 WY COLV 46 7337 3759 WY WORLAND 48 6931 5167 WY COLV 46 74693 7264 750 <						W	Y P	ATHFINDER DAM	45	7798	
M1 ALDIN 47 7011 414 WI ROCK SPRINGS FRAMES FRAMES FRAME 43 8273 1043 WY ALTA 1 NNW 40 9302 723 WY SARATOCA 43 8274 480 WY ALTA 5 SE 42 8646 1482 WY SEMINOE DAM 43 8204 1851 WY ARCHER 46 7266 6328 WY SHERIDAN WSO 45 7852 4115 WY BORDER 3 N 38 9785 124 WY HERMOPOLIS 47 7261 5210 WY BUFFALO BILL DAM 48 7687 0250 WY UPTON 43 8347 5184 WY CASPER 2 E 47 6913 4790 WY WHALEN DAM 48 6931 6479 WY CASPER WSO 46 7315 2087 WY WUPTON 48 6941 5427 WY COLV 46 7315 2087 WY WUPTON 48 6931 5157 WY COLV 46 7337 3759 WY WORLAND 48 6931 5167 WY COLV 46 74693 7264 750 <	WT L	WHITEWATER	48	6925	10 703670 No.4	W	Y P	AVILLION	45	7706	
M1 ALDIN 47 7011 414 WI ROCK SPRINGS FRAMES FRAMES FRAME 43 8273 1043 WY ALTA 1 NNW 40 9302 723 WY SARATOCA 43 8274 480 WY ALTA 5 SE 42 8646 1482 WY SEMINOE DAM 43 8204 1851 WY ARCHER 46 7266 6328 WY SHERIDAN WSO 45 7852 4115 WY BORDER 3 N 38 9785 124 WY HERMOPOLIS 47 7261 5210 WY BUFFALO BILL DAM 48 7687 0250 WY UPTON 43 8347 5184 WY CASPER 2 E 47 6913 4790 WY WHALEN DAM 48 6931 6479 WY CASPER WSO 46 7315 2087 WY WUPTON 48 6941 5427 WY COLV 46 7315 2087 WY WUPTON 48 6931 5157 WY COLV 46 7337 3759 WY WORLAND 48 6931 5167 WY COLV 46 74693 7264 750 <	WT L	WILLOW RESERVOIR	40	9315		พ	Y PI	HILLIPS	48	6745	
M1 ALDIN 47 7011 414 WI ROCK SPRINGS FRAMES FRAMES FRAME 43 8273 1043 WY ALTA 1 NNW 40 9302 723 WY SARATOCA 43 8274 480 WY ALTA 5 SE 42 8646 1482 WY SEMINOE DAM 43 8204 1851 WY ARCHER 46 7266 6328 WY SHERIDAN WSO 45 7852 4115 WY BORDER 3 N 38 9785 124 WY HERMOPOLIS 47 7261 5210 WY BUFFALO BILL DAM 48 7687 0250 WY UPTON 43 8347 5184 WY CASPER 2 E 47 6913 4790 WY WHALEN DAM 48 6931 6479 WY CASPER WSO 46 7315 2087 WY WUPTON 48 6941 5427 WY COLV 46 7315 2087 WY WUPTON 48 6931 5157 WY COLV 46 7337 3759 WY WORLAND 48 6931 5167 WY COLV 46 74693 7264 750 <	WTU	WINTER 6 NNW	38	9859		ū	Y P(OWELL	47	7269	
M1 ALDIN 47 7011 414 WI ROCK SPRINGS FRAMES FRAMES FRAME 43 8273 1043 WY ALTA 1 NNW 40 9302 723 WY SARATOCA 43 8274 480 WY ALTA 5 SE 42 8646 1482 WY SEMINOE DAM 43 8204 1851 WY ARCHER 46 7266 6328 WY SHERIDAN WSO 45 7852 4115 WY BORDER 3 N 38 9785 124 WY HERMOPOLIS 47 7261 5210 WY BUFFALO BILL DAM 48 7687 0250 WY UPTON 43 8347 5184 WY CASPER 2 E 47 6913 4790 WY WHALEN DAM 48 6931 6479 WY CASPER WSO 46 7315 2087 WY WUPTON 48 6941 5427 WY COLV 46 7315 2087 WY WUPTON 48 6931 5157 WY COLV 46 7337 3759 WY WORLAND 48 6931 5167 WY COLV 46 74693 7264 750 <	WTL	VISCONSIN DELLS	45	7749		W	Y RI	EDBIRD 1 NW	46	7380	
M1 ALDIN 47 7011 414 WI ROCK SPRINGS FRAMES FRAMES FRAME 43 8273 1043 WY ALTA 1 NNW 40 9302 723 WY SARATOCA 43 8274 480 WY ALTA 5 SE 42 8646 1482 WY SEMINOE DAM 43 8204 1851 WY ARCHER 46 7266 6328 WY SHERIDAN WSO 45 7852 4115 WY BORDER 3 N 38 9785 124 WY HERMOPOLIS 47 7261 5210 WY BUFFALO BILL DAM 48 7687 0250 WY UPTON 43 8347 5184 WY CASPER 2 E 47 6913 4790 WY WHALEN DAM 48 6931 6479 WY CASPER WSO 46 7315 2087 WY WUPTON 48 6941 5427 WY COLV 46 7315 2087 WY WUPTON 48 6931 5157 WY COLV 46 7337 3759 WY WORLAND 48 6931 5167 WY COLV 46 74693 7264 750 <	WTL	WISCONSIN BAPIDS	43	8286	3042	W	YR	IVERTON	43	8423	
M1 ALDIN 47 7011 414 WI ROCK SPRINGS FRAMES FRAMES FRAME 43 8273 1043 WY ALTA 1 NNW 40 9302 723 WY SARATOCA 43 8274 480 WY ALTA 5 SE 42 8646 1482 WY SEMINOE DAM 43 8204 1851 WY ARCHER 46 7266 6328 WY SHERIDAN WSO 45 7852 4115 WY BORDER 3 N 38 9785 124 WY HERMOPOLIS 47 7261 5210 WY BUFFALO BILL DAM 48 7687 0250 WY UPTON 43 8347 5184 WY CASPER 2 E 47 6913 4790 WY WHALEN DAM 48 6931 6479 WY CASPER WSO 46 7315 2087 WY WUPTON 48 6941 5427 WY COLV 46 7315 2087 WY WUPTON 48 6931 5157 WY COLV 46 7337 3759 WY WORLAND 48 6931 5167 WY COLV 46 74693 7264 750 <						W	Y R	OCHELLE 3 E	45	7838	
M1 ALDIN 47 7011 414 WI ROCK SPRINGS FRAMES FRAMES FRAME 43 8273 1043 WY ALTA 1 NNW 40 9302 723 WY SARATOCA 43 8274 480 WY ALTA 5 SE 42 8646 1482 WY SEMINOE DAM 43 8204 1851 WY ARCHER 46 7266 6328 WY SHERIDAN WSO 45 7852 4115 WY BORDER 3 N 38 9785 124 WY HERMOPOLIS 47 7261 5210 WY BUFFALO BILL DAM 48 7687 0250 WY UPTON 43 8347 5184 WY CASPER 2 E 47 6913 4790 WY WHALEN DAM 48 6931 6479 WY CASPER WSO 46 7315 2087 WY WUPTON 48 6941 5427 WY COLV 46 7315 2087 WY WUPTON 48 6931 5157 WY COLV 46 7337 3759 WY WORLAND 48 6931 5167 WY COLV 46 74693 7264 750 <	WY A	AFTON	39	9608	266	W	Y R	OCK SPRINGS	44	7879	
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY A	ALBIN	47	7081	4514	W	Y R	OCK SPRINGS FAA AP	43	8358	
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY A	ALTA 1 NNW	40	9302	723	W	Y S	ARATOGA	43		
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY A	ALVA 5 SE	42	8646	1482	W	Y SI	EMINOE DAM	43		
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY A	ARCHER	46	7276	2574	W	Y SI	HERIDAN WSO	45		
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WYE	BASIN	46	7560	6328						
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY F	BONDURANT 3 NW	33	11549	29		NT (11		44		
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY E	BORDER 3 N	38	9785	124	W	Y TH	HERMOPOLIS			
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY E	BOYSEN DAM	48	7168	9257	1.1	N T/	ODDINCTON EVD EADM	1.0	6617	
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY F	BUFFALO BILL DAM	47	6870	2050	W	ע צי	PTON	43	8347	
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY C	CARPENTER 3 E	47	6942	2930	W	Y WI	HALEN DAM	48	6931	6876
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY C	CASPER 2 E	47	6913	4799	W	Y WI	HEATLAND 4 N	49	6491	
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY C	CASPER WSO	45	7649	4370	W	Y W	ORLAND	44	8006	
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY C	CHEYENNE WSO	46	7315	2087	W	Y YI	ELLOWSTONE PARK	40	9125	
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY C	CHUGWATER	47	6993	2098	W	Y YO	ODER	48	6594	
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY C	CODY	46	7339	3759						
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY C	COLONY	46	7499	7934	P	R AI	RECIBO 2 SE	78	0	39944
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY C	CRANDALL CREEK	38	9767	475	P	R BA	ARRANQUITAS 1 S	72	43	10456
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY I	DEAVER	45	7856	4035	P	R CO	OLOSO	77	0	34423
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY I	DILLINGER	44	8162	5234	P	R CO	OROZAL SUBSTATION	76	0	27319
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY I	DIVERSION DAM	44	7787	1378	P	R F	AJARDO	79	0	50350
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY I	DIXON	41	8704	351	P	RH	UMACAO	78	0	40448
WY ELK MOUNTAIN 42 8620 296 PR JUNCOS 1 NNE 77 0 32597 WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY I	DULL CENTER 1 SE	47	7284	7619	P	RIS	SABELA SUBSTATION	76	0	28727
WY ENCAMPMENT 10 ESE 42 8565 358 PR LAJAS SUB STA 77 0 34918 WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GILLETTE 18 SW 44 7934 3537 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361 VI CHARLOTTE AMALIE 2 80 0 53974 WY HEART MOUNTAIN 44 7824 3047 PN GUAM-ANDERSEN 80 0 53974 WY KAYCEE 45 7691 2534 PN JOHNSTON WSO AP 79 0 46342 WY LAGRANGE 47 6960 4501 PN KOROR WSO 82 0 72338 WY LARAMIE FAA AIRPORT 41 8933 428 PN MAJURO WSO AP 81 0 66114 WY MEDICINE BOW 42					296	P	RJ	UNCOS 1 NNE	77	0	32597
WY EVANSTON 1 E 40 9225 216 PR MAYAGUEZ NUCLEAR CTR 77 0 36591 WY FARSON 37 10146 193 PR PONCE 4 E 79 0 50452 WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GILLETTE 18 SW 44 7934 3537 VI CHARLOTTE AMALIE 2 80 0 55139 WY GEEN RIVER 43 8345 1361 VI CHARLOTTE AMALIE 2 80 0 53974 WY HEART MOUNTAIN 44 7824 3047 PN GUAM-ANDERSEN 80 0 53974 WY JACKSON 38 9828 122 PN GUAM WSO 79 0 46342 WY KAYCEE 45 7691 2534 PN JOHNSTON WSO AP 79 0 47839 WY LAGRANGE 47 6960 4501 PN KOROR WSO 82 0 72338 WY LARAMIE FAA AIRPORT 41 8933 428 PN MAJURO WSO AP 81 0 66114 WY MODICINE BOW 42 8597	WY E	ENCAMPMENT 10 ESE	42	8565	358	P	RL	AJAS SUB STA	77		34918
WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GILLETTE 18 SW 44 7934 3537 VI CHARLOTTE AMALIE 2 80 0 55139 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY F	EVANSTON 1 E	40	9225	216						36591
WY GILLETTE 2 E 45 7761 5294 PR SAN JUAN WSO 80 0 55224 WY GILLETTE 18 SW 44 7934 3537 VI CHARLOTTE AMALIE 2 80 0 55139 WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361	WY F	FARSON	37	10146	193					0	50452
WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361 5139 WY GREEN RIVER 43 8345 1361 5139 5139				7761	5294	P	R SA	AN JUAN WSO	80	0	55224
WY GLENROCK 5 ESE 48 6814 5442 VI CHARLOTTE AMALIE 2 80 0 55139 WY GREEN RIVER 43 8345 1361 0 53974 WY HEART MOUNTAIN 44 7824 3047 PN GUAM-ANDERSEN 80 0 53974 WY JACKSON 38 9828 122 PN GUAM WSO 79 0 46342 WY KAYCEE 45 7691 2534 PN JOHNSTON WSO AP 79 0 47839 WY LAGRANGE 47 6960 4501 PN KOROR WSO 82 0 70454 WY LANDER WSO 44 7915 3940 PN KWAJALEIN WSO AP 82 0 72338 WY LARAMIE FAA AIRPORT 41 8933 428 PN MAJURO WSO AP 81 0 66114 WY LOVELL 45 7860 4609 PN PAGO PAGO WSO AP 80 0 57287 WY MEDICINE BOW 42 8597 291 PN NONAPE WSO 81 0 62331 WY MOORCROFT 44 8081 5822 </td <td>WY G</td> <td>GILLETTE 18 SW</td> <td>44</td> <td></td> <td>3537</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	WY G	GILLETTE 18 SW	44		3537						
WY JACKSON389828122PN GOAM WSO79046342WY KAYCEE4576912534PN JOHNSTON WSO AP79047839WY LAGRANGE4769604501PN KOROR WSO82070454WY LANDER WSO4479153940PN KWAJALEIN WSO AP82072338WY LARAMIE FAA AIRPORT418933428PN MAJURO WSO AP81066114WY LOVELL4578604609PN PAGO PAGO WSO AP80057287WY MEDICINE BOW428597291PN PONAPE WSO81062331WY MIDWEST 1 SW4770465541PN TRUK, MOEN I, WSO AP81068407WY MOORCROFT4480815822PN WAKE WSO AP80057637	WY G	GLENROCK 5 ESE	48	6814	5442	V	I CH	HARLOTTE AMALIE 2	80	0	55139
WY JACKSON389828122PN GOAM WSO79046342WY KAYCEE4576912534PN JOHNSTON WSO AP79047839WY LAGRANGE4769604501PN KOROR WSO82070454WY LANDER WSO4479153940PN KWAJALEIN WSO AP82072338WY LARAMIE FAA AIRPORT418933428PN MAJURO WSO AP81066114WY LOVELL4578604609PN PAGO PAGO WSO AP80057287WY MEDICINE BOW428597291PN PONAPE WSO81062331WY MIDWEST 1 SW4770465541PN TRUK, MOEN I, WSO AP81068407WY MOORCROFT4480815822PN WAKE WSO AP80057637	WY G	GREEN RIVER	43	8345	1361						
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Appendix A

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This Appendix is not part of Standard 90.2P, "Energy Efficient Design of New Low-Rise Residential Buildings", but is included for information purposes only.

TYPICAL DUCT INSULATION LEVELS

Level		Туре
R-2	Insta	lled insulation thermal conductance (C) = 0.48 $Btu/h \cdot ft^2 \cdot F (R = 2.1)$
	0	l in., minimum 0.6 lb/ft³ glass fiber blankets (wrap)
	0	0.5 in., 2 to 3 lb/ft' glass fiber blanket or board
		(duct liner)
	ο	0.5 in., 3 to 10 lb/ft ³ glass fiber board
	0	Flexible duct insulated with a glass fiber blanket
		having a l in. nominal wall thickness
R-4	Insta	lled insulation thermal conductance (C) = 0.24 Btu/h•ft ² • F (R = 4.2
	2 in., minimum 0.6 lb/ft ³ ,glass fiber blanket (wrap)	
	0	1 in., 1.5 to 3 lb/ft' glass fiber blanket or board
×		(duct liner)
:	o	1 in., 3 to 10 lb/ft ³ glass fiber board
	0	Flexible duct insulated with a glass fiber blanket
		having a 1.25 in. wall thickness
R-6	Insta	lled insulation thermal conductance (C) = 0.16 $Btu/h \cdot ft^2 \cdot F$ (R = 6.3
	0	3 in., minimum 0.6 lb/ft ³ glass fiber blanket (wrap)
	0	1.5 in., 1.5 to 3 lb/ft ³ glass fiber blanket or
		board (duct liner)
	0	1.5 in., 3 to 10 lb/ft ³ glass fiber board
	o	Flexible duct insulated with a glass fiber blanket
		having a 1.75 in. wall thickness

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NOTES

All insulation values are determined by using flat specimens to determine thermal conductance (C) using the relationship C = k/t where t is the installed thickness in inches and k (Btu·in/h·ft²· F) is determined for the insulation using ASTM C518-85 or C177-85 and measured at 75 F mean temperature. Duct wrap shall be tested at 75% of its nominal thickness, and the installed thickness value shall also be assumed to be 75% of the nominal thickness. For rigid board and duct liner products, the nominal value shall be used for thickness. Air films are not to be included in any calculations.

For flexible ducts, t is equal to the installed wall thickness determined by measuring the inner and outer circumferences of the duct, calculating the resultant inside and outside diameters, subtracting the inside diameter from the outside diameter and dividing the difference by 2.

Insulation examples listed in this appendix are suggested as combinations which may yield the required conductance value. If higher density materials are used, thickness may be decreased in some cases. Conversely, by increasing thickness, lighter density materials may be used to give the required thermal performance. Manufacturers data shall be utilized to make these determinations.



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