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1	1	Cog. Eng. BD Flanagan	<i>[Signature]</i>	5/29/96	G1-11	AF Wellner	<i>[Signature]</i>	6/3/96	H5-70	1	
1	1	Cog. Mgr. JG Field	<i>[Signature]</i>	5/29/96	G1-11	J.J. Mahoney	<i>[Signature]</i>	5/29/96	G1-11	1	1
1	1	QA CR Hoover	<i>[Signature]</i>	5/29/96	G1-11						
1	1	Safety DW McNally	<i>[Signature]</i>	5/29/96	G1-11						
1	1	RL Clawson	<i>[Signature]</i>	5/29/96	H5-13						
1	1	WR Jaquish	<i>[Signature]</i>	5/29/96	H5-70						
1	1	RJ Smith	<i>[Signature]</i>	5/31/96	G1-11						

18. BD Flanagan <i>[Signature]</i> 5/29/96 Signature of EDT Originator Date		20. JG Field <i>[Signature]</i> 5/31/96 Signature of Manager Date		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
Authorized Representative Date for Receiving Organization					

Documentation and Analysis for Packaging for the Hardigg Cases

B. D. Flanagan

Westinghouse Hanford Company, Richland, WA 99352

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Abstract: This documentation and analysis for packaging documents that Hardigg cases meet the requirements for Industrial Packaging Type 1 containers for the packaging of low specific activity radioactive material or surface contaminated object quantities for transport.

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Karen A. Roland 6/5/96
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Approved for Public Release

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LIST OF TERMS

cm	centimeter
DOT	U.S. Department of Transportation
in.	inch
IP-1	Industrial Packaging Type 1
IP-2	Industrial Packaging Type 2
IP-3	Industrial Packaging Type 3
kg	kilogram
lb	pound
LSA	low specific activity
SCO	surface contaminated object

DOCUMENTATION AND ANALYSIS FOR PACKAGING FOR THE HARDIGG¹ CASES

1.0 INTRODUCTION

The purpose of this documentation and analysis for packaging is to document that Hardigg cases meet the U.S. Department of Transportation (DOT) 49 CFR 173.411 as Industrial Packaging Type 1 (IP-1) containers and strong, tight containers for the packaging of low specific activity (LSA) radioactive material or surface contaminated object (SCO) quantities for transport. By meeting this requirement, LSA or SCO quantities of radioactive material can be shipped in compliance with WHC-CM-2-14, *Hazardous Material Packaging and Shipping*, and the DOT regulations.

2.0 PACKAGE DESCRIPTION

2.1 PACKAGING

This document specifically considers Hardigg cases in the following size range (see appendix). The smallest size considered, case number AL1616-0412AC, has inside dimensions 16 in. x 16 in. x 16 in. (40.64 cm x 40.64 cm x 40.64 cm [l x w x h]) and outside dimensions 19 in. x 19 in. x 17.3 in. (48.26 cm x 40.26 cm x 43.94 cm) and weighs 17.0 lb (7.71 kg). The largest size considered, case number AL2624-2724AC, has inside dimensions 26 in. x 24 in. x 51.5 in. (66.04 cm x 60.96 cm x 130.81 cm) and outside dimensions of 29 in. x 27 in. x 55.3 in. (73.66 cm x 68.58 cm x 140.46 cm) and weighs 58.3 lb (26.44 kg). Other sizes may be acceptable.

The cases are made of a molded durable polyethylene with corners that are 15%-20% thicker to absorb shocks more effectively. All hardware is fully recessed, including latches and handles. Stainless steel inserts are molded-in to give catches, hinges, and strikes added strength.

A tongue-in-groove gasketed parting line of each case provides a good seal. Each case will be free of any holes that could cause the container to "leak." The cases will be filled with polyethylene (closed cell) foam to provide cushioning and forms to hold the contents.

The gross weight of the package should not exceed 150 lb (68.04 kg) when using the handles for lifting and positioning. Each handle used for lifting is designed to carry 150 lb (68.04 kg) with a margin of safety of 2. Therefore, with two handles, the case will meet the design requirement of the handle margin of safety of 3 against yield when lifting the case.

¹Hardigg is a trademark of Hardigg Cases, a division of Hardigg Industries, Inc.

All items shall be bagged or wrapped in plastic before they are placed in the cases.

2.2 CONTENTS

Contents of the Hardigg cases must meet the requirements for which an IP-1 or strong tight container is authorized, specifically LSA or SCO (see 49 CFR 173.427).

3.0 ACCEPTANCE OF PACKAGING FOR USE

The Hardigg cases shall fulfill the design requirement for IP-1 (49 CFR 173.411).

3.1 REQUIREMENT DEFINITIONS

In addition to the IP-1 requirements, there are specific requirements for all packages: 49 CFR 173.24, "General requirements for packagings and packages." Upon review of these requirements, no conflict was noticed with use of Hardigg cases.

3.1.1 Industrial Packaging Type 1

Industrial Packagings (49 CFR 173.411)

(a) General. Each industrial packaging must comply with the requirements of this section which specifies packaging tests, and record retention applicable to Industrial Packaging Type 1 (IP-1), Industrial Packaging Type 2 (IP-2), and Industrial Packaging Type 3 (IP-3).

(b) Industrial packaging certification and tests. (1) Each IP-1 must meet the general design requirements prescribed in §173.410.

(2) [NA] (IP-2)

(3) [NA] (IP-3)

(4) [NA] (IM 101 or IM 102 portable tank)

(5) [NA] (Freight container)

(c) [NA] No records retention requirements for IP-1.

General Design Requirements (49 CFR 173.410)

(a) The package can be easily handled and properly secured in or on a conveyance during transport.

Acceptance: Each Hardigg case can be easily handled by using the handles provided at each end. Strapping may also be used to lift the cases. Proper securement can be accomplished by using strapping along with blocking and bracing on the conveyance.

(b) Each lifting attachment that is a structural part of the package must be designed with a minimum safety factor of three against yielding when used to lift the package in the intended manner, and it must be designed so that failure of any lifting attachment under excessive load would not impair the ability of the package to meet other requirements of this subpart. Any other structural part of the package which could be used to lift the package must be capable of being rendered inoperable for lifting the package during transport or must be designed with strength equivalent to that required for lifting attachments.

Acceptance: Each Hardigg case handle is rated for 150 lb (68.04 kg) and fully recessed. The use of two handles will meet the safety factor of three against yield. Failure of the handles will not impair the case's ability to meet other requirements.

(c) The external surface, as far as practicable, will be free from protruding features and will be easily decontaminated.

Acceptance: There are no unpracticable protruding features on the cases and each case is determined to be easily decontaminated.

(d) The outer layer of packaging will avoid, as far as practicable, pockets or crevices where water might collect.

Acceptance: There are no areas in which water may collect on the cases.

(e) Each feature that is added to the package will not reduce the safety of the package.

Acceptance: Not applicable. No features are being added to the case.

(f) The package will be capable of withstanding the effects of any acceleration, vibration or vibration resonance that may arise under normal conditions of transport without any deterioration in the effectiveness of the closing devices on the various receptacles or in the integrity of the package as a whole and without loosening or unintentionally releasing the nuts, bolts, or other securing devices even after repeated use.

Acceptance: The Hardigg cases are made of a durable polyethylene and filled with a cushioning foam. Therefore, accelerations and vibrations from normal transport will have little or no effect on the cases.

(g) The materials of construction of the packaging and any components or structure will be physically and chemically compatible with each other and with the package contents. The behavior of the packaging and the package contents under irradiation will be taken into account.

Acceptance: All materials used in the construction and components are fully compatible physically and chemically and there will be no degrading effects caused by the contents.

(h) [NA] (Valves)

(i) [NA] (Air transport)

3.1.2 Strong, Tight

There are no specific requirements for a strong, tight package other than being "strong" and "tight." The Hardigg cases have been shown to be "strong" by meeting the general design requirements of 49 CFR 173.410. The seamless design and tongue-in-groove seal show the leak-tight design, thus meeting the "tight" requirement.

4.0 TRANSPORTATION

4.1 ORIGIN AND DESTINATION

This document provides the necessary evaluation to show that the Hardigg cases described are acceptable for onsite and offsite transport.

4.2 REQUIREMENTS

The following requirements apply for transportation. Each applicable regulation and requirement is given below, along with its reference. Only the sections specifically applicable to the cases are listed. Additional transportation regulations and requirements, such as labeling and paperwork, applying to the general design and shipment of all packages are not provided here. It is the shipper's responsibility to ensure that shipments of the cases comply with all applicable regulations.

4.2.1 Contents

Definitions (49 CFR 173.403)

Low specific activity (LSA) material means Class 7 (radioactive) material with limited specific activity which satisfies the descriptions and limits set forth below. Shielding materials surrounding the LSA material may not be considered in determining the estimated average specific activity of the package contents. LSA material must be in one of three groups:

(1) LSA-I.

(i) Ores containing only naturally occurring radionuclides (e.g., uranium, thorium) and uranium or thorium concentrates of such ores; or

(ii) Solid unirradiated natural uranium or depleted uranium or natural thorium or their solid or liquid compounds or mixtures; or

(iii) Class 7 (radioactive) material, other than fissile material, for which the A_2 value is unlimited; or

(iv) Mill tailings, contaminated earth, concrete, rubble, other debris, and activated material in which the Class 7 (radioactive) material is essentially uniformly distributed and the average specific activity does not exceed $10^{-6} A_2/g$.

(2) LSA-II.

(i) Water with tritium concentration up to 0.8 TBq/liter (20.0 Ci/liter); or

(ii) Material in which the Class 7 (radioactive) material is essentially uniformly distributed and the average specific activity does not exceed $10^{-4} A_2/g$ for solids and gases, and $10^{-2} A_2/g$ for liquids.

(3) LSA-III. Solids (e.g., consolidated wastes, activated materials) that meet the requirements of §173.468 and which:

(i) The Class 7 (radioactive) material is essentially uniformly distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic, etc.); and

(ii) The Class 7 (radioactive) material is relatively insoluble, or it is intrinsically contained in a relatively insoluble material, so that, even under loss of packaging, the loss of Class 7 (radioactive) material per package by leaching when placed in water for seven days would not exceed $0.1 A_2$; and

(iii) The average specific activity of the solid does not exceed $2 \times 10^{-3} A_2/g$.

Surface Contaminated Object (SCO) means a solid object which is not itself radioactive but which has Class 7 (radioactive) material distributed on any of its surfaces. SCO must be in one of two groups with surface activity not exceeding the following limits.

(1) SCO-I: A solid object on which:

(i) The non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4 Bq/cm^2 (10^{-4} microcuries/ cm^2) for beta and gamma and low toxicity alpha emitters, or 0.4 Bq/cm^2 (10^{-2} microcuries/ cm^2) for alpha emitters;

(ii) The fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed $4 \times 10^3\text{ Bq/cm}^2$ (1.0 microcurie/ cm^2) for beta and gamma and low toxicity alpha emitters, or $4 \times 10^3\text{ Bq/cm}^2$ (0.1 microcurie/ cm^2) for all other alpha emitters; and

(iii) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed $4 \times 10^3\text{ Bq/cm}^2$ (1 microcurie/ cm^2) for beta and gamma and low toxicity alpha emitters, or $4 \times 10^3\text{ Bq/cm}^2$ (0.1 microcurie/ cm^2) for all other alpha emitters.

(2) SCO-II: A solid object on which the limits for SCO-I are exceeded and on which:

(i) The non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 400 Bq/cm^2 (10^{-2} microcurie/ cm^2) for beta and gamma and low toxicity alpha emitters or 40 Bq/cm^2 (10^{-3} microcurie/ cm^2) for all other alpha emitters;

(ii) The fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed $8 \times 10^3\text{ Bq/cm}^2$ (20 microcurie/ cm^2) for beta and gamma and low toxicity alpha emitters, or $8 \times 10^3\text{ Bq/cm}^2$ (2 microcurie/ cm^2) for all other alpha emitters; and

(iii) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed $8 \times 10^3\text{ Bq/cm}^2$ (20 microcurie/ cm^2) for beta and gamma and low toxicity alpha emitters, or $8 \times 10^3\text{ Bq/cm}^2$ (2 microcurie/ cm^2) for all other alpha emitters.

The shipper is responsible for ensuring that the material packaged meets the above requirements.

4.2.2 Transportation

Stacking of the cases during shipment is prohibited. The speed of the transport vehicle shall not exceed the posted speed limit at any time.

Transportation Requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO)
(49 CFR 173.427).

(a) In addition to other applicable requirements specified in this subchapter, low specific activity (LSA) materials and surface contaminated objects (SCO), unless excepted by paragraph (d) of this section, must be packaged in accordance with paragraph (b) or (c) of this section and must be transported in accordance with the following conditions:

(1) The external dose rate must not exceed an external radiation level of 10 mSv/h (1 rem/h) at 3 meters from the unshielded material;

(2) The quantity of LSA and SCO material in any single conveyance must not exceed the limits specified in Table 9;

(3) LSA material and SCO that are or contain fissile material must meet the applicable requirements of §173.451 (fissile requirements);

(4) Packages must meet the contamination control limits specified in §173.443;

(5) External radiation levels must comply with 173.441; and

(6) For LSA material and SCO required by this section to be consigned as exclusive use:

(i) Shipments must be loaded by the consignor and unloaded by the consignee from the conveyance or freight container in which originally loaded;

(ii) There must be no loose Class 7 (radioactive) material in the conveyance, however, when the conveyance is the packaging there must be no leakage of Class 7 (radioactive) material from the conveyance;

(iii) Packages must be braced so as to prevent shifting of lading under conditions normally incident to transportation;

(iv) Specific instructions for maintenance of exclusive use shipment controls must be provided by the offeror to the carrier. Such instructions must be included with the shipping paper information;

(v) Except for shipments of uncontrolled uranium or thorium ores, the transport vehicle must be placarded in accordance with subpart F of Part 172 of this subchapter;

(vi) For domestic transportation only, packages are excepted from the marking and labeling requirements of this subchapter. However, the exterior of each nonbulk package must be stenciled or otherwise marked "Radioactive-LSA" or "Radioactive-SCO", as appropriate, and nonbulk packages that contain a hazardous substance must also be stenciled or otherwise marked with the letters "RQ" in association with the above description; and

(vii) [NA] (Air transport)

(b) Except as provided in paragraph (c) of this section, LSA material and SCO must be packaged as follows:

(1) In an industrial package (IP-1, IP-2 or IP-3; 173.411), subject to the limitations of Table 8;

(2) [NA] (Type A package)

(3) For domestic transportation only, in a strong, tight package that prevents leakage of the radioactive content under normal conditions of transport. In addition to the requirements of paragraph (a) of this section, the following requirements must be met:

- (i) The shipment must be exclusive use;
- (ii) The quantity of Class 7 (radioactive) material in each packaging may not exceed an A_2 quantity.
- (c) LSA-I and SCO-I (see 173.403), unless packaged in accordance with paragraph (b) of this section, must be packaged in bulk packagings in accordance with this paragraph. The shipment must be, in addition to complying with the applicable requirements of paragraph (a) of this section, exclusive use:
- (1) Solids. Packages must be strong tight packagings, meeting the requirements of subpart B of this Part, transported in a closed transport vehicle. The requirements of 173.410 do not apply.

(2) [NA] (Liquids)

(d) Except for transportation by aircraft, LSA material and SCO that conform to the provisions specified in 10 CFR 20.2005 are excepted from all requirements of this subchapter pertaining to Class 7 (radioactive) materials when offered for transportation for disposal or recovery. A material which meets the definition of another hazard class is subchapter relating to that hazard class.

(e) LSA and SCO that exceed the packaging limits in this section must be packaged in accordance with 10 CFR part 71.

(f) Tables 8 and 9 are as follows:

Table 8. Industrial Package Integrity Requirements for LSA Material and SCO.

Contents	Industrial Packaging Type	
	Exclusive Use Shipment	Nonexclusive Use Shipment
LSA-I:		
Solid	IP-1	IP-1
Liquid	IP-1	IP-2
LSA-II		
Solid	IP-2	IP-2
Liquid and Gas ..	IP-2	IP-3
LSA-III	IP-2	IP-3
SCO-I	IP-1	IP-1
SCO-II	IP-2	IP-2

Table 9. *Conveyance Activity Limits for LSA Material and SCO.*

<i>Nature of Material</i>	<i>Activity Limit for Conveyances</i>
<i>LSA-I</i>	<i>No Limit</i>
<i>LSA-II and LSA-III; noncombustible solids.</i>	<i>No Limit</i>
<i>LSA-II and LSA-III; combustible solids and all liquids and gases.</i>	<i>100 A₂</i>
<i>SCO</i>	<i>100 A₂</i>

4.2.3 Loading and Unloading

Loading and unloading of the cases shall follow procedures developed by the facility using the cases.

4.2.4 Tiedowns

A tiedown system shall be used to secure the cases to the transport vehicle(s) and shall be in accordance with the criteria of 49 CFR 393.102-104. For securement of the case to the transfer vehicle, strapping along with blocking and bracing is the recommended method.

5.0 CONCLUSION

It has been shown previously that the Hardigg cases may be used as packaging for the transport of radioactive material as an IP-1 or strong, tight container. The allowable radiological limits are determined by the method of transport (i.e., LSA-I, LSA-II, LSA-III, SCO-I, or SCO-II) and use of the IP-1/strong, tight container. The regulations, current as of April 1, 1996, have been provided previously to aid in the determination of the most appropriate method of transport.

6.0 REFERENCES

- 49 CFR 173, 1996, "Shippers-General Requirements for Shipments and Packaging," *Code of Federal Regulations*, as amended.
- 49 CFR 393, 1996, "Parts and Accessories Necessary for Safe Operation," *Code of Federal Regulations*, as amended.

WHC-CM-2-14, *Hazardous Material Packaging and Shipping*, Westinghouse Hanford Company, Richland, Washington.

APPENDIX

HARDIGG CATALOG

Giants Stadium. Sixty-three thousand fans stomping thunder and screaming at the tops of their lungs for Billy Joel and Elton John. But it's not just the piano men they're waiting for. A steep ticket price entitles them to see smoke, fireworks and special effects provided in part by the most sophisticated large-screen display projector in the world. Valued at close to a hundred thousand dollars, the projector's sensitive high-tech precision optics can be damaged by exposure to rain, dust, humidity or mishandling by roadies rushing to get to the next gig. How does the projector survive? In a standard single lid Hardigg Case. An off-the-shelf size with airtight gasket and configured foam interior protects the 350-pound projector, which is stowed inside the container and remains there for safety. Engineered to protect, it enables that one piece of equipment to withstand the rigors of a rock tour around the world, bumped and jostled, lugged through airports and hoisted onto trucks. No matter what happens at the Meadowlands, thanks to Hardigg Case, even the last crowd in Tokyo—or Sydney—will enjoy the show.

Hardigg Engineers Over
200 Standard Sizes.

147 North Main Street, PO Box 201, South Overfield, MA 01373-0201 USA (413) 655-2163 / FAX (413) 655-8061

Hardigg Cases are rotationally molded of durable polyethylene, so they're rugged and recyclable—with corners that are 15% - 20% thicker to absorb shocks better—with molded-in color that can't wear off. All hardware is fully recessed. Patented anti-shear interlocks protect closure hardware from damaging shear forces during drops.

Tough stainless steel inserts are molded-in to give catches, hinges and strikes added strength and make them easier to replace, if necessary. With over 200 standard sizes—more than anyone else in the industry—Hardigg delivers protection solutions quickly and cost-effectively.

The tongue-in-groove gasketed parting line of each case seals tight—even after impact because it's molded right in. Inside standard cases, we can provide a variety of cushioning options: foam filled, foam lined, or with cushioning configured specifically for your application. Cases are available without cushioning as well.

** polyethylene - closed cell
polyurethane - softer*

Each Hardigg Case is carefully engineered for minimum weight and maximum protection. Molded-in interlocking ribs give the case greater strength and stacking stability.

See our size list of over 200 Hardigg standard single lid cases for technical data and available options.

For more information, call 413-665-2163 for the Hardigg Case dealer nearest you.

HARDIGG CASES
A Division of Hardigg Industries, Inc.

3 wk delivery

*Hardy
Don't take ALEX through
USA? purchasing to Hardigg*

Storage

STANDARD HARDIGG™ CASE SIZES

CASE	INSIDE DIM.			OUTSIDE DIM.			Lbs.	CASE	INSIDE DIM.			OUTSIDE DIM.			Lbs.
	L	W	H	L	W	H			L	W	H	L	W	H	
AL1010-0904	10	10	13	13	13	14.3	9.8	AL2216-0805	22	16	13.5	25	19	15	20.9
AL1010-0905	10	10	14	13	13	15.6	10.6	AL2216-1205	22	16	17	25	19	19	22.9
AL1010-1404	10	10	18	13	13	19.3	11.5	AL2221-0604	22.5	21	10.5	25.5	24	12.3	24.0
AL1010-1405	10	10	19	13	13	20.6	12.4	AL2221-0605	22.5	21	11.5	25.5	24	12.3	24.8
CL1109-0303HL	11	9	6	13	11	6.9	5.7	AL2221-0614AC	22.5	21	20.5	25.5	24	22.5	26.8
AL1212-0404	12	12	8	15	15	9.6	10.6	AL2221-1204	22.5	21	16	25.5	24	17.9	26.8
AL1212-0405	12	12	9	15	15	10.8	10.8	AL2221-1205	22.5	21	17	25.5	24	19.3	27.7
AL1212-1504	12	12	19	15	15	20.6	14.7	AL2221-1214AC	22.5	21	26	25.5	24	28	29.6
AL1212-1505	12	12	20	15	15	21.8	14.9	AL2221-1804	22.5	21	22.5	25.5	24	24.5	33.2
AL1212-1904	12	12	23	15	15	24.3	16.8	AL2221-1805	22.5	21	23.5	25.5	24	25.9	34.1
AL1212-1905	12	12	24	15	15	25.6	17.0	AL2221-1814AC	22.5	21	32.5	25.5	24	34.7	36.0
CL1412-0502	14	12	7	16	14	8	11.7	AL2221-2804	22.5	21	32.5	25.5	24	34	39.8
AL1413-0505	14.5	13	10	17.5	16	12.2	13.9	AL2221-2805	22.5	21	33.5	25.5	24	35.4	40.6
AL1413-1005	14.5	13	15	17.5	16	17	16.5	AL2221-2814AC	22.5	21	42.5	25.5	24	44.2	42.6
AL1413-2105	14.5	13	26	17.5	16	27.7	19.4	AL2313-1004	23	13	14	26	16	15.2	19.2
AL1414-0705	14	14	12	17	17	13.7	14.6	AL2315-2507	23	18	32	26	18	33	32.2
AL1616-0404	16	16	8	19	19	9.7	12.3	AL2316-0604	23	16	10	26	19	11.5	19
AL1616-0405	16	16	9	19	19	10.8	13.7	AL2318-1205	23	18	17	26	21	19	26.1
AL1616-0412AC	16	16	19	19	19	17.3	17.0	AL2318-1705	23	18	22	26	21	24	29.1
AL1616-0504	16	16	9	19	19	10.7	13.9	CL2406-0303	24	6	6	26	8	6.5	9.0
AL1616-0505	16	16	10	19	19	12	15.3	AL2414-0509AC	24.9	14.9	14	27.9	17.9	16	28.3
AL1616-0512AC	16	16	17	19	19	18.8	18.5	AL2423-0904	24	23	13	27	26	14.8	27.6
AL1616-1004	16	16	14	19	19	15.7	16.2	AL2423-0911AC	24	23	20	27	26	22.7	31.8
AL1616-1005	16	16	15	19	19	16.8	17.6	AL2423-1104	24	23	15	27	26	17	28.0
AL1616-1012AC	16	16	22	19	19	23.3	20.8	AL2423-1111AC	24	23	22	27	26	24.8	32.3
AL1616-1204	16	16	15.7	19	19	17	16.7	AL2617-0604	26	17	10	29	20	11.8	23.2
AL1616-1205	16	16	16.7	19	19	18.3	18.0	AL2617-1104	26	17	15	29	20	16.8	28.4
AL1616-1212AC	16	16	23.7	19	19	24.5	21.3	AL2624-0805	26	24	13	29	27	16.8	32.9
AL1616-1804	16	16	22.5	19	19	23.3	20.6	AL2624-0824AC	26	24	32	29	27	35.8	46.0
AL1616-1805	16	16	23.5	19	19	25	22.0	AL2624-1205	26	24	17	29	27	20.8	35.6
AL1616-1812AC	16	16	30.5	19	19	31.5	25.3	AL2624-1224AC	26	24	36	29	27	39.8	48.7
CL1713-0403	17	13	7	19	15	8	9.6	AL2624-1805	26	24	23	29	27	26.8	39.6
CL1713-0408AC	17	13	12	19	15	13	11.0	AL2624-1824AC	26	24	42	29	27	45.8	52.8
CL1715-1004	17	15	14	19	17	15	12.6	AL2624-2705	26	24	32.5	29	27	36.3	45.2
AL1717-0909AC	17	17	18	20	20	20	18.8	AL2624-2724AC	26	24	51.5	29	27	55.3	58.3
AL1814-0504	18	14.5	9	21	17.5	10.7	14.4	AL2727-0404	27	27	8	30	30	10.5	32.2
AL1814-0505	18	14.5	10	21	17.5	12	15.6	AL2727-0405	27	27	9	30	30	11.3	33.5
AL1814-1504	18	14.5	19	21	17.5	20.3	19.3	AL2727-0409AC	27	27	13	30	30	15.5	35.9
AL1814-1505	18	14.5	20	21	17.5	21.8	20.5	AL2727-0414AC	27	27	18	30	30	20.5	39.7
AL1814-2204	18	14.5	26	21	17.5	27.6	23.4	AL2727-0504	27	27	9	30	30	11.3	32.2
AL1814-2205	18	14.5	27	21	17.5	28.8	24.6	AL2727-0505	27	27	10	30	30	12.5	33.5
AL1818-0603HL	18	18	9	21	21	10.7	17.9	AL2727-0509AC	27	27	14	30	30	16.5	35.9
CL2012-0902	20	12	11	22	14	12.8	19.1	AL2727-0514AC	27	27	19	30	30	22.3	39.7
AL2013-0403	20	13	7	23	16	8.7	14.4	AL2727-0904	27	27	13	30	30	15.3	34.5
AL2013-0903	20	13	12	23	16	14	16.8	AL2727-0905	27	27	14	30	30	16.6	35.9
AL2015-0503HL	20	15	8	23	18	9	18.9	AL2727-0909AC	27	27	18	30	30	20.3	38.2
AL2015-1503HL	20	15	18	23	18	19	24.7	AL2727-0914AC	27	27	23	30	30	25.3	42.0
AL2020-1305	20	20	18	23	23	20	25.7	AL2727-1404	27	27	18	30	30	20.5	38.3
AL2216-0505	22	16	10	25	19	11.3	18.5	AL2727-1405	27	27	19	30	30	21.8	39.7

H.H. Bauer & Associates, Inc.

Kurt O. Bauer

Kurt O. Bauer

Tel: (360) 896-7467 • Fax: (360) 896-7305
PO Box 84447 • 2212 S.E. 132nd Court • Vancouver, WA 98684

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