



**INDIANA  
MICHIGAN  
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*A unit of American Electric Power*

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September 12, 2013

AEP-NRC-2013-73  
10 CFR 50.54(f)  
10 CFR 50.4

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
11555 Rockville Pike  
Rockville, MD 20852

**Subject:** Donald C. Cook Nuclear Plant Unit 1 and Unit 2  
Response to NRC Request for Information Pursuant to 10 CFR 50.54(f)  
Regarding the Seismic Aspects of Recommendation 2.1 of the Near-Term  
Task Force Review of Insights from the Fukushima Dai-ichi Accident – 1.5  
Year Response for CEUS Sites

**References:**

1. Nuclear Regulatory Commission (NRC) Letter, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2 Request for Information Pursuant to Title 10 of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident", dated March 12, 2012
2. NRC Letter, Endorsement of EPRI Final Draft Report 1025287, "Seismic Evaluation Guidance," dated February 15, 2013
3. EPRI Report 1025287, Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic
4. NEI Letter to NRC, Proposed Path Forward for NTTF Recommendation 2.1: Seismic Reevaluations, dated April 9, 2013
5. NRC Letter, EPRI Final Draft Report XXXXXX, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Near-Term Task Force Recommendation 2.1: Seismic," as an Acceptable Alternative to the March 12, 2012, Information Request for Seismic Reevaluations, dated May 7, 2013
6. Letter from J. P. Gebbie, Indiana Michigan Power Company to U. S. Nuclear Regulatory Commission document Control Desk, "Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Seismic Aspects of Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated April 25, 2013

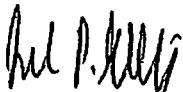
On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Reference 1 to all power reactor licensees and holders of construction permits in active or deferred status. Indiana Michigan Power Company (I&M) is the licensee for Donald C. Cook Nuclear Plant (CNP) Unit 1 and Unit 2. Enclosure 1 of Reference 1 requested each addressee in the Central and Eastern United States (CEUS) to submit a written response consistent with the requested seismic hazard evaluation information (Items 1 through 7) by September 12, 2013. On February 15, 2013, the NRC issued Reference 2, endorsing the Reference 3 industry guidance for responding to Reference 1. Section 4 of Reference 3 identifies the detailed information to be included in the seismic hazard evaluation submittals.

On April 9, 2013, Nuclear Energy Institute (NEI) submitted Reference 4 to the NRC, requesting NRC agreement to delay submittal of some of the CEUS seismic hazard evaluation information so that an update to the EPRI (2004, 2006) ground motion attenuation model could be completed and used to develop that information. NEI proposed that descriptions of subsurface materials and properties and base case velocity profiles (Items 3a and 3b in Section 4 of Reference 3) be submitted to the NRC by September 12, 2013, with the remaining seismic hazard and screening information submitted to the NRC by March 31, 2014. In Reference 5, the NRC agreed with this recommendation.

Enclosure 1 to this letter provides an affirmation. Enclosure 2 to this letter contains the requested descriptions of subsurface materials and properties and base case velocity profiles for the CNP Site (Unit 1 and Unit 2), and as committed to in Reference 6. The information provided in Enclosure 2 to this letter is considered an interim product of seismic hazard development efforts being performed for the industry by EPRI. The complete and final seismic hazard report for CNP will be provided to the NRC in I&M's seismic hazard submittal by March 31, 2014, in accordance with Reference 5 and Reference 6.

This letter contains no new regulatory commitments. Should you have any questions concerning the content of this letter, please contact Mr. Michael K. Scarpello, Manager, Nuclear Regulatory Affairs, at (269) 466-2649.

Sincerely,



Joel P. Gebbie  
Site Vice President

DB/amp

Enclosures: 1. Affirmation

2. Donald C. Cook Nuclear Plant (CNP) Site (Unit 1 and Unit 2) Subsurface  
Materials and Properties and Base Case Velocity Profiles

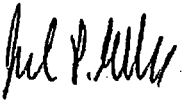
c: J. T. King, MPSC  
S. M. Krawec, AEP Ft. Wayne, w/o enclosure  
MDEQ – RMD/RPS  
NRC Resident Inspector  
C. D. Pederson, NRC Region III  
T. J. Wengert, NRC Washington, DC

Enclosure 1 to AEP-NRC-2013-73

**AFFIRMATION**

I, Joel P. Gebbie, being duly sworn, state that I am Site Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this request with the Nuclear Regulatory Commission on behalf of I&M, and that the statements made and the matters set forth herein pertaining to I&M are true and correct to the best of my knowledge, information, and belief.

Indiana Michigan Power Company



Joel P. Gebbie  
Site Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 12 DAY OF September, 2013

  
Notary Public

My Commission Expires: 04-04-2018

DANIELLE BURGOYNE  
Notary Public, State of Michigan  
County of Berrien  
My Commission Expires 04-04-2018  
Acting in the County of Berrien

## Enclosure 2 to AEP-NRC-2013-73

### Donald C. Cook Nuclear Plant (CNP) Site (Unit 1 and Unit 2) Subsurface Materials and Properties and Base Case Velocity Profiles

#### Site Description

##### Description of Subsurface Materials and Properties

The basic information used to create the site geologic profile at the CNP is shown in Table 1. This profile was developed using information documented in Reference 1. The Safe Shutdown Earthquake (SSE) Control Point was taken to be at elevation 587.4 ft, as shown in Table 1 and as documented in Reference 1. The profile was modeled up to this elevation. For dynamic properties of soft rock layers, modulus and damping curves were represented with two models. The first model used rock curves taken from Reference 2, the second model assumed linear behavior. These dynamic property models were weighted equally. For dynamic properties of fill and compacted sand layers, modulus and damping curves were also represented with two models. The first model used soil curves taken from Reference 2, the second model used soil curves taken from Reference 3 and Reference 4. These dynamic property models were weighted equally. To model the profile, rock modulus and damping curves from Reference 2 were paired with soil modulus and damping curves from Reference 2, and linear rock modulus and damping curves were paired with soil modulus and damping curves from Reference 3 and Reference 4.

##### Base Case Velocity Profile

Six base-case shear-wave velocity profiles were used to model amplification at the site, and these are shown in Figures 1A and 1B. Profiles 1, 2, and 3 assume that hard rock is at a depth of 127.3 ft, and Profiles 4, 5, and 6 assume that hard rock is at a depth of 3387.1 ft. The six profiles are weighted 0.2, 0.15, 0.15, 0.2, 0.15, and 0.15, respectively. Thicknesses, depths, and shear-wave velocities ( $V_s$ ) corresponding to Profiles 1, 2, and 3 are shown in Table 2A, and corresponding to Profiles 4, 5, and 6 are shown in Table 2B.

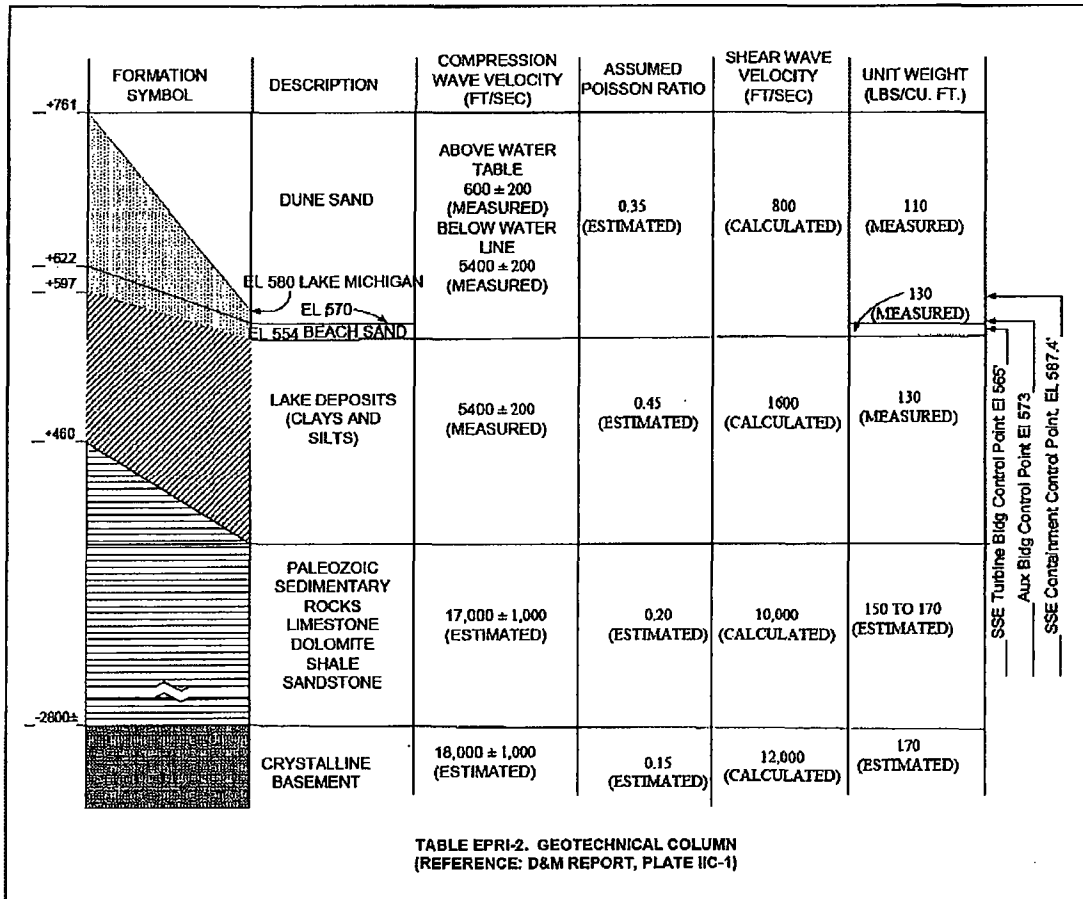
Densities (Unit Weights) will be based on data provided in Table 1.

##### References

1. American Electric Power (2012). *Site Geologic Conditions for D. C. Cook Nuclear Power Plant*, Informal report transmitted from AEP to EPRI in July, 2012, 15 pp. [Report SD-130816-001, Revision 0, EPRI Ground Motion Model Information Subsurface Materials, Properties and Base Case Velocity Profiles for D. C. Cook Nuclear Plant (CNP)]
2. EPRI (1993). *Guidelines for Determining Design Basis Ground Motions*, Elec. Power Res. Inst., Palo Alto, CA, Rept. TR-102293, Vol. 1-5
3. Silva, W.J., N. A. Abrahamson, G.R. Toro, and C. Costantino (1996). *Description and Validation of the Stochastic Ground Motion Model*, Rept. submitted to Brookhaven Natl. Lab., Assoc. Universities Inc., Upton NY 11973, Contract No. 770573

4. Walling, M.A., W.J., Silva and N.A. Abrahamson (2008). "Nonlinear Site Amplification Factors for Constraining the NGA Models," *Earthquake Spectra*, 24 (1) 243-255.

Table 1  
Summary of Geotechnical Profile Data for CNP



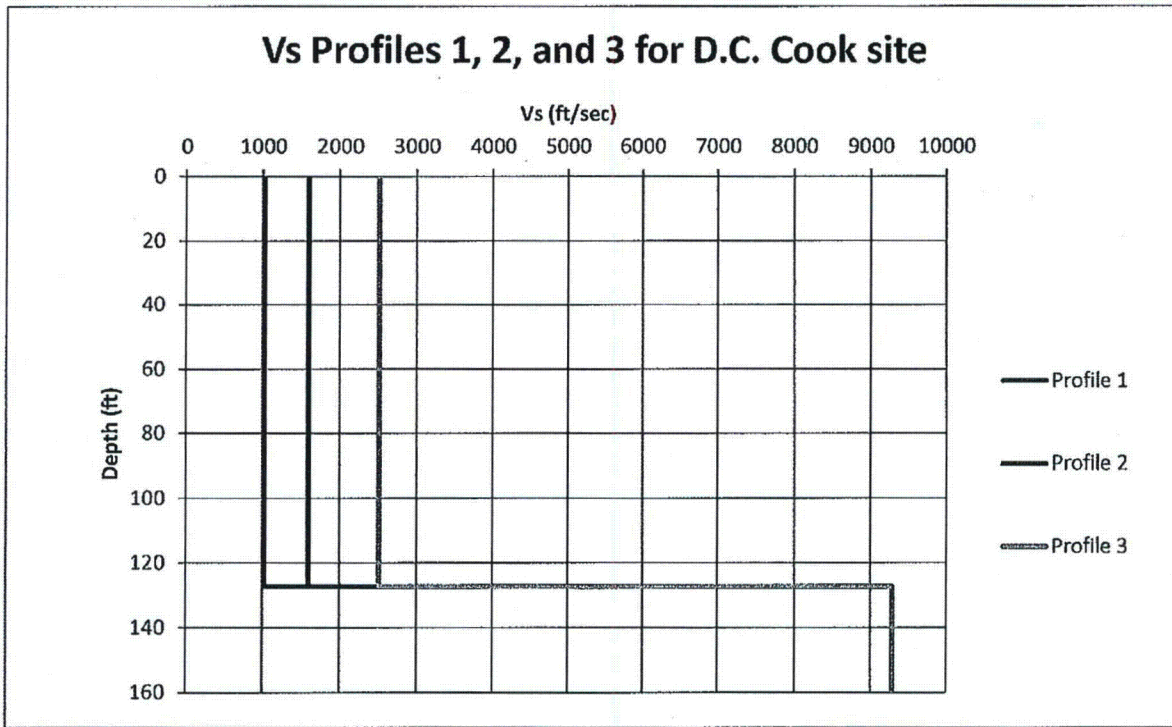


Figure 1A. Vs for Profiles 1, 2, and 3 for CNP site

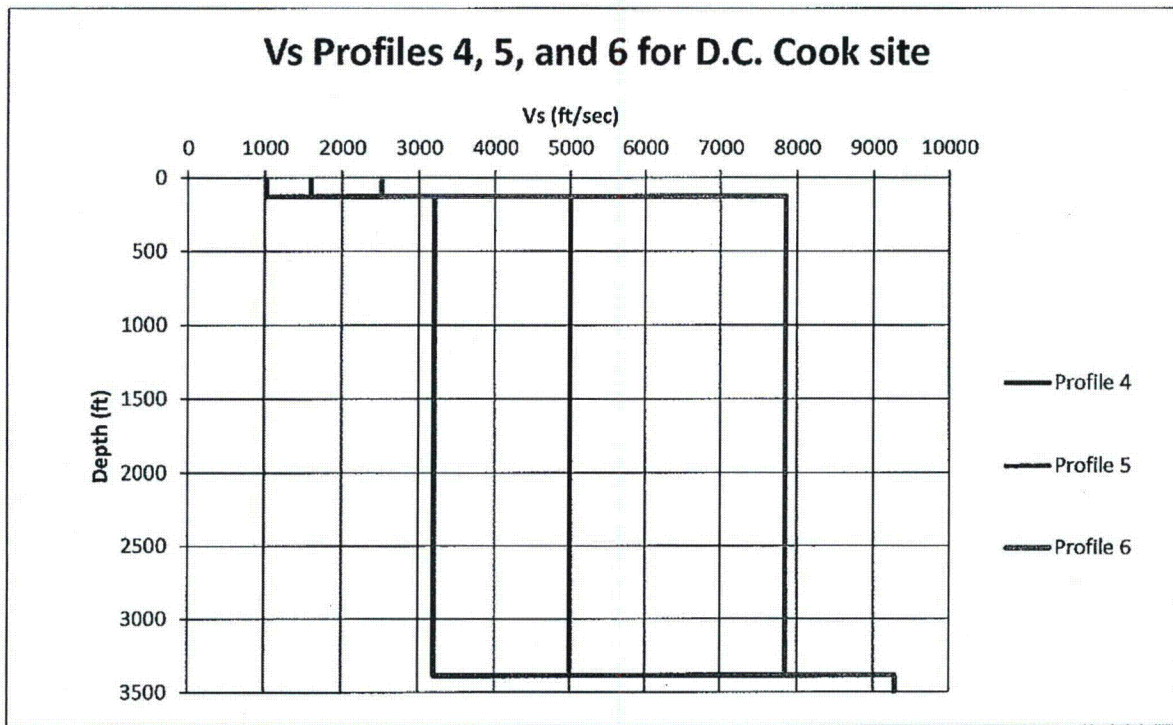


Figure 1B. Vs for Profiles 4, 5, and 6 for CNP site

Table 2A

Layer thicknesses, depths, and Vs for Profiles 1, 2, and 3 for CNP site

| Profile 1     |            |          | Profile 2     |            |          | Profile 3     |            |          |
|---------------|------------|----------|---------------|------------|----------|---------------|------------|----------|
| thickness(ft) | depth (ft) | Vs(ft/s) | thickness(ft) | depth (ft) | Vs(ft/s) | thickness(ft) | depth (ft) | Vs(ft/s) |
|               | 0          | 1600     |               | 0          | 1024     |               | 0          | 2512     |
| 6.4           | 6.4        | 1600     | 6.4           | 6.4        | 1024     | 6.4           | 6.4        | 2512     |
| 6.4           | 12.7       | 1600     | 6.4           | 12.7       | 1024     | 6.4           | 12.7       | 2512     |
| 6.4           | 19.1       | 1600     | 6.4           | 19.1       | 1024     | 6.4           | 19.1       | 2512     |
| 6.4           | 25.5       | 1600     | 6.4           | 25.5       | 1024     | 6.4           | 25.5       | 2512     |
| 6.4           | 31.8       | 1600     | 6.4           | 31.8       | 1024     | 6.4           | 31.8       | 2512     |
| 6.4           | 38.2       | 1600     | 6.4           | 38.2       | 1024     | 6.4           | 38.2       | 2512     |
| 6.4           | 44.6       | 1600     | 6.4           | 44.6       | 1024     | 6.4           | 44.6       | 2512     |
| 6.4           | 50.9       | 1600     | 6.4           | 50.9       | 1024     | 6.4           | 50.9       | 2512     |
| 6.4           | 57.3       | 1600     | 6.4           | 57.3       | 1024     | 6.4           | 57.3       | 2512     |
| 6.4           | 63.6       | 1600     | 6.4           | 63.6       | 1024     | 6.4           | 63.6       | 2512     |
| 6.4           | 70.0       | 1600     | 6.4           | 70.0       | 1024     | 6.4           | 70.0       | 2512     |
| 6.4           | 76.4       | 1600     | 6.4           | 76.4       | 1024     | 6.4           | 76.4       | 2512     |
| 6.4           | 82.7       | 1600     | 6.4           | 82.7       | 1024     | 6.4           | 82.7       | 2512     |
| 6.4           | 89.1       | 1600     | 6.4           | 89.1       | 1024     | 6.4           | 89.1       | 2512     |
| 6.4           | 95.5       | 1600     | 6.4           | 95.5       | 1024     | 6.4           | 95.5       | 2512     |
| 6.4           | 101.8      | 1600     | 6.4           | 101.8      | 1024     | 6.4           | 101.8      | 2512     |
| 6.4           | 108.2      | 1600     | 6.4           | 108.2      | 1024     | 6.4           | 108.2      | 2512     |
| 6.4           | 114.6      | 1600     | 6.4           | 114.6      | 1024     | 6.4           | 114.6      | 2512     |
| 6.4           | 120.9      | 1600     | 6.4           | 120.9      | 1024     | 6.4           | 120.9      | 2512     |
| 6.4           | 127.3      | 1600     | 6.4           | 127.3      | 1024     | 6.4           | 127.3      | 2512     |
| 9.6           | 136.9      | 9285     | 9.6           | 136.9      | 9285     | 9.6           | 136.9      | 9285     |



Table 2B

Layer thicknesses, depths, and Vs for Profiles 4, 5, and 6 for CNP site

| Profile 4     |            |          | Profile 5     |            |          | Profile 6     |            |          |
|---------------|------------|----------|---------------|------------|----------|---------------|------------|----------|
| thickness(ft) | depth (ft) | Vs(ft/s) | thickness(ft) | depth (ft) | Vs(ft/s) | thickness(ft) | depth (ft) | Vs(ft/s) |
|               | 0          | 1600     |               | 0          | 1024     |               | 0          | 2512     |
| 6.4           | 6.4        | 1600     | 6.4           | 6.4        | 1024     | 6.4           | 6.4        | 2512     |
| 6.4           | 12.7       | 1600     | 6.4           | 12.7       | 1024     | 6.4           | 12.7       | 2512     |
| 6.4           | 19.1       | 1600     | 6.4           | 19.1       | 1024     | 6.4           | 19.1       | 2512     |
| 6.4           | 25.5       | 1600     | 6.4           | 25.5       | 1024     | 6.4           | 25.5       | 2512     |
| 6.4           | 31.8       | 1600     | 6.4           | 31.8       | 1024     | 6.4           | 31.8       | 2512     |
| 6.4           | 38.2       | 1600     | 6.4           | 38.2       | 1024     | 6.4           | 38.2       | 2512     |
| 6.4           | 44.6       | 1600     | 6.4           | 44.6       | 1024     | 6.4           | 44.6       | 2512     |
| 6.4           | 50.9       | 1600     | 6.4           | 50.9       | 1024     | 6.4           | 50.9       | 2512     |
| 6.4           | 57.3       | 1600     | 6.4           | 57.3       | 1024     | 6.4           | 57.3       | 2512     |
| 6.4           | 63.6       | 1600     | 6.4           | 63.6       | 1024     | 6.4           | 63.6       | 2512     |
| 6.4           | 70.0       | 1600     | 6.4           | 70.0       | 1024     | 6.4           | 70.0       | 2512     |
| 6.4           | 76.4       | 1600     | 6.4           | 76.4       | 1024     | 6.4           | 76.4       | 2512     |
| 6.4           | 82.7       | 1600     | 6.4           | 82.7       | 1024     | 6.4           | 82.7       | 2512     |
| 6.4           | 89.1       | 1600     | 6.4           | 89.1       | 1024     | 6.4           | 89.1       | 2512     |
| 6.4           | 95.5       | 1600     | 6.4           | 95.5       | 1024     | 6.4           | 95.5       | 2512     |
| 6.4           | 101.8      | 1600     | 6.4           | 101.8      | 1024     | 6.4           | 101.8      | 2512     |
| 6.4           | 108.2      | 1600     | 6.4           | 108.2      | 1024     | 6.4           | 108.2      | 2512     |
| 6.4           | 114.6      | 1600     | 6.4           | 114.6      | 1024     | 6.4           | 114.6      | 2512     |
| 6.4           | 120.9      | 1600     | 6.4           | 120.9      | 1024     | 6.4           | 120.9      | 2512     |
| 6.4           | 127.3      | 1600     | 6.4           | 127.3      | 1024     | 6.4           | 127.3      | 2512     |
| 9.6           | 136.9      | 5000     | 9.6           | 136.9      | 3200     | 9.6           | 136.9      | 7850     |
| 10.0          | 146.9      | 5000     | 10.0          | 146.9      | 3200     | 10.0          | 146.9      | 7850     |
| 10.0          | 156.9      | 5000     | 10.0          | 156.9      | 3200     | 10.0          | 156.9      | 7850     |
| 10.0          | 166.9      | 5000     | 10.0          | 166.9      | 3200     | 10.0          | 166.9      | 7850     |
| 10.0          | 176.9      | 5000     | 10.0          | 176.9      | 3200     | 10.0          | 176.9      | 7850     |
| 10.0          | 186.9      | 5000     | 10.0          | 186.9      | 3200     | 10.0          | 186.9      | 7850     |
| 10.0          | 196.9      | 5000     | 10.0          | 196.9      | 3200     | 10.0          | 196.9      | 7850     |
| 10.0          | 206.9      | 5000     | 10.0          | 206.9      | 3200     | 10.0          | 206.9      | 7850     |
| 10.0          | 216.9      | 5000     | 10.0          | 216.9      | 3200     | 10.0          | 216.9      | 7850     |
| 20.0          | 236.9      | 5000     | 20.0          | 236.9      | 3200     | 20.0          | 236.9      | 7850     |
| 13.4          | 250.3      | 5000     | 13.4          | 250.3      | 3200     | 13.4          | 250.3      | 7850     |
| 26.6          | 276.9      | 5000     | 26.6          | 276.9      | 3200     | 26.6          | 276.9      | 7850     |
| 20.0          | 296.9      | 5000     | 20.0          | 296.9      | 3200     | 20.0          | 296.9      | 7850     |
| 20.0          | 316.9      | 5000     | 20.0          | 316.9      | 3200     | 20.0          | 316.9      | 7850     |
| 20.0          | 336.9      | 5000     | 20.0          | 336.9      | 3200     | 20.0          | 336.9      | 7850     |
| 20.0          | 356.9      | 5000     | 20.0          | 356.9      | 3200     | 20.0          | 356.9      | 7850     |

|        |        |      |        |        |      |        |        |      |
|--------|--------|------|--------|--------|------|--------|--------|------|
| 20.0   | 376.9  | 5000 | 20.0   | 376.9  | 3200 | 20.0   | 376.9  | 7850 |
| 20.0   | 396.9  | 5000 | 20.0   | 396.9  | 3200 | 20.0   | 396.9  | 7850 |
| 20.0   | 416.9  | 5000 | 20.0   | 416.9  | 3200 | 20.0   | 416.9  | 7850 |
| 20.0   | 436.9  | 5000 | 20.0   | 436.9  | 3200 | 20.0   | 436.9  | 7850 |
| 20.0   | 456.9  | 5000 | 20.0   | 456.9  | 3200 | 20.0   | 456.9  | 7850 |
| 43.1   | 500.0  | 5000 | 43.1   | 500.0  | 3200 | 43.1   | 500.0  | 7850 |
| 103.4  | 603.4  | 5000 | 103.4  | 603.4  | 3200 | 103.4  | 603.4  | 7850 |
| 146.5  | 749.9  | 5000 | 146.5  | 749.9  | 3200 | 146.5  | 749.9  | 7850 |
| 146.5  | 896.4  | 5000 | 146.5  | 896.4  | 3200 | 146.5  | 896.4  | 7850 |
| 146.5  | 1042.9 | 5000 | 146.5  | 1042.9 | 3200 | 146.5  | 1042.9 | 7850 |
| 146.5  | 1189.5 | 5000 | 146.5  | 1189.5 | 3200 | 146.5  | 1189.5 | 7850 |
| 146.5  | 1336.0 | 5000 | 146.5  | 1336.0 | 3200 | 146.5  | 1336.0 | 7850 |
| 146.5  | 1482.5 | 5000 | 146.5  | 1482.5 | 3200 | 146.5  | 1482.5 | 7850 |
| 146.5  | 1629.0 | 5000 | 146.5  | 1629.0 | 3200 | 146.5  | 1629.0 | 7850 |
| 146.5  | 1775.5 | 5000 | 146.5  | 1775.5 | 3200 | 146.5  | 1775.5 | 7850 |
| 146.5  | 1922.0 | 5000 | 146.5  | 1922.0 | 3200 | 146.5  | 1922.0 | 7850 |
| 146.5  | 2068.5 | 5000 | 146.5  | 2068.5 | 3200 | 146.5  | 2068.5 | 7850 |
| 146.5  | 2215.0 | 5000 | 146.5  | 2215.0 | 3200 | 146.5  | 2215.0 | 7850 |
| 146.5  | 2361.6 | 5000 | 146.5  | 2361.6 | 3200 | 146.5  | 2361.6 | 7850 |
| 146.5  | 2508.1 | 5000 | 146.5  | 2508.1 | 3200 | 146.5  | 2508.1 | 7850 |
| 146.5  | 2654.6 | 5000 | 146.5  | 2654.6 | 3200 | 146.5  | 2654.6 | 7850 |
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| 146.5  | 2947.6 | 5000 | 146.5  | 2947.6 | 3200 | 146.5  | 2947.6 | 7850 |
| 146.5  | 3094.1 | 5000 | 146.5  | 3094.1 | 3200 | 146.5  | 3094.1 | 7850 |
| 146.5  | 3240.6 | 5000 | 146.5  | 3240.6 | 3200 | 146.5  | 3240.6 | 7850 |
| 146.5  | 3387.1 | 5000 | 146.5  | 3387.1 | 3200 | 146.5  | 3387.1 | 7850 |
| 3280.8 | 6668.0 | 9285 | 3280.8 | 6668.0 | 9285 | 3280.8 | 6668.0 | 9285 |