

## **LAMPIRAN**

## LAMPIRAN A Listing Code

Lampiran *Listing code* metode jaringan saraf tiruan untuk menentukan tahap pelepasan beban di MATLAB.

### *Training Code*

```
clear all

excel_data = xlsread('data_example.xlsx', 'all');
P          = excel_data(:, 1:8)';
T          = excel_data(:, 9)';
% label    = excel_data(:, 7)';

% net      = fitlm(P, label);

target_vec = ind2vec(T);

net = lvqnet(50, 0.01, 'learnlv1');
net.trainParam.epochs = 100;
net.trainParam.goal = 1e-3;

net = train(net, P, target_vec);

% save('training_data', 'net')
```

### *Testing Code*

```
clear all
load('training_data.mat')

testing_dataset = xlsread('data_power.xlsx', 'Skenario45');

test_input  = testing_dataset(:, 1:8)';
test_target = testing_dataset(:, 9)';

total_data = numel(test_target);
test_result = zeros(total_data, 1);

for i = 1:total_data
    uji = net(test_input(1:8, i));
    uji_ind = vec2ind(uji);

    test_result(i) = uji_ind;
end

result = [test_result'; test_target];

jumlah_benar = 0;

for i = 1 : total_data
    if (result(1, i) == result(2, i))
        jumlah_benar = jumlah_benar + 1;
    end
end
```

```

end

accuracy = jumlah_benar / total_data;
accuracy_in_percent = accuracy * 100;

% uji = predict(net, null);

%{
for i = 1:numel(testing_data(:, 9))

end
%}

% total_beban = xlsread('Params.xlsx', 'params', 'C2:C11');

% testing_input = testing_data(:, 1);
% testing_target = testing_data(:, 2);
% testing_pattern = testing_data(:, 5:8);

% output_result = zeros(numel(testing_target), 1);

%{
for i = 1:numel(testing_input)
    uji = predict(net, testing_input(i));
    output_result(i) = ceil(uji);
end
%}

% testing_result = [output_result'; testing_target'];

% subplot(211)
% plot(P(1,:), T, 'bo', P(1,:), y, 'r*');
% xlabel('input');
% ylabel('target atau output');
% grid;
% subplot(212)
% plot(P(1,:), T, 'bo', P(1,:), y, 'r*');
% xlabel('input kedua');
% ylabel('target atau output');
% grid;

load('training_data.mat')

gensim(net);

```

## LAMPIRAN B DATA GENERATOR

### 1. Data generator Unit 1, 2, dan 3

| <u>TECHNICAL DATA OF GENERATOR</u> |                                 |
|------------------------------------|---------------------------------|
| 1. RATINGS AND SPECIFICATIONS      |                                 |
| TYPE                               | OF-35-2-11                      |
| RATED OUTPUT                       | 35 MW/43,75 MVA                 |
| RATED VOLTAGE                      | 11 KV                           |
| RATED CURRENT                      | 2296 A                          |
| RATED POWER FACTOR                 | 0,80                            |
| FREQUENCY                          | 50 HZ                           |
| SPEED                              | 3000 r/min                      |
| NO. OF PHASES                      | 3                               |
| STATOR WINDING CONNECTION          | STAR                            |
| NO. OF TERMINALS                   | 6                               |
| COOLING SYSTEM                     | CLOSED-CIRCUIT AIR COOLED       |
| AMBIENT TEMPERATURE                | 5--40 DEG.C                     |
| SHORT CIRCUIT RATIO (GUAR.)        | >=0.45                          |
| SUBTRANSIENT REACTANCE (GUAR.)     | >=0.10                          |
| TRANSIENT REACTANCE (GUAR.)        | <=0.30                          |
| EFFICIENCY (GUAR.)                 | >=97.5 %                        |
| BEARING PEDESTAL VIBRATION         | <=0.30 mm                       |
| EXCITATION SYSTEM                  | STATIC THYRISTOR<br>EXCITATION  |
| CEILING VOLTAGE                    | >=1.8 p.u                       |
| VOLTAGE RESPONSE RATIO             | HIGH INITIAL RESPONSE<br>SYSTEM |
| DURATION FOR FORCING EXCITATION    | 10 S                            |
| NOISE (GUAR.)                      | <=90 dB (A)                     |

## 2. Data Generator Unit 6

| OPERATING AND MAINTENANCE MANUAL                                    |  | Section 1              |
|---|--|------------------------|
| THOMAS<br>BANKQUE   |  | 01 . 05                |
| DESCRIPTIVE MANUAL  |  | Page : 01              |
|   |  | Revision :             |
|   |  | Date :                 |
| Par.  |  |                        |
| <b>GENERAL ELECTRICAL CHARACTERISTICS</b>                           |  |                        |
| - Cold air temperature.....   |  | 40°C                   |
| - Apparent power .....  |  | 87 500 KVA             |
| - Power under continuous operating conditions.....                  |  | 70 000 KW              |
| - Voltage +/- 5 % .....   |  | 11 000 V               |
| - Current .....   |  | 4 593 A                |
| - Cos Ø .....   |  | 0.8                    |
| - Frequency.....  |  | 50 Hz                  |
| - Speed .....   |  | 3 000 rpm              |
| - Airgap.....   |  | 60 mm                  |
| - Air flow rate .....   |  | 34.2 m <sup>3</sup> /s |
| - Losses to be dissipated.....                                      |  | 1 758 KW               |
| - Number of high voltage outputs .....                              |  | 6                      |
| - Number of phases.....   |  | 3                      |
| - Three-phase short circuit torque transmitted to foundations ..... |  | 2 600 000 mN           |

LAMPIRAN C Data Transformator

**SHIH LIN ELECTRIC & ENGINEERING CO.**  
TRANSFORMER SPECIFICATION

For IEEE Purpose  
 For IEC Purpose

|  |  |   |
|--|--|---|
| 1. Purchase  | IEEE (DP 4.2.4)  | Remarks   |
| 2. Industry Place  | —  |   |
| 3. Quantity  | One Set  |   |
| 4. Data  | Continuous Rating<br>33.30 kVA<br>60 Hz<br>21000-21000-21000-10000-10000 V<br>11000 V<br>L.V. Voltage<br>H.V. : 110 KV L.V. : 110 V<br>H.V. : 55 KV L.V. : 38 V<br>Applied Voltage<br>Vector Group<br>Dyn-11<br>Spec. Instruction<br>E10-40-24 |   |
| 5. Standard  | IEEE C57.12  |   |
| 6. Site Conditions   | Max. Ambient Temperature : 40 °C<br>Altitude : 2000 ft Below<br>Service Location : Out Door  |   |
| 7. Type  | Oil Immersed   |   |
| 8. Cooling Type  | ONAN   |   |
| 9. Oil preservation  | Seawater with Conservator  |   |
| 10. Internal connection Method   | H.V. Side : Vertical<br>L.V. Side : Vertical   |   |
| 11. Characteristics (Rated Voltage & Frequency at 0% Load, 75°C P.F.1.0) | No-load : — A<br>Total Loss : 45000 W<br>Efficiency : 99.50 %<br>% IR : 11.0 %   | Excitation Current : 1.2 %<br>Voltage Regulation (%) : 1.2 %<br>Audible Level : 60 db |
| 12. Temperature Rise   | Winding : 65 °C<br>Oil : 55 °C   |   |
| 13. Approximate Weight & Dimension                                       | Length (L) : — mm<br>Width (W) : — mm<br>Height (H) : — mm   | Oil : 2000 Liter<br>Total Weight : 10000 Kg   |
| 14. Outline Drawing  | E 31032  |   |
| 15. Painting Color   | No. 1-94 (Grey Blue) (R.E.)  |   |
| 16. Special condition  | —  |   |

Prepared: *C. Y. A.* Checked/Approved: *[Signature]* Spec. No.: SHK0004N51/25  
*[Signature]*

**TRANSFORMATOR OIL IMMERSED PT DSS**

| NO | NAME                                   | RATED POWER      | TYPE OF COOLING | RATED VOLTAGE                      | RATED CURRENT                      | % Z    | PHASA | F     | VECTOR GROUP |
|----|--|------------------|-----------------|------------------------------------|------------------------------------|--------|-------|-------|--------------|
| 1  | Main Transformator with #1, #2, dan #3 | 50.5/44 MVA      | ONAN/ONAF       | HV 20000 / LV 11000 V              | HV 1270.2 / LV 2399.5 A            | 10.50% | 3 φ   | 50 Hz | YNd11        |
| 2  | Main Transformator Unit #5             | 87.5/109 MVA     | ON/FA           | HV 11000 / HV 20000 V              | HV 4593.5721 / HV 2396.0147 A      | 10.84% | 3 φ   | 50 Hz | YNd11        |
| 3  | HV Stand By Transformator #2           | 7000 / 10000 KVA | ONAN/ONAF       | HV 20 ± 3.8 / LV 2.5% / LV 3.45 KV | HV : 524.9 / LV : 10771.3 A        | 7.23%  | 3 φ   | 50 Hz | YNd11        |
| 4  | HV Stand By Transformator #1           | 7000/10000 KVA   | ONAN/ONAF       | HV 20 ± 3.8 / LV 2.5% / LV 3.45 KV | HV : 288.7 / LV : 1872.5 A         | 7.62%  | 3 φ   | 50 Hz | YNd11        |
| 5  | HV Auxiliary Unit #1                   | 10000 KVA        | ONAN/ONAF       | HV 11000 / LV 3450 V               | HV 524.9 / LV 1671.5 A             | 7.43%  | 3 φ   | 50 Hz | Dd0          |
| 6  | HV Auxiliary Unit #2                   | 10000 KVA        | ONAN/ONAF       | HV 11000 / LV 3450 V               | HV 524.9 / LV 1671.5 A             | 7.43%  | 3 φ   | 50 Hz | Dd0          |
| 7  | HV Auxiliary Unit #3                   | 10000 KVA        | ONAN/ONAF       | HV 11000 / LV 3450 V               | HV 524.9 / LV 1671.5 A             | 7.43%  | 3 φ   | 50 Hz | Dd0          |
| 8  | HV Auxiliary Unit #6                   | 12500/15600 KVA  | ON/FA           | HV 11000 / LV 3450 V               | HV 626 / LV 818.78 A               | 6.59%  | 3 φ   | 50 Hz | Dd0          |
| 9  | TRANSFORMATOR DIESEL 1                 | 5000 KVA         | ONAN            | HV 11000 / LV 20000 KV             | HV 282.4 / HV 1443 A               | 6.70%  | 3 φ   | 50 Hz | Dyn11        |
| 10 | TRANSFORMATOR DIESEL 2                 | 5000 KVA         | ONAN            | HV 11000 / LV 20000 KV             | HV 282.4 / HV 1443 A               | 6.70%  | 3 φ   | 50 Hz | Dyn11        |
| 11 | TRANSFORMATOR DIESEL 3                 | 5000 KVA         | ONAN            | HV 11000 / LV 20000 KV             | HV 144.3 A / LV 282.4 A            |        | 3 φ   | 50 Hz | YNd11        |
| 12 | TRANSFORMATOR DIESEL 4                 | 5000 KVA         | ONAN            | HV 11000 / LV 20000 KV             | HV 144.3 A / LV 282.4 A            |        | 3 φ   | 50 Hz | YNd11        |
| 13 | TRANSFORMATOR DIESEL 5                 | 4000/5000 KVA    | ONAN/ONAF       | HV 11000 / LV 20000 KV             | HV 115.47/144.34 / LV 209/44282.43 | 6.03%  | 3 φ   | 50 Hz | YNd11        |

|    | STATIONARY TRANSFORMATOR W/T  | 2500 KVA                | ONAN       | HV 20000/ LV 400 KV               | PRIMER 72,17/SECONDARY 2508 A                     | 6,50%  | 3 φ | 50 Hz | Dyn 5    |
|----|-------------------------------|-------------------------|------------|-----------------------------------|---|--------|-----|-------|----------|
| 14 | TRANSFORMATOR MCC 1 W/T       | 4000/5000 KVA           | OA/FA      | HV 20000/ LV 11000 KV             | HV OA 115A<br>FA: 134A / LV OA: 210A<br>FA: 262 A | 6,0 %  | 3 φ | 50Hz  | Dyn11    |
| 15 | TRANSFORMATOR MCC 2 W/T       | 1500 KVA                | OA         | HV 3200 / LV 360/220 V            | HV 262 / LV 2279 A                                | 6,1 %  | 3 φ | 50Hz  | Dyn11    |
| 16 | NO 15 W/T                     | 1250/1400-1428/1610 KVA | OA/FFA     | HV 3300/ LV 380                   |   | 6,12 % | 3 φ | 50 Hz | Dyn      |
| 17 | TRANSFORMATOR #1 #2 #3 #6 CHS | 800 KVA                 | ONAN       | HV 3,45+- 5% / LV 0,4 KV          | HV 133,9/ LV 1154,7 A                             | 8%     | 3 φ | 50 Hz | D, ynd11 |
| 18 |                               | 10000 KVA               | ONAN/ ONAP | HV 20000/ LV 3450 V               | HV 288,7 / LV 1673,5 A                            | 7,23%  | 3 φ | 50 Hz | YN, d11  |
| 19 | TRANSFORMATOR PLN 150 KV      | 10000/12500 KVA         | ONAN/ ONAF | HV 20000 (8+-) x1,25% / LV 3450 V | HV 0,288 / LV 2,09 A                              | 7,23%  | 3 φ | 50 Hz | YNd11    |

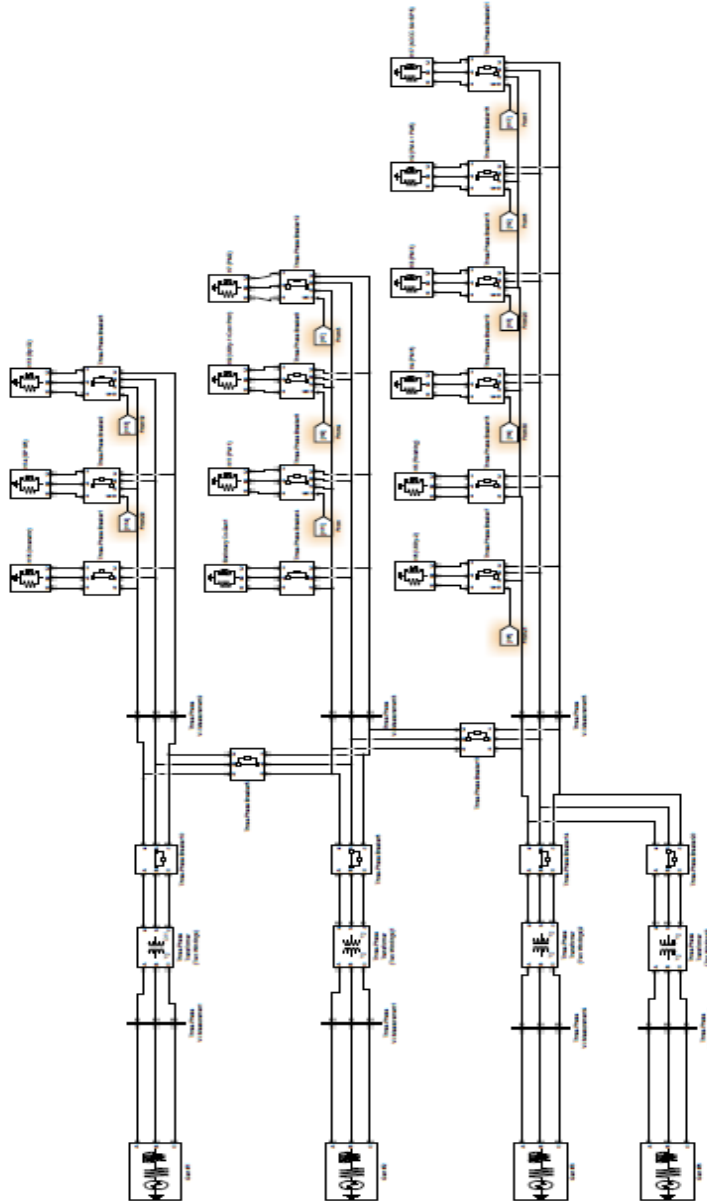
Mengesah  
Kepala Divisi Elektrikal & Injeksi  
04.18.2018  
Lili Susanti Dibia Ningsih  
NIP : 983312

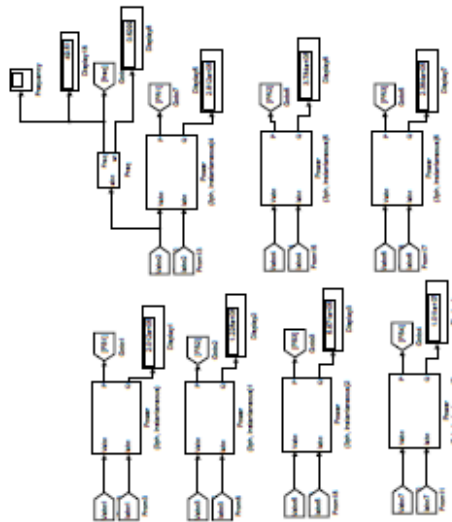
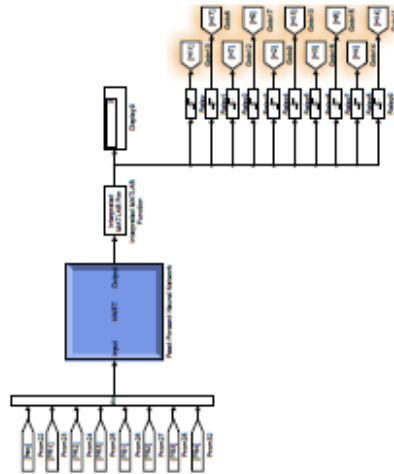


**LAMPIRAN D      *Circuit Breaker***

|                                       | A      | 630                         | 1250 | 1600 | 2000 | 2500 |
|---------------------------------------|--------|-----------------------------|------|------|------|------|
| Rated current                         | kV     | 7.2                         | 12   | 17.5 | 24   | 36   |
| Rated short-circuit breaking capacity | kA     | 12.5                        | 12.5 | 12.5 | 12.5 | 25   |
|                                       | kA     | 16                          | 16   | 16   | 16   | 16   |
|                                       | kA     | 25                          | 25   | 25   | 25   | 25   |
|                                       | kA     | 31.5                        | 31.5 | 31.5 | 31.5 | 31.5 |
|                                       | kA     | 40                          | 40   | -    | -    | -    |
| Rated short-circuit making capacity   | kA     | 45                          | 63   | 80   | 100  | -    |
| Rated frequency                       | Hz     | 50-60                       |      |      |      |      |
| Rated operating sequence              |        | O - 0.3 s - CO - 3 min - CO |      |      |      |      |
| Total opening time                    | ms     | 60                          |      |      |      |      |
| Closing time                          | ms     | 60                          |      |      |      |      |
| Rating of Charging motor              | VA (W) | 300                         |      |      |      |      |
| Closing coil                          | VA (W) | 250                         |      |      |      |      |
| Trip coil                             | VA (W) | 250                         |      |      |      |      |

LAMPIRAN E *Single Line* Sistem Distribusi Dengan Metode Jaringan Saraf Tiruan Menggunakan Simulink Matlab





**LAMPIRAN F                      Data Metode Jaringan Saraf Tiruan**

| <b>Frequency</b> | <b>Ps1</b> | <b>Ps2</b> | <b>Ps3</b> | <b>Ps4</b> | <b>Pr1</b> | <b>Pr2</b> | <b>Pr4</b> | <b>Tahap Pelepasan Beban</b> |
|------------------|------------|------------|------------|------------|------------|------------|------------|------------------------------|
| 50               | 62160463   | 34954132   | 55019591   | 37280359   | 10213249   | 34930575   | 57829813   | 1                            |
| 50               | 61572671   | 34623444   | 54498515   | 36990273   | 10251190   | 34443533   | 56645108   | 1                            |
| 50               | 60737761   | 34153715   | 53757985   | 36640677   | 10464108   | 33872740   | 55225536   | 1                            |
| 50               | 60175336   | 33837444   | 53259526   | 36290343   | 10649148   | 33622479   | 54715706   | 1                            |
| 50               | 59923899   | 33696359   | 53037875   | 35911340   | 10623643   | 33704998   | 55245185   | 1                            |
| 50               | 59864502   | 33663445   | 52987389   | 35531322   | 10355736   | 33959480   | 56360563   | 1                            |
| 50               | 59882651   | 33674114   | 53005811   | 35231749   | 9951013    | 34207659   | 57460011   | 1                            |
| 50               | 59913941   | 33691978   | 53035214   | 35089859   | 9571533    | 34333394   | 58092519   | 1                            |
| 50               | 59935980   | 33704376   | 53055250   | 35130112   | 9351107    | 34305074   | 58093730   | 1                            |
| 50               | 27625294   | 23152202   | 87398098   | 33345719   | 11532952   | 28272942   | 27636941   | 1                            |
| 50               | 16774742   | 23195194   | 77982880   | 25434081   | 7707245    | 20754832   | -7337891   | 1                            |
| 49.9996          | 2516896    | 9650792    | 27337482   | 3465911    | 11316172   | 3486423    | -1000364   | 1                            |
| 49.9973          | 52.05954   | 4152811    | 2594065    | 134548.9   | 6197569    | 606694.4   | 3050771    | 1                            |
| 49.99245         | 46.6643    | 1421690    | 914647.2   | 276423.9   | 1946644    | 588215.7   | 2275439    | 1                            |
| 49.98376         | 62.40325   | 35823.76   | 44066.04   | 242944.5   | 24605.37   | 557773.7   | 1899233    | 1                            |
| 49.97198         | 109.3927   | 0.020386   | 5135.319   | 217977.9   | 32868.46   | 551611.3   | 2115623    | 1                            |
| 49.95769         | 126.8885   | 0.014002   | 18.5353    | 204221.4   | 35832.64   | 554235.2   | 2280965    | 1                            |
| 49.94201         | 94.59527   | 0.023958   | 426.3802   | 205036     | 26611.63   | 560661     | 2248774    | 1                            |
| 49.92793         | 57.5862    | 0.021403   | 882.5089   | 233783.4   | 22874.98   | 601532.3   | 2820237    | 1                            |
| 49.91905         | 65.93236   | 0.009088   | 712.5629   | 265404.6   | 24098.4    | 628093.4   | 3088317    | 1                            |
| 49.91506         | 109.8628   | 0.004759   | 201.3919   | 299383.3   | 31163.93   | 657985.9   | 3389330    | 1                            |
| 49.91693         | 127.0782   | 0.014121   | 19.97907   | 310467.7   | 39886.74   | 649798.8   | 3108452    | 1                            |
| 49.92404         | 94.56105   | 0.02399    | 428.3571   | 302926     | 47844.27   | 627160.9   | 2735746    | 1                            |
| 49.93586         | 57.51932   | 0.021348   | 879.7005   | 278050.2   | 52112.18   | 594495     | 2266292    | 1                            |
| 49.9516          | 66.0054    | 0.0091     | 714.8412   | 239654.6   | 49886.15   | 552189.9   | 1775948    | 1                            |
| 49.97126         | 109.8896   | 0.004761   | 200.1916   | 212837.7   | 43903.45   | 539875.8   | 1732406    | 1                            |
| 49.99149         | 127.1581   | 0.014105   | 19.64554   | 196784.6   | 34473.9    | 536730.8   | 1822124    | 1                            |
| 50.01148         | 94.64087   | 0.024038   | 429.9323   | 205319.8   | 26656.84   | 561021.6   | 2254698    | 1                            |
| 50.0263          | 57.49988   | 0.021331   | 877.6908   | 233530.3   | 22895.55   | 600691.6   | 2791726    | 1                            |
| 50.0356          | 66.02392   | 0.009127   | 716.6678   | 265806     | 24209.9    | 629023.7   | 3117582    | 1                            |
| 50.03851         | 109.7995   | 0.004764   | 199.3374   | 298814.9   | 31141.91   | 656803.6   | 3347792    | 1                            |
| 50.03522         | 127.0904   | 0.014078   | 19.37793   | 310419.6   | 39892.37   | 650021.4   | 3120763    | 1                            |
| 50.02701         | 94.60152   | 0.024051   | 431.0508   | 302810.7   | 47823.32   | 627193.8   | 2733034    | 1                            |
| 50.01294         | 57.44331   | 0.021292   | 876.0566   | 277650.5   | 51993.79   | 593810.3   | 2252703    | 1                            |
| 49.99559         | 66.08609   | 0.009131   | 717.957    | 240114.8   | 49904.63   | 553272     | 1806601    | 1                            |
| 49.97637         | 109.8336   | 0.004764   | 198.6373   | 212659     | 43813.34   | 539311.6   | 1718371    | 1                            |
| 49.95547         | 127.1686   | 0.014072   | 19.19224   | 197182.9   | 34520.35   | 537330.3   | 1840210    | 1                            |
| 49.93939         | 94.67636   | 0.024085   | 431.9811   | 205584.2   | 26701.81   | 561332.2   | 2259072    | 1                            |

|          |          |          |          |          |          |          |         |   |
|----------|----------|----------|----------|----------|----------|----------|---------|---|
| 49.92809 | 57.43279 | 0.021287 | 874.9224 | 233353.3 | 22925.01 | 600034.9 | 2775017 | 1 |
| 49.9235  | 66.0952  | 0.009151 | 719.0403 | 266107   | 24308.23 | 629714.6 | 3130704 | 1 |
| 49.92494 | 109.7503 | 0.004766 | 198.1555 | 298334.8 | 31130.77 | 655832.1 | 3321501 | 1 |
| 49.93171 | 127.0999 | 0.014053 | 19.0345  | 310332.1 | 39894.33 | 650144.9 | 3124668 | 1 |
| 49.94334 | 1455071  | 1310395  | 1510507  | 309728.4 | 507866.5 | 8119983  | 3166931 | 1 |
| 49.9563  | 4550376  | 3799139  | 4432518  | 283233.7 | 946993.5 | 18225405 | 2673322 | 1 |
| 49.966   | 9388574  | 7257466  | 8774039  | 241427.6 | 999131.6 | 29990051 | 1845408 | 1 |
| 49.97153 | 13131695 | 8902163  | 11716001 | 213174.1 | 541943.9 | 36245756 | 1746372 | 1 |
| 49.9722  | 12201269 | 7482633  | 10834396 | 205204.5 | 615805.1 | 30714665 | 2301937 | 1 |
| 49.96798 | 12375290 | 7047022  | 10985297 | 205933.9 | 1629761  | 26558734 | 2258387 | 1 |
| 49.9589  | 8877923  | 4998975  | 7875384  | 239615.8 | 3546399  | 15779750 | 3195210 | 1 |
| 49.94507 | 8931810  | 5029318  | 7918202  | 266929   | 5560590  | 13462131 | 3139077 | 1 |
| 49.92882 | 8458976  | 4763075  | 7495509  | 299133.8 | 6704974  | 12474280 | 3350686 | 1 |
| 49.90912 | 8763910  | 4934777  | 7766843  | 308647   | 6377549  | 15048602 | 3049107 | 1 |
| 49.8869  | 9338922  | 5258554  | 8280793  | 304915.2 | 4897150  | 19134412 | 2803985 | 1 |
| 49.86379 | 9840278  | 5540858  | 8730362  | 275543.3 | 3048728  | 22795540 | 2195293 | 1 |
| 49.83932 | 10124337 | 5700806  | 8986059  | 241656.2 | 1652328  | 24805435 | 1851264 | 1 |
| 49.81475 | 10196473 | 5741424  | 9051383  | 213244.3 | 1212351  | 24834789 | 1741307 | 1 |
| 49.79326 | 10134163 | 5706338  | 8994934  | 196877.7 | 1770895  | 23332131 | 1815693 | 1 |
| 49.7772  | 10023784 | 5644186  | 8894172  | 207881   | 2974689  | 21176904 | 2314974 | 1 |
| 49.76783 | 9926202  | 5589240  | 8804404  | 232215.5 | 4280903  | 19273355 | 2730239 | 1 |
| 49.7653  | 9868615  | 5556814  | 8750974  | 266986.9 | 5198884  | 18249424 | 3137004 | 1 |
| 49.76923 | 9851907  | 5547406  | 8735362  | 298566.8 | 5462717  | 18284973 | 3315892 | 1 |
| 49.77968 | 9863245  | 5553790  | 8746193  | 308929.3 | 5090971  | 19155899 | 3079676 | 1 |
| 49.79394 | 9886798  | 5567052  | 8768874  | 304292.8 | 4328965  | 20389224 | 2767451 | 1 |
| 49.81232 | 9910002  | 5580118  | 8791443  | 275690.5 | 3518656  | 21473400 | 2217585 | 1 |
| 49.83112 | 9925754  | 5588987  | 8806855  | 241752.3 | 2959121  | 22056066 | 1856603 | 1 |
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| 50.0888  | 9266.498 | 0.107885 | 63938867 | 63938867 | 35564.15 | 62940091 | 2066185  | 3 |
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| 50.1838  | 10016.74 | 0.138757 | 66777613 | 66777613 | 29901.13 | 66483671 | 2321219  | 3 |
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| 50.00205 | 142.038  | 2596377  | 0.547617 | 298729.7 | 2635843  | 610703.7 | 2386966  | 5 |
| 50.02325 | 140.7725 | 3002785  | 0.622134 | 253168.7 | 3092969  | 581291.6 | 1974663  | 5 |
| 50.04252 | 51.72839 | 3930358  | 0.828461 | 204123   | 3974046  | 547245.9 | 1657402  | 5 |

|          |          |          |          |          |          |          |         |   |
|----------|----------|----------|----------|----------|----------|----------|---------|---|
| 50.05784 | 0.119081 | 4091357  | 0.911427 | 179870.1 | 4071398  | 544901.7 | 1827142 | 5 |
| 50.06889 | 56.37804 | 3257782  | 0.728817 | 179204.7 | 3258133  | 550129.5 | 2098885 | 5 |
| 50.07594 | 141.9372 | 2578648  | 0.5482   | 209413.4 | 2661005  | 577912.3 | 2604160 | 5 |
| 50.08044 | 140.602  | 2992263  | 0.620309 | 258141.4 | 3100855  | 614860.3 | 3083989 | 5 |
| 50.08098 | 51.73545 | 3928834  | 0.829519 | 301330   | 3959298  | 634809.3 | 3237325 | 5 |
| 50.0774  | 0.120379 | 4096840  | 0.909777 | 332009.9 | 4037136  | 652047.9 | 3253124 | 5 |
| 50.06949 | 56.35608 | 3266690  | 0.728871 | 328178.2 | 3216035  | 636668.4 | 2845926 | 5 |
| 50.05697 | 142.0328 | 2587017  | 0.548724 | 298607.1 | 2626629  | 610797.9 | 2387057 | 5 |
| 50.04247 | 140.5644 | 2996803  | 0.619533 | 252892.9 | 3087244  | 580667.4 | 1964642 | 5 |
| 50.02812 | 51.78942 | 3927871  | 0.831204 | 204704.8 | 3971694  | 548345.1 | 1688645 | 5 |
| 50.01727 | 0.120791 | 4090811  | 0.909373 | 179847.5 | 4070849  | 544322.9 | 1812710 | 5 |
| 50.01152 | 56.30223 | 3257938  | 0.729403 | 179653.7 | 3258214  | 550668.4 | 2113714 | 5 |
| 50.01137 | 142.0661 | 2578900  | 0.549093 | 209681.4 | 2661176  | 578162.9 | 2605517 | 5 |
| 50.01613 | 140.4824 | 2992423  | 0.618393 | 257844.4 | 3100976  | 614139.9 | 3063951 | 5 |
| 50.02677 | 51.80788 | 3928895  | 0.831639 | 301506.9 | 3959382  | 635486.7 | 3249668 | 5 |
| 50.04067 | 0.121748 | 4096843  | 0.908236 | 331376.5 | 4037213  | 651088.7 | 3227380 | 5 |
| 50.05869 | 1390624  | 2848805  | 3757301  | 335328.3 | 2159585  | 9703389  | 3301003 | 5 |
| 50.07766 | 3197268  | 6243385  | 8463917  | 298457.3 | 2155609  | 21021184 | 2388787 | 5 |
| 50.09497 | 5138991  | 9616238  | 13875956 | 258897.7 | 517516.4 | 33267485 | 2389348 | 5 |
| 50.10918 | 6784793  | 12338030 | 19531740 | 213314.9 | 54238.41 | 41255168 | 2165617 | 5 |
| 50.11738 | 7765481  | 14256977 | 23957483 | 179086.9 | 73227.55 | 45099002 | 1792435 | 5 |
| 50.11952 | 5885753  | 11398219 | 19864624 | 187786.3 | 69772.03 | 35559107 | 2572059 | 5 |
| 50.11567 | 5240149  | 10483163 | 18646008 | 210202.9 | 52278.44 | 31942958 | 2600259 | 5 |
| 50.10566 | 3302970  | 6611607  | 11764011 | 264144.9 | 31026.41 | 20927216 | 3479465 | 5 |
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| 50.07514 | 3448422  | 6902761  | 12282061 | 332026.8 | 1587.381 | 23267078 | 3256027 | 5 |
| 50.05274 | 3897993  | 7802673  | 13883271 | 326259.4 | 5873.794 | 26574784 | 2782275 | 5 |
| 50.03029 | 4418748  | 8845076  | 15738015 | 300931.3 | 22718.86 | 29875271 | 2461837 | 5 |
| 50.00727 | 4794776  | 9597779  | 17077296 | 251208.6 | 44748.57 | 31983340 | 1913906 | 5 |
| 49.98124 | 4951012  | 9910518  | 17633752 | 206656.1 | 63917.09 | 32637584 | 1733186 | 5 |
| 49.96073 | 4920370  | 9849182  | 17524617 | 180679.9 | 73549.4  | 32192548 | 1836053 | 5 |
| 49.94312 | 4787655  | 9583523  | 17051932 | 179545.1 | 68285.27 | 31248239 | 2082552 | 5 |
| 49.93349 | 4638818  | 9285594  | 16521827 | 212135   | 52530.02 | 30335923 | 2656039 | 5 |
| 49.93007 | 4530824  | 9069422  | 16137194 | 256766.7 | 29844.95 | 29753551 | 3011608 | 5 |
| 49.93321 | 4483934  | 8975561  | 15970187 | 302208.6 | 10825.15 | 29568950 | 3255224 | 5 |
| 49.94241 | 4489666  | 8987034  | 15990600 | 331341   | 1730.804 | 29677194 | 3223021 | 5 |
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| 49.97491 | 4567270  | 9142375  | 16266999 | 300319.9 | 22758.45 | 30152771 | 2429449 | 5 |
| 49.99367 | 4599134  | 9206159  | 16380488 | 251477.6 | 44720.21 | 30298569 | 1938444 | 5 |
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| 50.03022 | 4589252  | 9186378  | 16345293 | 212011.1 | 52387.25 | 30207489 | 2632945 | 5 |

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|----------|----------|----------|----------|----------|----------|----------|----------|---|
| 50.02458 | 4577471  | 9162795  | 16303332 | 256864.6 | 29925.15 | 30173339 | 3017665  | 5 |
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| 50.00564 | 4577073  | 9161998  | 16301914 | 302039   | 11023.52 | 30207469 | 3243429  | 5 |
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| 50.05193 | 5865063  | 11743784 | 20902083 | -505081  | 45558.12 | 20440846 | 48863439 | 5 |
| 50.05027 | 13662243 | 27346487 | 48655015 | 4841426  | 63469.08 | 22212151 | 1.11E+08 | 5 |
| 50.04687 | 23411136 | 46844432 | 83318271 | 18264334 | 73073.41 | 16111382 | 1.7E+08  | 5 |
| 50.04441 | 28288530 | 56589217 | 1.01E+08 | 32026504 | 67808.57 | 9666424  | 1.73E+08 | 5 |
| 50.04463 | 29459580 | 58914085 | 1.05E+08 | 45641233 | 52381.2  | 10399961 | 1.36E+08 | 5 |
| 50.04848 | 29005375 | 57988284 | 1.03E+08 | 56829916 | 29911.8  | 21032772 | 85421621 | 5 |
| 50.05588 | 28258212 | 56483315 | 1E+08    | 62613794 | 11168.74 | 38188606 | 46747943 | 5 |
| 50.06724 | 27731395 | 55429177 | 98480856 | 61541475 | 2192.889 | 55300374 | 33024100 | 5 |
| 50.08211 | 27475861 | 54926656 | 97602644 | 54709821 | 6429.092 | 66316612 | 44671763 | 5 |
| 50.09957 | 27389833 | 54767796 | 97343655 | 45227602 | 22957.14 | 68271568 | 72528994 | 5 |
| 50.12016 | 27375754 | 54752028 | 97337647 | 36770228 | 44627.02 | 61975803 | 1.03E+08 | 5 |
| 50.13938 | 27382167 | 54772180 | 97386510 | 32107612 | 63493.93 | 51098925 | 1.26E+08 | 5 |
| 50.15897 | 27392888 | 54794171 | 97426604 | 32206400 | 72911.55 | 40311868 | 1.33E+08 | 5 |
| 50.17294 | 27405897 | 54814975 | 97454339 | 36176761 | 67813.61 | 33430078 | 1.26E+08 | 5 |
| 50.1807  | 27420079 | 54835244 | 97476000 | 41916046 | 52241.46 | 32196070 | 1.09E+08 | 5 |
| 50.18214 | 27431964 | 54851438 | 97491321 | 47067818 | 29997.52 | 36029434 | 90525741 | 5 |