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12 IN THE UNITED STATES DISTRICT COURT
13 FOR THE DISTRICT OF ARIZONA
14

15 UNITED STATES OF AMERICA,

16 Plaintiff,

17 v.

18 DENALI WATER SOLUTIONS, LLC,

19 Defendant.

No. 2:24-cv-03084-DWL

CONSENT DECREE

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1 WHEREAS, Plaintiff United States of America, on behalf of the United States
2 Environmental Protection Agency (“EPA”), has filed a complaint in this action concurrently with
3 this Consent Decree, alleging that Defendant, Denali Water Solutions, LLC (“Denali”) violated
4 the Clean Water Act (“CWA”), 33 U.S.C. § 1345(e), and CWA regulations codified at 40 C.F.R.
5 Part 503.

6 WHEREAS, the Complaint against Denali alleges that, in connection with Denali’s land
7 application of sewage sludge (also known as “biosolids”), as defined in 40 C.F.R. § 503.9(w), at
8 locations in Arizona and southern California, Denali applied sewage sludge in amounts
9 exceeding the “agronomic rate” in violation of 40 C.F.R. § 503.14(d) and failed to obtain the
10 information it needed to properly calculate agronomic rates in violation of 40 C.F.R.
11 § 503.12(e)(1).

12 WHEREAS, Denali does not admit to the factual basis alleged or any liability to the
13 United States arising out of the transactions or occurrences alleged in the Complaint.

14 WHEREAS, as of August 22, 2024, Denali has voluntarily sold the assets, and
15 transferred or assigned the contracts, that it used to conduct its land application business within
16 Arizona and California, and has represented that it has no current plans to re-enter that market
17 within that region.

18 WHEREAS, the Parties recognize, and the Court by entering this Consent Decree finds,
19 that this Consent Decree has been negotiated by the Parties in good faith and will avoid litigation
20 between the Parties and that this Consent Decree is fair, reasonable, and in the public interest.

21 NOW, THEREFORE, before the taking of any testimony, without the adjudication or
22 admission of any issue of fact or law except as provided in Section I, and with the consent of the
23 Parties, IT IS HEREBY ADJUDGED, ORDERED, AND DECREED as follows:

24 **I. JURISDICTION AND VENUE**

25 1. This Court has jurisdiction over the subject matter of this action, pursuant to
26 28 U.S.C. §§ 1331, 1345, and 1355, and the CWA, 33 U.S.C. §§ 1319(b) and (d), and over the
27 Parties. Venue lies in this District pursuant to the CWA, 33 U.S.C. § 1319(b), and 28 U.S.C.
28 §§ 1391(b) and (c) and 1395(a), because Denali conducts business in this judicial district and

1 some of the violations alleged in the Complaint are alleged to have occurred in this judicial
2 district. For purposes of this Decree, or any action to enforce this Decree, Denali consents to the
3 Court's jurisdiction over this Decree and any such action and over Denali and consents to venue
4 in this judicial district.

5 2. For purposes of this Consent Decree, Denali agrees that the Complaint states claims
6 upon which relief may be granted pursuant to the CWA, 33 U.S.C. §§ 1319(b) and 1345(e), and
7 40 C.F.R. Part 503.

8 **II. APPLICABILITY**

9 3. The obligations of this Consent Decree apply to and are binding upon the United
10 States and upon Denali and any successors, assigns, or other entities or persons otherwise bound
11 by law, and upon any entity that acquires Denali or a majority interest therein.

12 4. Denali shall provide a copy of this Consent Decree to all officers, employees, and
13 agents whose duties might reasonably include compliance with any provision of this Decree, as
14 well as to any contractor retained to perform work required under this Consent Decree. Denali
15 shall condition any such contract upon performance of the work in conformity with the terms of
16 this Consent Decree.

17 5. In any action to enforce this Consent Decree, Denali shall not raise as a defense the
18 failure by any of its officers, directors, employees, agents, or contractors to take any actions
19 necessary to comply with the provisions of this Consent Decree.

20 **III. DEFINITIONS**

21 6. Terms used in this Consent Decree that are defined in the CWA or in regulations
22 promulgated pursuant to the CWA have the meanings assigned to them in the CWA or such
23 regulations, unless otherwise provided in this Decree. Whenever the terms set forth below are
24 used in this Consent Decree, the following definitions apply:

- 25 a. "Complaint" means the complaint filed by the United States in this action.
26 b. "Consent Decree" or "Decree" means this Decree and all appendices attached hereto
27 (listed in Section XXV).
28 c. "Day" means a calendar day unless expressly stated to be a business day. In

1 computing any period of time for a deadline under this Consent Decree, where the last
2 day would fall on a Saturday, Sunday, or federal holiday, the period runs until the close
3 of business of the next business day.

4 d. “Defendant” or “Denali” means Denali Water Solutions, LLC.

5 e. “DOJ” means the United States Department of Justice and any of its successor
6 departments or agencies.

7 f. “EPA” means the United States Environmental Protection Agency and any of its
8 successor departments or agencies.

9 g. “Effective Date” means the date provided in Section XV.

10 h. “Final Reporting Period” shall have the meaning given in Paragraph 14.

11 i. “Paragraph” means a portion of this Decree identified by an Arabic numeral.

12 j. “Parties” means the United States and Denali.

13 k. “Protocol” means the Soil Sampling and Agronomic Rate Calculation Protocol
14 attached hereto as Appendix A.

15 l. “Protocol Reporting Period” shall have the meaning given in Paragraph 16.

16 m. “Section” means a portion of this Decree identified by a Roman numeral.

17 n. “United States” means the United States of America, acting on behalf of EPA.

18 **IV. CIVIL PENALTY**

19 7. Within 30 Days after the Effective Date, Denali shall pay the sum of \$610,000 as a
20 civil penalty, together with interest accruing from March 15, 2024, at the rate specified in
21 28 U.S.C. § 1961 as of the date of lodging.

22 8. Denali shall pay the civil penalty due, together with interest, by FedWire Electronic
23 Funds Transfer (“EFT”) to the DOJ account, in accordance with instructions provided to Denali
24 by the Financial Litigation Unit (“FLU”) of the United States Attorney’s Office for the District
25 of Arizona after the Effective Date. The payment instructions provided by the FLU will include
26 a Consolidated Debt Collection System (“CDCS”) number, which Denali shall use to identify all
27 payments required to be made in accordance with this Consent Decree. The FLU will provide
28 the payment instructions via email to:

1 Jimmy Mardis, Vice President, Environmental
2 Denali Water Solutions, LLC
3 jimmy.mardis@denaliwater.com
cc: michele.helton@denaliwater.com

4 on behalf of Denali. Denali may change the individual to receive payment instructions on its
5 behalf by providing written notice of such change to DOJ and EPA in accordance with
6 Section XIV (Notices).

7 9. At the time of payment, Denali shall send notice that payment has been made: (i) to
8 EPA via email at cinwd_acctsreceivable@epa.gov or via regular mail at EPA Cincinnati Finance
9 Office, 26 W. Martin Luther King Drive, Cincinnati, Ohio 45268; (ii) to DOJ via email or
10 regular mail in accordance with Section XIV; and (iii) to EPA in accordance with Section XIV.
11 Such notice shall state that the payment is for the civil penalty owed pursuant to the Consent
12 Decree in U.S. v. Denali Water Solutions, LLC and shall reference the civil action number,
13 CDCS Number and DOJ case number 90-5-1-1-12436.

14 10. Denali shall not deduct any penalties paid under this Decree pursuant to this Section
15 or Section VIII (Stipulated Penalties) in calculating its federal income tax.

16 **V. COMPLIANCE REQUIREMENTS**

17 11. Denali shall not land apply sewage sludge in the states of Arizona and California
18 unless that land application is done in compliance with the Soil Sampling and Agronomic Rate
19 Calculation Protocol (Protocol) attached hereto as Appendix A.

20 12. Approval of Deliverables.

21 a. Denali shall submit any plan, report, or other item that it is required to submit for
22 approval pursuant to this Consent Decree to EPA. EPA may approve the submission or
23 decline to approve it and provide written comments. Within 30 Days of receiving EPA's
24 written comments, Denali shall either: (i) alter the submission consistent with EPA's
25 written comments and provide the revised submission to EPA for final approval, or (ii)
26 submit the matter for dispute resolution under Section X.

27 b. Upon receipt of EPA's final approval of the submission, or upon completion of the
28 submission pursuant to dispute resolution, Denali shall implement the submission in

1 accordance with the schedule and requirements in the approved submission.

2 13. Permits. Where any compliance obligation under this Section requires Denali to
3 obtain a federal, state, or local permit or approval, Denali shall submit timely and complete
4 applications and take all other actions necessary to obtain all such permits or approvals. Denali
5 may seek relief under the provisions of Section IX (Force Majeure) for any delay in the
6 performance of any such obligation resulting from a failure to obtain, or a delay in obtaining, any
7 permit or approval required to fulfill such obligation, if Denali has submitted timely and
8 complete applications and has taken all other actions necessary to obtain all such permits or
9 approvals.

10 VI. REPORTING REQUIREMENTS

11 14. Final Report. Denali shall submit to EPA a Final Report, via email in accordance with
12 Paragraph 18, within 90 days after Denali has ceased all land application of sewage sludge in
13 Arizona and California. The Final Report shall describe Denali's land application activities from
14 January 1, 2024, through the last date of application ("Final Reporting Period").

15 a. The Final Report shall include:

- 16 (1) The total amount of sewage sludge land applied during the Final Reporting
17 Period.
- 18 (2) The total amount of sewage sludge otherwise disposed as authorized by 40
19 C.F.R. Part 503 (landfilled, composted, incinerated, placed at a surface disposal
20 site, or stored) during the Final Reporting Period.
- 21 (3) Information provided to Denali by each Publicly Owned Treatment Works
22 (POTW) to meet the requirements of 40 C.F.R. Part 503.
- 23 (4) A list of all fields in Arizona and California to which Denali land-applied
24 sewage sludge during the Final Reporting Period.
- 25 (5) For each such field, the following information in a summary form:
 - 26 (a) Name and address of field owner;
 - 27 (b) Location, including field identification name/number, and size of field in
28 acres;

1 (c) Date(s) of land application(s) and amount(s) (in wet tons and dry tons) of
2 sewage sludge applied;

3 (d) Dates and descriptions of soil sampling and results of soil analysis
4 (including any required reanalysis) completed prior to each land
5 application;

6 (e) Calculation of the agronomic rate (PAN) including all inputs and variables
7 and the data sources used to obtain them (e.g., direct sampling or
8 databases).

9 15. Protocol Notification. In the event Denali decides, after the Effective Date, to
10 recommence land application of sewage sludge in Arizona or California pursuant to Paragraph
11 11, Denali shall notify EPA, in accordance with Paragraph 18, at least 30 Days prior to the first
12 land application. The notification shall include the anticipated date that land application will
13 begin, the farms at which land application is anticipated, and the name and contact information
14 for the individual responsible for ensuring that Denali complies with Paragraph 11 and the
15 Protocol.

16 16. Protocol Annual Report. In the event Denali decides to recommence land application
17 of sewage sludge in Arizona or California pursuant to Paragraph 11, Denali shall submit to EPA,
18 via email in accordance with Paragraph 18, a Protocol Annual Report by March 1 of each year
19 after the date Denali begins such land application activities. The Protocol Annual Report shall
20 describe Denali's land application activities covered by the Consent Decree during the prior
21 calendar year ("Protocol Reporting Period") and its anticipated land application activities for the
22 current calendar year.

23 a. Each Protocol Annual Report shall include the information required under the Final
24 Report as specified in paragraph 14 and its subparagraphs, as well as the following:

25 (1) For each field to which Denali land-applied sewage sludge during the Protocol
26 Reporting Period, the following information in a summary form:

27 (a) Dates of irrigation water sampling, nitrate concentration in each sample,
28 and the source for the volume of irrigation water used in the Protocol

1 calculation for each land application;

2 (b) Crop(s) grown and how Denali ascertained the crop(s) grown, and dates of
3 planting and harvesting; and

4 (c) Crop yield and how Denali ascertained the crop yield.

5 (2) Identification of any fields where:

6 (a) Denali's soil sampling detected 10 mg/kg nitrate-N or higher in any
7 sample at the 5-foot depth; or

8 (b) Denali's field inspection revealed the actual crop being grown was not the
9 crop reported by the landowner, along with Denali's resulting
10 recalculation of the application rate and whether that recalculation shows a
11 surplus of nitrogen was applied to that field.

12 (3) Identification of any fields where Denali's sewage sludge application exceeded
13 the agronomic rate and the amount (in percentage and in tons) of the
14 exceedance, with an explanation of how the exceedance occurred and what
15 actions Denali took in response to the exceedance.

16 (4) A list of all fields in Arizona and California to which Denali plans to land-apply
17 sewage sludge during the next Protocol Reporting Period and, for each field, the
18 crop(s) that are anticipated to be planted on that field.

19 b. At the same time that it submits each Protocol Annual Report, Denali shall make
20 available to EPA, via email in accordance with Paragraph 18, or through an electronic
21 portal, electronic copies of all data, soil sampling results, and other information sources,
22 including photos and videos, that Denali relied on in preparing the Protocol Annual
23 Report and assessing its compliance with this Consent Decree.

24 17. If Denali violates, or has reason to believe that it may have violated or may violate,
25 any requirement of this Consent Decree, including the Protocol, Denali shall notify DOJ and
26 EPA of such violation and its likely duration, in writing, within ten business days after the Day
27 Denali first becomes aware of the violation, with an explanation of the violation's likely cause
28 and of the remedial steps taken, or to be taken, to prevent or minimize such violation. If the

1 cause of a violation cannot be fully explained at the time the report is due, Denali shall so state in
2 the report. Denali shall investigate the cause of the violation and shall then submit an
3 amendment to the report, including a full explanation of the cause of the violation, within 30
4 Days of the Day Denali becomes aware of the cause of the violation unless otherwise agreed to
5 by the Parties. Nothing in this Paragraph or the following Paragraph relieves Denali of its
6 obligation to provide the notice required by Section IX (Force Majeure).

7 18. Denali shall submit the reports required by this Section to EPA at the addresses set
8 forth in Section XIV (Notices).

9 19. Whenever any violation of this Consent Decree or of any applicable permits or any
10 other event affecting Denali's performance under this Decree may pose an immediate threat to
11 the public health or welfare or the environment, Denali shall notify EPA by email as soon as
12 possible, but no later than 24 hours after Denali first knew of the violation or event. This
13 procedure is in addition to the requirements set forth in the preceding Paragraph and the
14 immediate reporting requirements of the Protocol.

15 20. Each report submitted by Denali under this Section shall be signed by an official of
16 the submitting party and include the following certification:

17 I certify under penalty of perjury that this document and all attachments were prepared
18 under my direction or supervision in accordance with a system designed to assure that
19 qualified personnel properly gather and evaluate the information submitted. Based on my
20 inquiry of the person or persons who manage the system, or those persons directly
21 responsible for gathering the information, the information submitted is, to the best of my
22 knowledge and belief, true, accurate, and complete. I have no personal knowledge that
23 the information submitted is other than true, accurate, and complete. I am aware that
24 there are significant penalties for submitting false information, including the possibility
25 of fine and imprisonment for knowing violations.

26 21. This certification requirement does not apply to emergency or similar notifications
27 where compliance would be impractical.

28

1 22. The reporting requirements of this Consent Decree do not relieve Denali of any
2 reporting obligations required by the CWA or implementing regulations (including annual
3 reports required by 40 C.F.R. Part 503), or by any other federal, state, or local law, regulation,
4 permit, or other requirement.

5 23. Any information provided pursuant to this Consent Decree may be used by the United
6 States in any proceeding to enforce the provisions of this Consent Decree and as otherwise
7 permitted by law.

8 **VII. THIRD PARTY VERIFICATION**

9 A. Auditor Hiring Procedures

10 24. In the event Denali chooses to land apply after the Effective Date of this Consent
11 Decree as provided under paragraph 11, in accordance with the procedures set forth below,
12 Denali shall hire an independent Third Party Auditor (“Auditor”) to perform all the duties set
13 forth in Paragraphs 34 through 40 in order to assess Denali’s compliance with the Protocol.

14 25. Denali shall give the Auditor a copy of this Consent Decree and all appendices, as
15 well as all other information and access necessary to complete the Audits set forth herein.
16 Denali’s contract with the Auditor shall require the Auditor to perform all of the duties in
17 Paragraphs 34 through 40 and upon EPA’s request, within a reasonable time and upon
18 reasonable notice, to be fully available to consult with EPA about Denali’s compliance with the
19 Protocol.

20 26. Denali shall bear all costs associated with the Auditor, cooperate fully with any
21 reasonable requests of the Auditor, and provide the Auditor with access, upon reasonable notice
22 and taking into account operational impacts, to all records, employees, contractors, and
23 properties under Denali’s ownership or control that the Auditor deems necessary to effectively
24 perform the duties described in Paragraphs 34 through 40. Denali shall ensure that the Auditor(s)
25 conduct the Audits in accordance with the requirements set forth in Paragraphs 34 through 40.

26 27. Hiring Process. No later than 30 Days prior to beginning any land application
27 activities pursuant to paragraph 11, Denali shall submit to the United States the name and
28

1 qualifications of three (3) proposed independent Third-Party Auditors that both Denali and each
2 proposed Auditor certify meet the following conditions:

3 a. the Auditor has experience with 40 C.F.R. Part 503 and the requirements for the land
4 application of sewage sludge;

5 b. the Auditor and its personnel have not been employed by Denali, have not conducted
6 research and/or development for Denali, and have not provided advisory services of any
7 kind to Denali, within the last three (3) years; and

8 c. the Auditor has not been retained by Denali to satisfy any of the requirements of
9 Section V (Compliance Requirements) of this Consent Decree.

10 28. Denali shall not employ the Auditor or its personnel to provide any other commercial,
11 business, or voluntary services to Denali during the monitorship and for a period of at least three
12 (3) years following the Auditor's submission of its final Annual Compliance Audit Report
13 pursuant to Paragraph 37, and Denali shall not provide future employment to the Auditor or any
14 of its personnel who managed, conducted, or otherwise participated in the Audits for a period of
15 at least three (3) years following the Auditor's submittal of its final Annual Compliance Audit
16 Report pursuant to Paragraph 37.

17 29. Within 30 Days of receiving the list of Auditor candidates, the United States shall
18 notify Denali in writing which, if any, of the candidates are approved. By no later than 30 Days
19 of receiving the United States' approval, Denali shall select one of the approved candidates to
20 serve as the Auditor and enter into a contract to perform the activities set forth in Paragraphs 34
21 through 40. The contract for the auditing services shall include the restrictions described in
22 Paragraph 27.

23 30. If the United States does not approve of any of the candidates, then Denali shall,
24 within 45 Days of receipt of the United States' written notification in Paragraph 29, submit to the
25 United States for approval the names and qualifications of two (2) proposed alternative Auditors
26 that meet the qualifications set forth in Paragraph 27.

27 31. Auditor Replacement Procedure: If after approval, either the United States or Denali
28 independently determines that the approved Auditor cannot satisfactorily perform the required

1 Audits due to extenuating circumstances such as incapacitation, illness, sale of business, or
2 retirement, within 60 Days of that determination or receiving the United States' notice of the
3 same, Denali shall submit to the United States for approval the name and qualifications of two
4 (2) proposed replacement Auditors that meet the qualifications set forth in Paragraph 27 above.
5 If Denali and the United States do not agree on the need to select a replacement Auditor, Denali
6 may invoke the dispute resolution procedures in Section X (Dispute Resolution) of this Consent
7 Decree.

8 32. Nothing in Paragraphs 27 through 31 precludes the United States from assessing
9 stipulated penalties for missed Audit deadlines associated with the need to replace an Auditor
10 unless Denali successfully asserts that the inability of the Auditor to perform the required Audit
11 was due to a Force Majeure event in accordance with Section IX (Force Majeure) of this Consent
12 Decree.

13 33. Within 60 Days of the United States' final approval of the Auditor, the Auditor shall
14 meet with EPA to provide an overview and detailed project plan of how it will perform all of its
15 obligations in this Consent Decree. The Auditor shall bring its key personnel to such meeting,
16 including the lead manager(s) and senior staff involved in implementing its obligations.
17 Representatives of Denali may attend this meeting.

18 B. Auditor Responsibilities

19 34. The Auditor must comply with the procedures and requirements in this Section VII.B
20 to provide an objective and fair assessment of Denali's compliance with the requirements of the
21 Protocol.

22 35. Neither Denali nor the United States will be bound by any recommendations or
23 conclusions of the Auditor. However, if Denali violates any requirement of this Consent Decree,
24 Denali will be liable for stipulated penalties to the United States, pursuant to Section VIII
25 (Stipulated Penalties) regardless of the recommendations or conclusions of the Auditor.

26 36. Annual Compliance Audit. Denali shall provide the Auditor with all reports required
27 under Section VI (Reporting Requirements), and access to all supporting data, at the same time
28

1 they are provided to EPA. The Auditor shall review Denali’s Protocol Annual Report and any
2 other reports Denali has submitted during the last calendar year to evaluate:

- 3 a. Denali’s compliance with the requirements of the Protocol;
- 4 b. An independent analysis of any reports Denali submitted under Paragraph 15 and the
5 explanations provided therein;
- 6 c. An independent analysis of Denali’s soil sampling practices and PAN calculation
7 methodology, whether they comply with the Protocol; and
- 8 d. The completeness and accuracy of Denali’s submittals, including:
 - 9 (1) Whether it has correctly reported the information in Paragraph 14.a(5);
 - 10 (2) Whether it has correctly reported overapplications in accordance with the
11 formula set forth in the Protocol; and
 - 12 (3) Any relevant information that is missing or incomplete in the reports or the
13 supporting data.

14 37. The Auditor shall submit to both Denali and EPA simultaneously the results of the
15 Annual Compliance Audit (“Annual Compliance Audit Report”) within 45 Days of Denali’s
16 submission of its Protocol Annual Report.

17 38. The Annual Compliance Audit Report shall include:

- 18 a. a description of the information and records reviewed in evaluating the issues listed in
19 Paragraph 36;
- 20 b. each Audit Finding, identified and listed separately; and
- 21 c. the Auditor’s recommendations for Denali to address each Audit Finding or to
22 otherwise improve compliance with the Protocol.

23 39. The Auditor shall not share any draft reports with Denali prior to the submission of an
24 Annual Compliance Audit Report.

25 40. The Annual Compliance Audit Report and any findings or recommendations of the
26 Auditor shall not be subject to any privilege or protection.

27 41. Within 15 Days of receiving each Annual Compliance Audit Report, Denali shall
28 submit to EPA a response in accordance with Section XIV (Notices) that shall include:

- 1 a. A description of Denali’s actions to address each Audit Finding, including schedules
- 2 and deadlines;
- 3 b. an explanation of any Audit Finding identified by the Annual Compliance Audit
- 4 Report with which Denali does not agree and potential alternative actions that Denali
- 5 wishes to take; and
- 6 c. a response to each of the recommendations in the Annual Compliance Audit Report.

7 **VIII. STIPULATED PENALTIES**

8 42. Denali shall be liable for stipulated penalties to the United States for violations of this
 9 Consent Decree as specified below, unless excused under Section IX (Force Majeure). A
 10 violation includes failing to perform any obligation required by the terms of this Decree,
 11 including any work plan or schedule approved under this Decree, according to all applicable
 12 requirements of this Decree and within the specified time schedules established by or approved
 13 under this Decree.

14 43. Late Payment of Civil Penalty. If Denali fails to pay the civil penalty required to be
 15 paid under Section IV (Civil Penalty) when due, Denali shall pay a stipulated penalty of \$1,000
 16 per Day for each Day that the payment is late.

17 44. Agronomic Rate Exceedances. For each field in Arizona and California where
 18 Denali’s land application, or application rate calculation, is inconsistent with the Protocol and
 19 results in an exceedance of the agronomic rate, the following stipulated penalties shall accrue:

Percent Exceedance of Agronomic Rate at Each Field during Reporting Period	Penalty per 100 Dry Tons of Sewage Sludge Applied to Each Field in Excess of Agronomic Rate
0.1% - 10%	\$ 1000
10.1% - 25%	\$ 1500
Over 25%	\$ 2000

26 45. Protocol Violations. For each field in Arizona and California where Denali’s land
 27 application, or application rate calculation, is inconsistent with the Protocol, but does not result
 28

1 in an exceedance of the agronomic rate, a stipulated penalty of \$500 shall accrue per violation
2 per Day

3 46. Reporting Requirements. The following stipulated penalties shall accrue per
4 violation per Day for each violation of the reporting requirements of Section VI, including
5 failure to timely submit required reports:

6	Penalty Per Violation Per Day	Period of Noncompliance
7	\$500	1st through 14th Day
8	\$1,000	15th through 30th Day
9	\$2,000	31st Day and beyond

10 47. Third Party Verification Requirements. The following stipulated penalties shall
11 accrue per violation per Day for each violation of the Third Party Verification requirements of
12 Section VII, including failure to timely submit required materials to the Auditor or EPA as
13 required under Paragraphs 36-38 and 41:

14	Penalty Per Violation Per Day	Period of Noncompliance
15	\$500	1st through 14th Day
16	\$1,000	15th through 30th Day
17	\$2,000	31st Day and beyond

18 48. Stipulated penalties under this Section shall begin to accrue on the Day after
19 performance is due or on the Day a violation occurs, whichever is applicable, and shall continue
20 to accrue until performance is satisfactorily completed or until the violation ceases. Stipulated
21 penalties shall accrue simultaneously for separate violations of this Consent Decree.

22 49. Denali shall pay any stipulated penalty within 30 Days of receiving the United States'
23 written demand unless subject to Dispute Resolution per Paragraph 51 below.

24 50. The United States may in the unreviewable exercise of its discretion, reduce or waive
25 stipulated penalties otherwise due under this Consent Decree.

26 51. Stipulated penalties shall continue to accrue as provided in Paragraph 48, during any
27 Dispute Resolution, but need not be paid until the following:

- 28 a. If the dispute is resolved by agreement of the Parties or by a decision of EPA that is

1 not appealed to the Court, Denali shall pay accrued penalties determined to be owing,
2 together with interest, to the United States within 30 Days of the effective date of the
3 agreement or the receipt of EPA's decision or order.

4 b. If the dispute is appealed to the Court and the United States prevails in whole or in
5 part, Denali shall pay all accrued penalties determined by the Court to be owing, together
6 with interest, within 60 Days of receiving the Court's decision or order, except as
7 provided in subparagraph c, below.

8 c. If any Party appeals the District Court's decision, Denali shall pay all accrued
9 penalties determined to be owing, together with interest, within 15 Days of receiving the
10 final appellate court decision.

11 52. Denali shall pay stipulated penalties owing to the United States in the manner set
12 forth in Paragraph 7 and with the confirmation notices required by Paragraph 10, except that the
13 transmittal letter shall state that the payment is for stipulated penalties and shall state for which
14 violation(s) the penalties are being paid.

15 53. If Denali fails to pay stipulated penalties according to the terms of this Consent
16 Decree, Denali shall be liable for interest on such penalties, as provided for in 28 U.S.C. § 1961,
17 accruing as of the date payment became due. Nothing in this Paragraph shall be construed to
18 limit the United States from seeking any remedy otherwise provided by law for Denali's failure
19 to pay any stipulated penalties.

20 54. The payment of penalties and interest, if any, shall not alter in any way Denali's
21 obligation to complete the performance of the requirements of this Consent Decree.

22 55. Non-Exclusivity of Remedy. Stipulated penalties are not the United States' exclusive
23 remedy for violations of this Consent Decree. Subject to the provisions of Section XII (Effect of
24 Settlement/Reservation of Rights), the United States expressly reserves the right to seek any
25 other relief it deems appropriate for Denali's violation of this Decree or applicable law, including
26 but not limited to an action against Denali for statutory penalties, additional injunctive relief,
27 mitigation or offset measures, and/or contempt. However, the amount of any statutory penalty
28

1 assessed for a violation of this Consent Decree shall be reduced by an amount equal to the
2 amount of any stipulated penalty assessed and paid pursuant to this Consent Decree.

3 **IX. FORCE MAJEURE**

4 56. “Force majeure,” for purposes of this Consent Decree, means any event arising from
5 causes beyond the control of Denali, of any entity controlled by Denali, or of Denali’s
6 contractors, that delays or prevents the performance of any obligation under this Consent Decree
7 despite Denali’s best efforts to fulfill the obligation. Given the need to protect public health and
8 welfare and the environment, the requirement that Denali exercise “best efforts to fulfill the
9 obligation” includes using best efforts to anticipate any potential force majeure and best efforts
10 to address the effects of any potential force majeure (a) as it is occurring and (b) following the
11 potential force majeure, such that any delay or non-performance is, and any adverse effects of
12 the delay or non-performance are, minimized to the greatest extent possible. “Force majeure”
13 does not include financial inability to perform any obligation under this Consent Decree.

14 57. If any event occurs for which Denali will or may claim a force majeure, Denali shall
15 provide notice to EPA by email. The deadline for the initial notice is three days after Denali first
16 knew or should have known that the event would likely delay or prevent performance. Denali
17 shall be deemed to know of any circumstance of which any contractor of, subcontractor of, or
18 entity controlled by Denali knew or should have known.

19 58. If Denali seeks to assert a claim of force majeure concerning the event, within seven
20 Days after the notice under Paragraph 57, Denali shall submit a further notice to EPA that
21 includes (a) an explanation and description of the event and its effect on Denali’s completion of
22 the requirements of the Consent Decree; (b) a description and schedule of all actions taken or to
23 be taken to prevent or minimize the delay and/or other adverse effects of the event; (c) if
24 applicable, the proposed extension of time for Denali to complete the requirements of the
25 Consent Decree; (d) Denali’s rationale for attributing such delay to a force majeure; (e) a
26 statement as to whether, in the opinion of Denali, such event may cause or contribute to an
27 endangerment to public health or welfare or the environment; and (f) all available proof
28 supporting the claim that the delay was attributable to a force majeure.

1 59. Failure to submit a timely or complete notice or claim under Paragraph 57 or 58
2 regarding an event precludes Denali from asserting any claim of force majeure regarding that
3 event, provided, however, that EPA may, in its unreviewable discretion, excuse such failure if it
4 is able to assess to its satisfaction whether the event is a force majeure, and whether Denali has
5 exercised its best efforts, under Paragraph 56.

6 60. After receipt of any claim of force majeure, EPA will notify Denali of its
7 determination whether Denali is entitled to relief under Paragraph 56, and, if so, the excuse of, or
8 the extension of time for, performance of the obligations affected by the force majeure. An
9 excuse of, or extension of the time for performance of, the obligations affected by the force
10 majeure does not, of itself, excuse or extend the time for performance of any other obligation.

11 61. If Denali elects to invoke the dispute resolution procedures set forth in Section X
12 (Dispute Resolution), it shall do so no later than 15 Days after receipt of EPA's notice in
13 Paragraph 60. In any such proceeding, Denali has the burden of proving that it is entitled to
14 relief under Paragraph 56, that its proposed excuse or extension was or will be warranted under
15 the circumstances, and that it complied with the requirements of Paragraphs 56 - 58. If Denali
16 carries this burden, the delay or non-performance at issue shall be deemed not to be a violation
17 by Denali of the affected obligation of this Consent Decree identified to EPA and the Court.

18 **X. DISPUTE RESOLUTION**

19 62. Unless otherwise expressly provided for in this Consent Decree, the dispute
20 resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising
21 under or with respect to this Consent Decree. Denali's failure to seek resolution of a dispute
22 under this Section concerning an issue of which it had notice and an opportunity to dispute under
23 this Section prior to an action by the United States to enforce any obligation of Denali arising
24 under this Decree precludes Denali from raising any such issue as a defense to any such
25 enforcement action.

26 63. Informal Dispute Resolution. Any dispute subject to Dispute Resolution under this
27 Consent Decree shall first be the subject of informal negotiations. The dispute shall be
28 considered to have arisen when Denali sends DOJ and EPA a written Notice of Dispute. Such

1 Notice of Dispute shall state clearly the matter in dispute. The period of informal negotiations
2 shall not exceed 20 Days from the date the dispute arises, unless that period is modified by
3 written agreement. If the Parties cannot resolve a dispute by informal negotiations, then the
4 position advanced by the United States shall be considered binding unless, within 15 Days after
5 the conclusion of the informal negotiation period, Denali invokes formal dispute resolution
6 procedures as set forth below.

7 64. Formal Dispute Resolution. Denali shall invoke formal dispute resolution
8 procedures, within the time period provided in the preceding Paragraph, by sending DOJ and
9 EPA a written Statement of Position regarding the matter in dispute. The Statement of Position
10 shall include, but need not be limited to, any factual data, analysis, or opinion supporting
11 Denali's position and any supporting documentation relied upon by Denali.

12 65. The United States will send Denali its Statement of Position within 45 Days of receipt
13 of Denali's Statement of Position. The United States' Statement of Position shall include, but
14 need not be limited to, any factual data, analysis, or opinion supporting that position and any
15 supporting documentation relied upon by the United States. The United States' Statement of
16 Position is binding on Denali, unless Denali files a motion for judicial review of the dispute in
17 accordance with the following Paragraph.

18 66. Judicial Dispute Resolution. Denali may seek judicial review of the dispute by filing
19 with the Court and serving on the United States a motion requesting judicial resolution of the
20 dispute. The motion (a) must be filed within ten Days of receipt of the United States' Statement
21 of Position pursuant to the preceding Paragraph; (b) may not raise any issue not raised in
22 informal dispute resolution pursuant to Paragraph 54, unless the Plaintiffs raise a new issue of
23 law or fact in the Statement of Position; (c) shall contain a written statement of Denali's position
24 on the matter in dispute, including any supporting factual data, analysis, opinion, or
25 documentation, and (d) shall set forth the relief requested and any schedule within which the
26 dispute must be resolved for orderly implementation of the Consent Decree.

1 67. The United States shall respond to Denali’s motion within the time period allowed by
2 the Local Rules of this Court. Denali may file a reply memorandum, to the extent permitted by
3 the Local Rules.

4 68. Standard of Review.

5 a. Disputes Concerning Matters Accorded Record Review. Except as otherwise
6 provided in this Consent Decree, in any dispute brought under Paragraph 64 pertaining to
7 the adequacy or appropriateness of plans, procedures to implement plans, schedules or
8 any other items requiring approval by EPA under this Consent Decree; the adequacy of
9 the performance of work undertaken pursuant to this Consent Decree; and all other
10 disputes that are accorded review on the administrative record under applicable principles
11 of administrative law, Denali shall have the burden of demonstrating, based on the
12 administrative record, that the position of the United States is arbitrary and capricious or
13 otherwise not in accordance with law.

14 b. Other Disputes. Except as otherwise provided in this Consent Decree, in any other
15 dispute brought under Paragraph 64, Denali shall bear the burden of demonstrating that
16 its position complies with this Consent Decree and better furthers the objectives of the
17 Consent Decree.

18 69. The invocation of dispute resolution procedures under this Section shall not, by itself,
19 extend, postpone, or affect in any way any obligation of Denali under this Consent Decree,
20 unless and until final resolution of the dispute so provides. Stipulated penalties with respect to
21 the disputed matter shall continue to accrue from the first Day of noncompliance, but payment
22 shall be stayed pending resolution of the dispute as provided in Paragraph 51. If Denali does not
23 prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in
24 Section VIII (Stipulated Penalties).

25 **XI. INFORMATION COLLECTION AND RETENTION**

26 70. The United States and its representatives, including attorneys, contractors, and
27 consultants, shall have the right of entry into any facility covered by this Consent Decree, at all
28 reasonable times, upon presentation of credentials, to:

- 1 a. monitor the progress of activities required under this Consent Decree;
- 2 b. verify any data or information submitted to the United States in accordance with the
- 3 terms of this Consent Decree;
- 4 c. obtain samples and, upon request, splits of any samples taken by Denali or its
- 5 representatives, contractors, or consultants;
- 6 d. obtain documentary evidence, including photographs and similar data; and
- 7 e. assess Denali's compliance with this Consent Decree.

8 71. Upon request, Denali shall provide EPA or its authorized representatives splits of any
9 samples taken by Denali. Upon request, EPA shall provide Denali splits of any samples taken by
10 EPA.

11 72. Until five years after the termination of this Consent Decree, Denali shall retain, and
12 shall instruct its contractors and agents to preserve, all non-identical copies of all documents,
13 records, or other information (including documents, records, or other information in electronic
14 form) in its or its contractors' or agents' possession or control, or that come into its or its
15 contractors' or agents' possession or control, and that relate in any manner to Denali's
16 performance of its obligations under this Consent Decree. This information-retention
17 requirement shall apply regardless of any contrary corporate or institutional policies or
18 procedures. At any time during this information-retention period, upon request by the United
19 States, Denali shall provide copies of any documents, records, or other information required to
20 be maintained under this Paragraph.

21 73. At the conclusion of the information-retention period provided in the preceding
22 Paragraph, Denali shall notify the United States at least 90 Days prior to the destruction of any
23 documents, records, or other information subject to the requirements of the preceding Paragraph
24 and, upon request by the United States, Denali shall deliver any such documents, records, or
25 other information to EPA. Denali may assert that certain documents, records, or other
26 information is privileged under the attorney-client privilege or any other privilege recognized by
27 federal law. If Denali asserts such a privilege, it shall provide the following: (a) the title of the
28 document, record, or information; (b) the date of the document, record, or information; (c) the

1 name and title of each author of the document, record, or information; (d) the name and title of
2 each addressee and recipient; (e) a description of the subject of the document, record, or
3 information; and (f) the privilege asserted by Denali. However, no documents, records, or other
4 information created or generated pursuant to the requirements of this Consent Decree shall be
5 withheld on grounds of privilege.

6 74. Denali may also assert that information required to be provided under this Section is
7 protected as Confidential Business Information (“CBI”) under 40 C.F.R. Part 2. As to any
8 information that Denali seeks to protect as CBI, Denali shall follow the procedures set forth in 40
9 C.F.R. Part 2.

10 75. This Consent Decree in no way limits or affects any right of entry and inspection, or
11 any right to obtain information, held by the United States pursuant to applicable federal laws,
12 regulations, or permits, nor does it limit or affect any duty or obligation of Denali to maintain
13 documents, records, or other information imposed by applicable federal or state laws,
14 regulations, or permits.

15 **XII. EFFECT OF SETTLEMENT/RESERVATION OF RIGHTS**

16 76. This Consent Decree resolves only the civil claims of the United States for the
17 violations alleged in the Complaint filed in this action through the date of lodging.

18 77. The United States reserves all legal and equitable remedies available to enforce the
19 provisions of this Consent Decree. This Consent Decree shall not be construed to limit the rights
20 of the United States to obtain penalties or injunctive relief under the CWA or implementing
21 regulations, or under other federal laws, regulations, or permit conditions, except as expressly
22 specified in Paragraph 76. The United States further reserves all legal and equitable remedies to
23 address any conditions if there is or may be an imminent and substantial endangerment to the
24 public health or welfare or the environment arising from Denali’s activities, whether related to
25 the violations addressed in this Consent Decree or otherwise.

26 78. In any subsequent administrative or judicial proceeding initiated by the United States
27 for injunctive relief, civil penalties, other appropriate relief relating to Denali’s activities, Denali
28 shall not assert, and may not maintain, any defense or claim based upon the principles of waiver,

1 claim preclusion (res judicata), issue preclusion (collateral estoppel), claim-splitting, or other
2 defenses based upon any contention that the claims raised by the United States in the subsequent
3 proceeding were or should have been brought in the instant case, except with respect to claims
4 that have been specifically resolved pursuant to Paragraph 76.

5 79. This Consent Decree is not a permit, or a modification of any permit, under any
6 federal, State, or local laws or regulations. Denali is responsible for achieving and maintaining
7 complete compliance with all applicable federal, State, and local laws, regulations, and permits;
8 and Denali's compliance with this Consent Decree shall be no defense to any action commenced
9 pursuant to any such laws, regulations, or permits, except as set forth herein. The United States
10 does not, by its consent to the entry of this Consent Decree, warrant or aver in any manner that
11 Denali's compliance with any aspect of this Consent Decree will result in compliance with
12 provisions of the CWA, or with any other provisions of federal, State, or local laws, regulations,
13 or permits.

14 80. This Consent Decree does not limit or affect the rights of Denali or of the United
15 States against any third parties, not party to this Consent Decree, nor does it limit the rights of
16 third parties, not party to this Consent Decree, against Denali, except as otherwise provided by
17 law.

18 81. This Consent Decree shall not be construed to create rights in, or grant any cause of
19 action to, any third party not party to this Consent Decree.

20 **XIII. COSTS**

21 82. The Parties shall bear their own costs of this action, including attorneys' fees, except
22 that the United States shall be entitled to collect the costs (including attorneys' fees) incurred in
23 any action necessary to collect any portion of the civil penalty or any stipulated penalties due but
24 not paid by Denali.

25 **XIV. NOTICES**

26 83. Unless otherwise specified in this Decree, whenever notifications, submissions, or
27 communications are required by this Consent Decree, they shall be made in writing and sent by
28 mail or email, with a preference for email, addressed as follows:

1 As to DOJ by email (preferred): eescdcopy.enrd@usdoj.gov
2 Re: DJ # 90-5-1-1-12436

3 As to DOJ by mail: EES Case Management Unit
4 Environment and Natural Resources Division
5 U.S. Department of Justice
6 P.O. Box 7611
7 Washington, D.C. 20044-7611
8 Re: DJ # 90-5-1-1-12436

9 As to EPA by email (preferred): draper.seth@epa.gov

10 As to EPA by mail: Seth Draper, Compliance Officer
11 Enforcement and Compliance Assurance Division
12 U.S. EPA Region 7
13 11201 Renner Boulevard
14 Lenexa, Kansas 66219

15 As to Denali by email: (preferred) jimmy.mardis@denaliwater.com
16 michele.helton@denaliwater.com

17 As to Denali by mail: Jimmy Mardis, Vice President, Environmental
18 Denali Water Solutions, LLC
19 5417 Pinnacle Point Parkway
20 Suite 202
21 Rogers, AR 72756

22 Michele Helton
23 220 S. Commerce Ave
24 Russellville, AR 72801

25 84. Either Party may, by written notice to the other Party, change its designated notice
26 recipient or notice address provided above.

27 85. Notices submitted pursuant to this Section shall be deemed submitted upon mailing or
28 transmission by email, unless otherwise provided in this Consent Decree or by mutual agreement
of the Parties in writing.

29 **XV. EFFECTIVE DATE**

30 86. The Effective Date of this Consent Decree shall be the date upon which this Consent
31 Decree is entered by the Court or a motion to enter the Consent Decree is granted, whichever
32 occurs first, as recorded on the Court's docket.

33 **XVI. RETENTION OF JURISDICTION**

34 87. The Court shall retain jurisdiction over this case until termination of this Consent
35 Decree, for the purpose of resolving disputes arising under this Decree or entering orders

1 modifying this Decree, pursuant to Sections X and XVII, or effectuating or enforcing compliance
2 with the terms of this Decree.

3 **XVII. MODIFICATION**

4 88. The terms of this Consent Decree, including any attached appendices, may be
5 modified only by a subsequent written agreement signed by all the Parties, including written
6 agreement by email. Where the modification constitutes a material change to this Decree, it shall
7 be effective only upon approval by the Court.

8 89. Any disputes concerning modification of this Decree shall be resolved pursuant to
9 Section X (Dispute Resolution), provided, however, that, instead of the burden of proof provided
10 by Paragraph 68, the Party seeking the modification bears the burden of demonstrating that it is
11 entitled to the requested modification in accordance with Federal Rule of Civil Procedure 60(b).

12 **XVIII. TERMINATION**

13 90. After Denali has (a) submitted the Final Report as required by Paragraph 14 for the
14 Final Reporting Period; (b) maintained satisfactory compliance with this Consent Decree,
15 including if applicable Paragraphs 11, 15, and 16 and Section VII (Third Party Verification), for
16 a period of five (5) years from the Effective Date; (c) has complied with all other requirements of
17 Section VI (Reporting Requirements); and (d) has paid the civil penalty and any accrued
18 stipulated penalties as required by this Consent Decree, Denali may serve upon the United States
19 a Request for Termination, stating that Denali has satisfied those requirements, together with all
20 necessary supporting documentation.

21 91. Following receipt by the United States of Denali's Request for Termination, the
22 Parties shall confer informally concerning the Request and any disagreement that the Parties may
23 have as to whether Denali has satisfactorily complied with the requirements for termination of
24 this Consent Decree. If the United States agrees that the Decree may be terminated, the Parties
25 shall submit, for the Court's approval, a joint stipulation terminating the Decree.

26 92. If the United States does not agree that the Decree may be terminated, Denali may
27 invoke Dispute Resolution under Section X. However, Denali shall not seek Dispute Resolution
28 of any dispute regarding termination until 30 Days after service of its Request for Termination.

XIX. PUBLIC PARTICIPATION

1
2 93. This Consent Decree shall be lodged with the Court for a period of not less than 30
3 Days for public notice and comment in accordance with 28 C.F.R. § 50.7. The United States
4 reserves the right to withdraw or withhold its consent if the comments regarding the Consent
5 Decree disclose facts or considerations indicating that the Consent Decree is inappropriate,
6 improper, or inadequate. Denali consents to entry of this Consent Decree without further notice
7 and agrees not to withdraw from or oppose entry of this Consent Decree by the Court or to
8 challenge any provision of the Decree, unless the United States has notified Denali in writing
9 that it no longer supports entry of the Decree.

10 **XX. SIGNATORIES/SERVICE**

11 94. Each undersigned representative of Denali and the Assistant Attorney General for
12 the Environment and Natural Resources Division of the Department of Justice identified on the
13 DOJ signature page below, certifies that that person is fully authorized to enter into the terms and
14 conditions of this Consent Decree and to execute and legally bind the Party that person
15 represents to this document.

16 95. This Consent Decree may be signed in counterparts, and its validity shall not be
17 challenged on that basis. Denali agrees to accept service of process by mail with respect to all
18 matters arising under or relating to this Consent Decree and to waive the formal service
19 requirements set forth in Rules 4 and 5 of the Federal Rules of Civil Procedure and any
20 applicable Local Rules of this Court including, but not limited to, service of a summons. Denali
21 need not file an answer to the complaint in this action unless or until the Court expressly declines
22 to enter this Consent Decree.

23 **XXI. INTEGRATION**

24 96. This Consent Decree, including deliverables that are subsequently approved pursuant
25 to this Decree, constitutes the entire agreement among the Parties regarding the subject matter of
26 the Decree and supersedes all prior representations, agreements and understandings, whether oral
27 or written, concerning the subject matter of the subject matter of the Decree herein.

XXII. 26 U.S.C. SECTION 162(f)(2)(A)(ii) IDENTIFICATION

97. For purposes of the identification requirement in Section 162(f)(2)(A)(ii) of the Internal Revenue Code, 26 U.S.C. § 162(f)(2)(A)(ii), and 26 C.F.R. § 1.162-21(b)(2), performance of Section V (Compliance Requirements), Paragraphs 11-13 and related Appendix A; Section VI (Reporting Requirements), Paragraphs 14-18 and 20-23; Section VII (Third Party Verification), Paragraphs 24-41; and Section XI (Information Collection and Retention), Paragraphs 70-73 and 75, is restitution, remediation, or required to come into compliance with law.

XXIII. HEADINGS

98. Headings to the Sections and Subsections of this Consent Decree are provided for convenience and do not affect the meaning or interpretation of the provisions of this Consent Decree.

XXIV. FINAL JUDGMENT

99. Upon approval and entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment of the Court as to the United States and Denali. The Court finds that there is no just reason for delay and therefore enters this judgment as a final judgment under Fed. R. Civ. P. 54 and 58.

XXV. APPENDICES

100. The following Appendices are attached to and part of this Consent Decree:
“Appendix A” is the Soil Sampling and Agronomic Rate Calculation Protocol.

Dated and entered this __ day of _____, 20__

UNITED STATES DISTRICT JUDGE

1 FOR THE UNITED STATES OF AMERICA:

2 11/6/2024

3 Date

TODD KIM
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice

6 */s/ Danica Anderson Glaser*

7 DANICA ANDERSON GLASER
8 Senior Counsel
9 Environmental Enforcement Section
10 Environment and Natural Resources Division
11 U.S. Department of Justice
12 Washington, DC 20044-7611

13 GARY M. RESTAINO
14 United States Attorney
15 District of Arizona

1 FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY:

2 ROSEMARIE Digitally signed by
ROSEMARIE KELLEY
3 KELLEY Date: 2024.11.05
14:59:11 -05'00'

4 Date _____

Rosemarie A. Kelley
Director, Office of Civil Enforcement
Office of Enforcement and Compliance Assurance
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Megan Knight
Attorney Advisor, Water Enforcement Division
Office of Civil Enforcement
Office of Enforcement and Compliance Assurance
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

1 FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 7:

2 MEGHAN MCOLLISTER Digitally signed by MEGHAN MCOLLISTER
3 Date: 2024.10.09 09:09:28 -05'00'

4 Date

Meghan A. McCollister
Regional Administrator
U.S. Environmental Protection Agency, Region 7
11201 Renner Boulevard
Lenexa, KS 66219

6 LESLIE HUMPHREY Digitally signed by LESLIE HUMPHREY
7 Date: 2024.10.08 10:41:38 -05'00'

8 Date

Leslie Humphrey
Regional Counsel
U.S. Environmental Protection Agency, Region 7
11201 Renner Boulevard
Lenexa, KS 66219

10 KASEY BARTON Digitally signed by KASEY BARTON
11 Date: 2024.10.07 11:47:37 -05'00'

12 Date

Kasey Barton
Senior Attorney, Office of Regional Counsel
U.S. Environmental Protection Agency, Region 7
11201 Renner Boulevard
Lenexa, KS 66219

1 FOR DENALI WATER SOLUTIONS, LLC:

2

3

4

10/1/2024

5

Date

DocuSigned by:

Alvin Thomas

C09DE3B6C8F5491...

Alvin L. Thomas
General Counsel

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Appendix A

APPENDIX A

Soil Sampling and Agronomic Rate Calculation Protocol

Upon the Effective Date of the Consent Decree (“CD”), Denali shall implement this Soil Sampling and Agronomic Rate Calculation Protocol (“Protocol”) any time it land applies sewage sludge in the states of Arizona and California. Denali shall not make changes to the Protocol unless approved in writing by EPA.

I. Definitions

- A. Terms used in this Protocol have the meaning given to them in 40 C.F.R. Part 503 unless otherwise stated herein. All terms defined below or in Part 503 are capitalized.
- B. As used in this Protocol, the following definitions apply:
 1. “Application Rate” means the maximum amount of Land Application permitted for a given Field.
 2. “Application Year” is a calendar year that Denali applies Sewage Sludge to a particular Field during the duration of the CD. Application Years are Field-specific because Denali may apply to different Fields in different calendar years.
 - i. “Application Year 1” for a given Field is the first calendar year that Denali applies Sewage Sludge to that Field.
 - ii. “Application Year 2” is the second calendar year that Denali applies Sewage Sludge to a Field, even if it is discontinuous from Application Year 1.
 - iii. And so on.
 3. “Denali” means Denali personnel and/or a subcontractor hired by Denali.
 4. “Field” means a Land Application site that is uniquely identified on a Denali farm map.¹
 5. “Kv” represents the volatilization factor. Kv is the percentage of N remaining in Sewage Sludge following volatilization.
 6. “Mineralization” is the microbial breakdown of nitrogen in organic forms to plant-available inorganic forms (ammonium and nitrate).
 7. “MIN” represents the mineralization rate. MIN is the percentage of N remaining in Sewage Sludge following mineralization.
 8. “NH₄” means Ammonium.
 9. “NO₃” means Nitrate.
 10. “TKN” means Total Kjeldahl Nitrogen.
 11. “Volatilization” is the loss of volatile forms of inorganic nitrogen (ammonia) to the atmosphere from Sewage Sludge.

II. Application Rate Calculation

- A. Denali shall limit Land Application at each Field to an Application Rate that is less than or equal to the Agronomic Rate.

¹ For example, Broken Wing Farm is the overall farm. The specific ‘Field’ is the uniquely identified parcel within Broken Wing Farm identified as MA-7-2042.

B. Calculation Timing.

1. Denali shall calculate the Application Rate for each Field prior to doing any Land Application at that Field in a calendar year.
2. If double-cropping occurs in a given Field, Denali shall re-calculate the Application Rate after the first crop is harvested and prior to any subsequent Land Application.

C. Calculation Method.

1. Denali shall calculate the Application Rate for each Field using the Application Rate Worksheet (“Worksheet”) included as **Attachment 1**.
2. Denali shall obtain and use values for the Worksheet as follows:
 - i. *Available nitrogen from sewage sludge* (Lines 2, 6, 9) shall be obtained in accordance with Section III below.
 - ii. *Volatilization factor* (Line 3) shall be obtained in accordance with Section IV.A below.
 - iii. *Mineralization rate* (Line 7) shall be obtained in accordance with Section IV.B below.
 - iv. *Available nitrogen in the soil* (Line 12) shall be obtained in accordance with Section V below.
 - v. *Nitrogen supplied from other sources* (Lines 14-19) shall be obtained in accordance with Section VI below.
 - vi. *Total nitrogen requirement of the crop* (Lines 21-23) shall be obtained in accordance with Section VII below.
3. The result from the Worksheet in Attachment 1 will give an Application Rate in dry tons of Nitrogen needed. This result will then be converted to wet tons of total Sewage Sludge using the percent solids.
4. Number of wet tons needed to supply the required Nitrogen for each Field will be determined by the Nitrogen requirement for the specific crop grown, determined by Section VII below, minus Nitrogen available from other sources, determined by Sections V and VI below.
5. To address multiple biosolids streams from multiple generators land applied on the same field, Denali will use a weighted average for all generators based on the individual generator’s PAN and frequency and volume generated as further explained in Section III.
 - i. Denali will implement their designed Operation Management System (“OMS”) to account for metal cumulative loading. The OMS accounts for metals concentrations in each load from each POTW to each individual field.
 - ii. Denali will report these field accumulations of metals in their annual reports to EPA.
6. Values of “0” or “Not Applicable” may only be used if the actual subject will not be present (e.g., zero (0.0) gallons irrigation water will be applied for the entire growing season).

III. Sewage Sludge Characterization

- A. Denali shall collect Sewage Sludge sampling data from each POTW or other source from which it obtains Sewage Sludge for Land Application.
- B. Denali shall use the sampling data to determine nitrogen levels in the Sewage Sludge (Lines 2, 6, and 9 of Attachment 1 (Worksheet)) on a dry weight basis. Denali will convert dry weight results to wet weight using percent solids.
- C. Where Denali Land Applies Sewage Sludge from multiple POTWs on the same Field, it shall use a weighted average based on the PAN of each material and the number of loads per week of each material generated. This will result in the total number of wet tons that can be applied per Field for a given Application Rate.

IV. Volatilization and Mineralization

- A. The below rates will be used to determine the total available nitrogen from sewage sludge in the year that sludge is applied. Ongoing mineralization of that sludge in subsequent post-application years will be accounted for in the soil nitrogen testing collected pursuant to Section V.
- B. Volatilization factor (K_v, Line 3): Denali shall use the K_v values provided in Sullivan (2021), page 9, Table 2, converted to a percentage by dividing by 100:

Table 2. Estimates of ammonium-N retained after biosolids application

	Surface-applied			Injected
	Liquid biosolids	Dewatered biosolids	Composted, air-dried, or heat-dried biosolids	All biosolids
Time to incorporation by tillage	Ammonium-N retained (percent of applied)			
Incorporated immediately	95	95	100	100
After 1 day	70	50	100	100
After 2 days	60	30	100	100
No incorporation	55	20	100	100

- C. Mineralization rate (MIN, Line 7): Denali shall use the high end of the MIN value ranges provided in Sullivan (2021), page 10, Table 3, converted to a percentage by dividing by 100:

Table 3. First year mineralization estimates for organic N in biosolids

Processing	First-year organic N mineralization rate (percent of organic N)
Fresh*	
Anaerobic digestion, liquid or dewatered	30-40
Aerobic digestion, liquid or dewatered	30-40
Drying bed	30-40
Heat-dried	30-40
Lagoon	
Less than 6 months	30-40
6 months to 2 years	20-25
2 to 10 years	10-20
More than 10 years	5-10
Composting	0-10
Blends and soil products	†

V. Soil Sampling Protocol

A. Denali shall complete one soil analysis set per Field each time it calculates the Application Rate for that Field.

1. Each soil analysis set shall include one or more soil analyses for each depth Denali sampled in the Field, as specified below.
2. Denali shall distribute the subsamples randomly to avoid sampling bias, using the first of the two methods described on pages 1-2 of the Arizona Cooperative Extension's Soil Sampling and Analysis guidance (listed below in Section VIII) for selecting soil sampling locations (i.e., the randomly selected method, not the grid method).

B. Sampling and Analysis Process.

1. **Initial Analysis Set in Calendar Year.** For the initial calculation of Application Rate in a calendar year, each Field shall be analyzed for nitrogen content with the following number of samples taken at the following depths:
 - i. Fields up to 50 acres:
 - a. 0-1 ft = 15 composited subsamples
 - b. 1-2 ft = 15 composited subsamples
 - c. 2-3 ft = 1 sample
 - d. 3-4 ft = 1 sample
 - e. 4-5 ft = 1 sample
 - ii. All additional subsamples mentioned in Sections V.B.iii.a.- V.B.iii.e. will be selected using the method described in Section V.A.2. over the entire acreage of the field (i.e., the full number of samples to be taken will be randomly selected from the full size of the field, *not* the additional acreage of field size). Sub-samples will follow the requirements stated in Attachment 2 and defined below.
 - iii. For Fields that are larger than 50 acres:
 - a. 0-1 ft: 3 additional subsamples for every 10 additional acres of Field size beyond 50 acres (i.e., 3 additional subsamples for a 60-acre field, 6 for a 70-acre field, etc.). These additional subsamples will be composited with the subsamples from Section V.B.1.i.a.
 - b. 1-2 ft: 3 additional subsamples for every 10 additional acres of Field size beyond 50 acres (i.e., 3 additional subsamples for a 60-acre field, 6 for a 70-acre field, etc.). These additional subsamples will be composited with the subsamples from Section V.B.1.i.b.
 - c. 3 ft: 1 additional subsample for every 50 additional acres of Field size beyond 50 acres (i.e., 1 additional subsample for Fields of 51-100-acres, 2 for Fields of 101-150-acres, etc.). These additional subsamples will be composited with the sample from Section V.B.1.i.c.
 - d. 4 ft: 1 additional subsample for every 50 additional acres in Field size (i.e., 1 additional subsample for Fields of 51-100-acres, 2 for

- Fields of 101-150-acres, etc.). These additional subsamples will be composited with the sample from Section V.B.1.i.d.
- e. 5 ft: 1 additional subsample for every 50 additional acres in Field size (*i.e.*, 1 additional subsample for Fields of 51-100-acres, 2 for Fields of 101-150-acres, etc.). These additional subsamples will be composited with the sample from Section V.B.1.i.e.
 - iv. A summary of the sampling requirements by Field size is provided in **Attachment 2**.
 - v. Under this sampling approach, Denali will complete one soil analysis set per Field consisting of at least five soil analyses, *i.e.*, one analysis at depth 0-1 ft, one analysis at depth 1-2 ft, and one each at 3 ft, 4 ft, and 5 ft.²
2. **Subsequent Analysis Sets in same Calendar Year.** For any subsequent calculation of Application Rate at a previously analyzed Field in the same calendar year (*e.g.*, due to double-cropping), Denali shall re-sample that Field prior to any further Land Application in that calendar year, but may use the following reduced number of samples taken at the following depths:
- i. Fields up to 50 acres:
 - a. 0-1 ft = 15 composited subsamples
 - b. 1-2 ft = 15 composited subsamples
 - ii. Fields > 50 acres:
 - a. 0-1 ft: 3 additional subsamples for every additional 10 acres of Field size. These additional subsamples will be composited with the subsamples from Section V.B.1.i.a.
 - b. 1-2 ft: 3 additional subsamples for every additional 10 acres of Field size. These additional subsamples will be composited with the subsamples from Section V.B.1.i.b.
 - iii. Under this sampling approach, Denali will complete one soil analysis set per Field consisting of two soil analyses, *i.e.*, one analysis at each depth (0-1 ft, 1-2 ft).
- C. **Reanalysis.** If the Initial Analysis for a given Field detects 10 mg/kg nitrate-N or higher in any sample from that Field at the 5 ft depth, Denali shall promptly notify the farmer and shall do one of the following:
1. Not conduct any Land Application at that Field during the current calendar year and retest in the next calendar year at the 0-5 ft depths as described in Section V.B.1; **or**
 2. Not conduct Land Application at that Field during the current calendar year unless and until it successfully completes a Reanalysis Set consisting of the following:
 - i. Take the following soil samples at deeper soil depths:
 - a. 5 ft: 3 composited subsamples for every 50 acres of Field size
 - b. 6 ft: 3 composited subsamples for every 50 acres of Field size

² For example, on a 60-acre Field, for the Initial Analysis Set, Denali will collect 42 soil samples, and conduct 5 analyses: eighteen 0-1 foot subsamples (1 analysis), eighteen 1-2 foot subsamples (1 analysis), two 2-3 foot samples (1 analysis), two 3-4 foot samples (1 analysis), and two 4-5 foot samples (1 analysis).

- c. 7 ft: 3 composited subsamples for every 50 acres of Field size
 - ii. Complete an analysis set consisting of three analyses (one at each depth in Section V.C.1.i).
 - iii. If the Reanalysis Set does not detect nitrate-N at 10 mg/kg or higher in any of the three analyses, Denali may conduct Land Application in that calendar year.
- D. Modifications to Soil Sampling Requirements. After Application Year 3 at a given Field, Denali may request a Field-specific modification to the soil sampling requirements as follows:
 1. If both of the Initial Analysis Sets for both of the two consecutive Application Years prior to the request detected nitrate-N below 10 mg/kg at the 5 ft depth, Denali shall not be required to do further soil analysis in that Field at the 5 ft depth.
 2. If both of the Initial Analysis Sets for both of the two consecutive Application Years prior to the request detected nitrate-N below 10 mg/kg at the 4 and 5 ft depths, Denali shall not be required to do further soil analysis in that Field at the 4 and 5 ft depths.
 3. If both of the Initial Analysis Sets for both of the two consecutive Application Years prior to the request detected nitrate-N below 10 mg/kg at the 3, 4 and 5 ft depths, Denali shall not be required to do further soil analysis in that Field at the 3, 4 and 5 ft depths.

VI. Nitrogen from Other Sources

- A. Commercial Fertilizers (Line 14). At each Field where Denali is conducting Land Application, Denali shall use its best efforts to obtain from the farmer actual volumes of commercial fertilizers that have been applied or will be applied to that Field in the relevant Application Year and determine the amount of N in that volume. Denali shall record its best efforts with contemporaneous documentation in a permanent record, available to EPA.
- B. Irrigation Water (Lines 15-18).
 1. **Sampling**. At each Field where Denali is conducting Land Application in a given calendar year, Denali shall take in-Field measurements of nitrate-N at each irrigation source on a monthly basis during the growing season.
 2. **Worksheet Calculation**. Denali shall calculate the irrigation water input for the Worksheet (Line 18) as follows:
 - i. For Fields that only receive irrigation water from one source, Denali shall use the concentration and volume determined under Sections VI.B.3 and VI.B.4 below.
 - ii. For Fields that receive irrigation water from multiple sources, Denali shall use a weighted average based on the estimated volume used from each source.
 3. **Concentration (Line 16)**. Denali shall determine the nitrate-N concentration in irrigation water as follows:

- i. Application Year 1: Denali shall use a value of 10 milligrams per liter (mg/L) nitrate-N at all Fields in the first Application Year for that Field.
 - ii. Subsequent Application Years: For each Field, Denali shall use the average value of all its prior sampling results for that Field obtained under Section VI.B.1 above.
 4. **Volume** (Line 17). Denali shall determine the volume of irrigation water applied to each Field as follows:
 - i. Wherever possible, Denali shall collect the farmer's estimate of projected irrigation water volume to be used on each Field during a given growing season.
 - ii. If an estimate from the farmer is not available, Denali shall use the maximum allotment of water that could be used for that farm and growing season, divided across fields in cultivation.
 - C. Other Sources (septage, manure, industrial sludge, etc.) (Line 19). At each Field where Denali is conducting Land Application, Denali shall use its best efforts to obtain from the farmer actual volumes of other sources of N that have been applied or will be applied to that Field in the relevant Application Year and determine the amount of N in that volume. Denali shall record its best efforts with contemporaneous documentation in a permanent record, available to EPA.

VII. Crop Nitrogen Requirements

- A. Denali shall calculate the crop estimated nitrogen requirement (lbs/ac) for the Worksheet (Line 23) as follows:
- B. **Crop Verification.**
 1. Denali shall base its Worksheet calculations on actual crops planted, as follows:
 - i. Prior to each Land Application, Denali shall obtain from the landowner information on the actual crop planted or to be planted on each Field.
 - ii. Denali personnel shall inspect each Field after Land Application and document the inspection in a permanent record, available to EPA, recording:
 - a. The date of Land Application
 - b. The date Denali personnel inspected the Field
 - c. The crop observed to be growing on the Field, and
 - d. The employee conducting the inspection
 2. If Denali's inspection reveals that the actual crop being grown is not the crop reported by the landowner, Denali shall recalculate the Application Rate for that year using the appropriate crop nitrogen need and limit any further Land Application in that year to that revised Application Rate. To the extent the recalculation shows a surplus of nitrogen applied to the field, Denali will
 - i. Cease Land Application on that Field for the remainder of the current crop;
 - ii. Promptly notify the farmer; and
 - iii. Add in the surplus nitrogen amount into the next crop's Application Rate calculation (Line 19).

C. Crop Yield (Line 21).

1. Denali shall use its best efforts to obtain from the landowner actual crop yield data for each Field for the last 5 cropping years (for the specific crop to be planted/grown). Denali shall eliminate the lowest and highest results, average the remaining three results, and use that average value for the crop yield.
2. Where Denali cannot obtain actual crop data from the landowner, Denali shall use the last 5 years of reported data that is publicly available for the specific crop being grown. If no public data is available for that crop, Denali shall use public data for similar crops. Denali shall eliminate the lowest and highest results, average the remaining three results, and use that average value for the crop yield.
3. Denali shall use the following publicly available sources:
 - i. For Arizona: United States Department of Agriculture (“USDA”) Arizona Field Office Annual Statistical Bulletin, *available here*: https://www.nass.usda.gov/Statistics_by_State/Arizona/Publications/Annual_Statistical_Bulletin/index.php.
 - ii. For California: Riverside County Agricultural Commissioner’s Office Crop Reports, *available here*: <https://rivcoawm.org/resources/publications-databases>, and Merced County Crop reports, *available here*: <https://www.countyofmerced.com/151/Crop-Statistics-Reports>.
 - iii. If these sources do not have appropriate crop yield data, Denali will obtain crop yield data from state agricultural extension offices and will include citations to all sources in its annual reports submitted under the CD.
4. If these publicly available sources do not have appropriate crop yield data, Denali shall develop a crop yield to use in the Worksheet based on sources it deems appropriate, including from the USDA and state agricultural services. Denali will include an explanation of its approach in its annual reports submitted under the CD.

D. Crop Nitrogen Demand (Line 22). Denali shall use the Nitrogen Demand Guide in **Attachment 3** to assign a nitrogen demand per common unit of harvest of yield for the specific crop in cultivation.

E. Denali shall not conduct Land Application on rangeland unless and until it submits, and EPA approves, a proposal for how Denali will determine the appropriate value to use for the Worksheet (Line 23) with respect to rangeland.

VIII. References

- EPA/831-B-93-002b U.S. EPA. 1994. Land Application of Sewage Sludge; A Guide for Land Appliers on the Requirements of the Federal Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 503. Report Number EPA/831-B-93-002b. Appendix E. Office of Enforcement and Compliance Assurance, Environmental Protection Agency, Washington, DC 20460. December 1994.
- Worksheet for Calculating Biosolids Application Rates, Feb. 2021 (PNW 511). Dan M. Sullivan, Deirdre Griffin LaHue, Biswanath Dari, Andy I. Bary and Craig G. Cogger. Pacific Northwest Extension Publication. Oregon State University, University of Idaho, Washington State University.
- Arizona Cooperative Extension's Soil Sampling and Analysis, Revised October 2011, AZ1412, <https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1412.pdf>
- https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2004/wqo/wqo2004-0012.pdf

Attachment 1

Application Rate Worksheet

APPLICATION RATE WORKSHEET					Max. to Apply	Applied
Waste Source:				Wet Tons		
Waste Type:				Dry Tons		
Analysis Date:				Wet Metric Tons		
Field Name:				Dry Metric Tons		
Acreage:				Wet Tons/Acre		
Application Method:				Dry Tons/Acre		
Multiple Cropping (Y/N)				Wet Metric Tons/ha		
Crop Number (1 of #)				Dry Metric Tons/ha		
Crop Type				Number of Loads		
Line	Section	Description of Input		VALUE	Units	
1	1. Sewage Sludge Nitrogen	Ammonium nitrogen				
2		NH4-N (analytical result in mg/kg convert to %)	mg/kg ÷ 10,000 = %		%	
3		Volatilization Factor (Kv)	See IV.B. convert to decimal			decimal %
4		Total ammonium nitrogen	Line 2 * Line 3			%
5		Mineralized organic nitrogen				
6		Org-N (analytical result in mg/kg convert to %)	mg/kg ÷ 10,000 = %			%
7		Mineralization Rate (MIN)	See IV.C. convert to decimal			decimal %
8		Total mineralized organic nitrogen	Line 6 * Line 7			%
9		NO3-N (analytical result in mg/kg convert to %)	mg/kg ÷ 10,000 = %			%
10		Total available nitrogen from sewage sludge	Sum Lines 4, 8, 9			%
11		PAN per dry ton of Sewage Sludge	[Line 10] ÷ (100) * (2000 lbs/t)			lbs N/ DT
12	2. Soil Residual Nitrogen	Soil NO3-N (analytical result)			mg/kg	
13		Conversion to lbs/ac	(Line 12 * 2)		lbs N/ac	
14	3. Nitrogen supplied from other sources	Commercial Fertilizers			lbs N/ac	
15		Irrigation water (conversion factor of 1mg/l = 2.72 lbs/ac-ft)				
16		Concentration of nitrate-N in water (analytical result or 10 mg/L)				mg/L N
17		Volume of irrigation water				ac-ft irr H2O
18		Total N from irrigation water	(Line 16 * 2.72) * Line 17			lbs N/ac
19	Other N Sources				lbs N/ac	
20	Sum Existing Sources	Total nitrogen available from existing sources	Sum Lines 13, 14, 18, 19		lbs N/ac	
21	4. Crop N requirements	Crop Yield Units (Tons per ac. or Bushels per ac.)	See Attachment 3 (Column C)		unit/ac	
22		Crop N demand (N lbs per Ton or N lbs. per Bushels)	See Attachment 3 (Column D)		lbs N/ac/unit	
23		Total crop nitrogen requirement	(Line 21 * Line 22)			lbs N/ac
24	5. Sewage Sludge Application Rate	Supplemental nitrogen needed from dry ton of sewage sludge	Line 23 - Line 20		lbs N/ac	
25		Application Rate (per Dry Ton(s) of Sewage Sludge)	Line 24 ÷ Line 11			DT/ac
26	6. Volume of biosolids needed per Acre	Percent total solids			%	
27		Conversion of Dry Tons (DT) to Wet Tons (WT)	(Line 25 * 100) ÷ Line 26			WT/ac needed
28	7. Application Rate for Entire Field	Maximum total DT needed for field	Line 25 * acreage		total DT	
29		Maximum total WT needed for field	Line 27 * acreage		total WT	
30		Maximum total # of loads needed for field	Line 29 ÷ (25 WT/load)			# loads per field.

Attachment 2

Soil Sub-Samples by Field Size

Field Size (ac)	≤ 50	51-60	61-70	71-80	81-90	91-100	101-110	111-120	121-130	131-140	141-150	151-160	Etc.	
Depth (ft)														
0-1	15	18	21	24	27	30	33	36	39	42	45	48		
1-2	15	18	21	24	27	30	33	36	39	42	45	48		
3	1	2	2	2	2	2	3	3	3	3	3	4		
4	1	2	2	2	2	2	3	3	3	3	3	4		
5	1	2	2	2	2	2	3	3	3	3	3	4		

Attachment 3

Nitrogen Demand Guide

Fertilizer Calculator Guide				
Calculation Table for base Nutrient Determination			Nitrogen Base Rate	
[A] Crop	[B] Standard Units of production (all on per Acre Basis) [REFERENCE]	[C] Yield Goal [INPUT]	[D] Pounds of Nitrogen per Unit Yield (based on Removal Rate) [REFERENCE]	[E] Base Pounds of Nitrogen Per Acre [CALCULATION] [E = C x D]
Alfalfa	Tons	8.39	56.00	470.00
Bermuda	Tons	4.66	50.00	233.10
Fescue	Tons	0.00	40.00	0.00
Sorgum-Sudan Hay	Tons	22.29	41.00	914.00
Silage Corn	Tons	29.71	8.30	246.60
Barley	Goal	59.26	1.10	65.19
Corn Grain	Bushel	140.00	0.91	127.40
Cotton	Bale	2.85	31.00	88.40
Sorgum Grain	Bushel	0.00	0.85	0.00
Wheat (12%)	Tons	60.62	1.26	76.38

Notes:

- Crop [A] - selected crops
- Standard Units [B] - provided based on common reference; may vary but ultimately yield on a per acre basis
- Yield Goal (YG) [C] – **INPUT DATA** either from farm information or county average
- Pounds of Nitrogen per Yield [D] - N Removal Rate as listed in AgPhD Application; may be rounded and may differ slightly with other peer reviewed references
- Calculation [E]:
 - $[C] \times [D] = [E]$
 - $(YG/Ac * \#N/Unit \text{ using removal rate} = \text{Nitrogen per acre/yr})$

Attachment 4


Sample Calculation

The application rate worksheet on the following page shows an example of how application rate would be calculated for a particular field. The example uses two types of information inputs:

- (1) Inputs shown in the rows highlighted in purple come from an actual field summary report, reproduced below.
- (2) Inputs shown in the rows highlighted in green are hypothetical values using the following assumptions:
 - a. The crop being planted is Alfalfa.
 - b. Soil sampling of the example field showed soil NO₃-N of 15 mg/kg (Line 13).
 - c. The concentration of nitrate-N in water was assumed to be 10 mg/L for the first Application Year, per VI.3.ii of the Protocol (Line 17).
 - d. The volume of irrigation water to be applied is 6 ac-ft (consistent with alfalfa) (Line 18).
 - e. The farmer reported no commercial fertilizers or other sources of N were applied to the field (Lines 15 & 20).

The worksheet results are shown in yellow. For compliance, Denali's application rate for this field must be no more than 13453.35 wet tons, 2367.79 dry tons, or 538.13 loads of sewage sludge.

Field/Biosolids Information



FARM APPLICATION SUMMARY REPORT

For: 1/1/2022 To: 12/31/2022

Waste Source: [REDACTED]	Wet Tons Applied:	1,107.26	
Waste Type: WWTP BIOSOLIDS	Dry Tons Applied:	194.88	
Analysis Date: 03/26/2022	Wet Metric Tons Applied:	1,005.17	
Field Name: [REDACTED]	Dry Metric Tons Applied:	176.91	
Acreage: 72.60	Wet Tons/Acre Applied:	15.25	
Application Method: Surface	Dry Tons/Acre Applied:	2.68	
Volume Applied: 1,107.26 WET TONS	Wet Metric Tons/ha Applied:	13.85	
	Dry Metric Tons/ha Applied:	2.44	

Constituent	Analysis (mg/kg)	Applied (kg/ha)	Applied (lb/ac)
% Solids	17.60%		
TKN	10,000.00	60.4728	53.6853
NH3	2,400.00	14.4416	12.8845
NO3	1.10	0.0066	0.0059
Organic N	7,600.00	45.7316	40.8009
Pb	1.30	0.0081	0.0070
Cd	0.14	0.0008	0.0007
Cr	5.40	0.0325	0.0290
Cu	100.00	0.6017	0.5369
Pb	1.90	0.0114	0.0102
Hg	0.15	0.0009	0.0008
Mo	2.70	0.0162	0.0145
Ni	2.70	0.0162	0.0145
Se	2.20	0.0132	0.0118
Zn	120.00	0.7221	0.6442
PAN	234.03 lbs	16.3828	14.6164

Percent Solids: Line 26

NH3 (NH4-N): Line 2

NO3: Line 9

Organic N: Line 6

APPLICATION RATE WORKSHEET				
			Max. to Apply	Applied
Waste Source:			Wet Tons	13453.35
Waste Type:	WWTP Biosolids		Dry Tons	2367.79
Analysis Date:	3/26/2022		Wet Metric Tons	12204.68
Field Name:			Dry Metric Tons	2148.02
Acreage:	72.6		Wet Tons/Acre	185.31
Application Method:	Surface		Dry Tons/Acre	32.61
Multiple Cropping (Y/N)			Wet Metric Tons/ha	415.40
Crop Number (1 of #)			Dry Metric Tons/ha	73.11
Crop Type	Alfalfa		Number of Loads	538.13
Line	Section	Description of Input	VALUE	Units
1	1. Sewage Sludge Nitrogen	Ammonium nitrogen		
2		NH4-N (analytical result in mg/kg convert to %)	mg/kg ÷ 10,000 = %	0.24 %
3		Volatilization Factor (Kv)	See IV.B. convert to decimal	0.5 decimal %
4		Total ammonium nitrogen	Line 2 * Line 3	0.12 %
5		Mineralized organic nitrogen		
6		Org-N (analytical result in mg/kg convert to %)	mg/kg ÷ 10,000 = %	0.76 %
7		Mineralization Rate (MIN)	See IV.C. convert to decimal	0.4 decimal %
8		Total mineralized organic nitrogen	Line 6 * Line 7	0.304 %
9		NO3-N (analytical result in mg/kg convert to %)	mg/kg ÷ 10,000 = %	0.00011 %
10		Total available nitrogen from sewage sludge	Sum Lines 4, 8, 9	0.42411 %
11		PAN per dry ton of Sewage Sludge	[Line 10] ÷ (100)] * (2000 lbs/t)	8.4822 lbs N/ DT
12	2. Soil Residual Nitrogen	Soil NO3-N (analytical result)	15 mg/kg	
13		Conversion to lbs/ac	(Line 12 * 2)	30 lbs N/ac
14	3. Nitrogen supplied from other sources	Commercial Fertilizers		0 lbs N/ac
15		Irrigation water (conversion factor of 1mg/l = 2.72 lbs/ac-ft)		
16		Concentration of nitrate-N in water (analytical result or 10 mg/L)		10 mg/L N
17		Volume of irrigation water		6 ac-ft irr H2O
18		Total N from irrigation water	(Line 16 * 2.72) * Line 17	163.2 lbs N/ac
19	Other N Sources		0 lbs N/ac	
20	Sum Existing Sources	Total nitrogen available from existing sources	Sum Lines 13, 14, 18, 19	193.2 lbs N/ac
21	4. Crop N requirements	Crop Yield Units (Tons per ac. or Bushels per ac.)	See Attachment 3 (Column C)	8.39 unit/ac
22		Crop N demand (N lbs per Ton or N lbs. per Bushels)	See Attachment 3 (Column D)	56 lbs N/ac/unit
23		Total crop nitrogen requirement	(Line 21 * Line 22)	469.84 lbs N/ac
24	5. Sewage Sludge Application Rate	Supplemental nitrogen needed from dry ton of sewage sludge	Line 23 - Line 20	276.6 lbs N/ac
25		Application Rate (per Dry Ton(s) of Sewage Sludge)	Line 24 ÷ Line 11	32.6 DT/ac
26	6. Volume of biosolids needed per Acre	Percent total solids		17.6 %
27		Conversion of Dry Tons (DT) to Wet Tons (WT)	(Line 25 * 100) ÷ Line 26	185.31 WT/ac needed
28	7. Application Rate for Entire Field	Maximum total DT needed for field	Line 25 * acreage	2367.79 total DT
29		Maximum total WT needed for field	Line 27 * acreage	13453.35 total WT
30		Maximum total # of loads needed for field	Line 29 ÷ (25 WT/load)	538.13 # loads per field.