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# 3.2.P.8.1 STABILITY SUMMARY AND CONCLUSION

An initial shelf life of 9 months from the date of manufacture (DOM) is proposed for DP material stored in the commercial container closure system, defined in Section 3.2.P.7, when stored at the recommended long-term storage condition of -15°C to -25°C (-20°C). The proposed shelf life includes up to 1 month (30 days) of storage at 2 – 8°C (5°C) and up to 24 hours at room temperature (25°C) to support administration of the vaccine at the point of care site. The DP DOM is defined by the start date of sterile filtration.

For clinical scale lots manufactured at ModernaTX, Inc. and Scale A PPQ lots manufactured at Catalent, mRNA-1273 DP stability samples were selected at random post visual inspection, prior to labeling. For Catalent and Baxter Scale B PPQ lots, stability samples were selected at random post-packaging.

## 3.2.P.8.1.1 Stability Summary and Conclusions

The stability of DP has been extensively characterized in numerous studies of development lots and lots manufactured at full scale under Emergency Use Authorization. The scope of this section includes stability studies of clinical trial lots, additional lots used in statistical modeling to support shelf-life claims, and Scale B process performance qualification lots. This differs from the scope of stability summaries for more traditional products because of the extraordinary requirements for accelerated development and distribution of mRNA-1273 drug product (DP). This section also describes certain stability study timepoints that were missed.

Production of mRNA-1273 was transferred to multiple manufacturing sites within less than one year in response to pandemic needs. In these circumstances, there are a large number of registration lots in stability studies, but many of these studies have not yet reached the 9-month time point. Studies of earlier development and clinical lots have attained longer timepoints. This section includes both registration lots and additional clinical and development lots with longer timepoints which were used for stability modeling to establish shelf life claims.

The mRNA-1273 DP registration stability program was executed according to ICH Q1A (R2), *Stability Testing of New Drug Substances and Products*, and ICH Q5C, *Stability Testing of Biotechnological/Biological Products.* An initial shelf life of 9 months is proposed for DP material stored in the commercial container closure system, defined in Section 3.2.P.7, when stored at the recommended long-term storage condition of -15°C to -25°C (-20°C). The proposed

shelf life includes up to 1 month (30 days) of storage at 2 – 8°C (5°C) and up to 24 hours at room temperature (25°C) to support administration of the vaccine at the point of care site.

The properties of mRNA-loaded lipid nanoparticles with respect to the attributes that affect product potency have been systematically and thoroughly assessed. These attributes include the quantity of mRNA delivered; the fidelity of the mRNA sequence, including cap, tail, and open reading frame; the integrity of the mRNA; and biophysical attributes of the lipid nanoparticles, particularly including the state of mRNA encapsulation and the size distribution of the particles. Direct measurements of those attributes of greatest significance have been established and those assays are included in the routine release panel.

The product quality attribute which changes most during manufacturing and distribution is mRNA integrity assessed by mRNA purity. Degradation of mRNA in the product has been extensively studied by applying a sensitive chromatographic assay to assess the formation of RNA degradants. The principal routes of degradation are hydrolytic chain scission, which is measured by the species which elute prior to the main peak (RNA fragments); and the formation of covalent adducts between the RNA and degradants of the cationic lipid, which are relatively hydrophobic and elute after the main peak (RNA-lipid adduct). Measurement of mRNA purity by RP-HPLC is a precise, accurate and the most stability-indicating measure of product activity.

The stability profiles for all the stability-indicating attributes are evaluated and monitored, but the primary determinant of shelf life is purity. The purity stability profiles are consistent and predictable for all vial fill volumes, container types, manufacturing scales, and individual lots assessed to-date. Degradation rates for purity at each temperature of interest are reported in Section 3.2.P.8.1.2. The product shelf life claim is established using the degradation rates estimated from stability studies for multiple lots, following expectations and procedures established in ICH guidelines and the WHO guideline on vaccine stability.

Development, clinical, and Scale A lots were used in the purity modeling analysis (Table 1). The DP development lots are representative of clinical material manufactured at ModernaTX, Inc. (Norwood, MA). All lots of DP manufactured at ModernaTX, Inc. used the Scale A manufacturing process (Section 3.2.P.2.3 {Manufacturing History}). All lots of DP manufactured at Catalent Indiana, LLC (Catalent). and used for statistical modeling used the Scale A manufacturing process (Section 3.2.P.2.3 {Manufacturing History}). DP lots manufactured using the Scale B process at Catalent have been placed in stability studies, but these studies had not attained at least 3 timepoints when the model for shelf life was established. The mRNA purity data from studies used for shelf life determination are presented in Section 3.2.P.8.3. End-on-end

stability studies were performed on Scale A lots to confirm modeling results; data are discussed in Section 3.2.P.8.1.2.1.

Clinical material (Table 1) stability indicating attributes were shown to be within specifications throughout the proposed dosing regimen. Clinical lot stability data are presented in Section 3.2.P.8.3 and protocols are provided in Section 3.2.P.8.1.4.

Registration lots for Scale B Process Performance Qualification (PPQ) manufactured using the processes described in Section 3.2.P.3.3 {Catalent} and Section 3.2.P.3.3 {Baxter}, have been placed on stability studies. Stability studies were performed in Type 1 borosilicate glass vials (Table 2), aluminosilicate glass vials (Table 3), and SiOPlas™ 10-mL cyclic olefin polymer vials (Table 4). An analysis of stability data for mRNA-1273 Drug Product lots with different fill volumes has been conducted which demonstrates that there are no significant differences in degradation rate as a function of fill volume. The data from these studies are presented in Section 3.2.P.8.3 and protocols are provided in Section 3.2.P.8.1.3.

Stability and characterization studies designed to evaluate product stability under light exposure and freeze/thaw conditions are discussed in Section 3.2.P.8.1.6.

Scale A and Scale B stability samples were stored in the commercial closure systems: Ompi® 10R clear Type 1 borosilicate glass vials, SiOPlas™ 10-mL cyclic olefin polymer vials, Corning Valor 10R clear aluminosilicate glass vials, or Corning Velocity 10R clear Type 1 borosilicate glass vials with serum stopper and an aluminum crimp flip-off seal (Section 3.2.P.7). Samples stored at the recommended storage condition of -20 ± 5°C are evaluated against the specification current at the time of testing. Samples stored at alternate storage conditions use the specification as a reference point to characterize stability trends at that condition.

**Table 1: Drug Product Stability Modeling Lots**

| Lot | Purpose | Manufacturing Location | Lot Size | Fill Volume (mL) | Container Closure | Conditions | |
|---|---|---|---|---|---|---|---|
| | | | | | | Temperature | Duration |
| AMPDP-200005 | Development | ModernaTX, Inc. | (b) (4) | 0.6 | Ompi® 2R clear Type 1 borosilicate glass vial | -60°C to -90°C | 6 months |
| | | | | | | 5°C ± 3°C | 6 months |
| DH-02838 | Development | ModernaTX, Inc. | | 0.2 | Ompi® 2R clear Type 1 borosilicate glass vial | -60°C to -90°C | 12 months |
| | | | | | | 5°C ± 3°C | 6 months |
| DHM-49621 | Development | ModernaTX, Inc. | | 0.2 | Ompi® 2R clear Type 1 borosilicate glass vial | -60°C to -90°C | 12 months |
| | | | | | | 5°C ± 3°C | 6 months |
| AMPDP-200022 (b) (4) | Development | ModernaTX, Inc. | | 0.6 | Ompi® 2R clear Type1 borosilicate glass vial | -40°C ± 5°C | 12 months |
| | | | | | | -20°C ± 5°C | 12 months |
| | | | | | | 5°C ± 3°C | 5 months |
| AMPDP-200022 (b) (4) | Development | ModernaTX, Inc. | | 0.6 | Ompi® 2R clear Type 1 borosilicate glass vial | -60°C to -90°C | 12 months |
| AMPDP-200022 (b) (4) | Development | ModernaTX, Inc. | | 0.6 | SiOPlas 2-mL COP vial | -60°C to -90°C | 12 months |
| | | | | | | -20°C ± 5°C | 12 months |
| | | | | | | 5°C ± 3°C | 5 months |

| Lot | Purpose | Manufacturing Location | Lot Size | Fill Volume (mL) | Container Closure | Conditions | |
|---|---|---|---|---|---|---|---|
| | | | | | | Temperature | Duration |
| AMPDP-200022 (b) (4) | Development | ModernaTX, Inc. | (b) (4) | 0.6 | Ompi® 2R clear Type1 borosilicate glass vial | -60°C to -90°C | 12 months |
| | | | | | | -40°C ± 5°C | 12 months |
| | | | | | | -20°C ± 5°C | 12 months |
| | | | | | | 5°C ± 3°C | 5 months |
| AMPDP-200022 (b) (4) | Development | ModernaTX, Inc. | | 0.6 | SiOPlas 2-mL COP vial | -60°C to -90°C | 18 months |
| | | | | | | -20°C ± 5°C | 12 months |
| | | | | | | 5°C ± 3°C | 5 months |
| DH-03453.1 | Development | ModernaTX, Inc. | | 6.5 | Ompi® 10R clear Type 1 borosilicate glass vial | -40°C ± 5°C | 12 months |
| | | | | | | -20°C ± 5°C | 12 months |
| | | | | | | 5°C ± 3°C | 6 months |
| | | | | | | 5°C ± 3°C | 6 months |
| DH-03453.2 | Development | ModernaTX, Inc. | | 6.5 | SiOPlas 10-mL COP vial | -40°C ± 5°C | 12 months |
| | | | | | | -20°C ± 5°C | 12 months |
| | | | | | | 5°C ± 3°C | 6 months |
| | | | | | | 5°C ± 3°C | 6 months |
| DH-03453.3 | Development | ModernaTX, Inc. | | 0.6 | Ompi® 2R clear Type 1 borosilicate glass vial | -70°C ± 10C | 6 months |
| | | | | | | 5°C ± 3°C | 6 months |

| Lot | Purpose | Manufacturing Location | Lot Size | Fill Volume (mL) | Container Closure | Conditions | |
|---|---|---|---|---|---|---|---|
| | | | | | | Temperature | Duration |
| DHM-53331 | Development | ModernaTX, Inc. | (b) (4) | 0.6 | Ompi® 2R clear Type 1 borosilicate glass vial | -70°C ± 10C | 6 months |
| | | | | | | 5°C ± 3°C | 6 months |
| 6007520001 | Clinical | ModernaTX, Inc. | (b) (4) vials | 5.0 | Ompi® 10R clear Type 1 borosilicate glass vial | -60°C to -90°C | 12 months |
| | | | | | | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 6 months |
| | | | | | | 25 ± 2°C | 72 hours |
| 6007520002 | Clinical | ModernaTX, Inc. | vials | 5.0 | Ompi® 10R clear Type 1 borosilicate glass vial | -60°C to -90°C | 12 months |
| | | | | | | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 6 months |
| | | | | | | 25 ± 2°C | 72 hours |
| 6007520003 | Clinical | ModernaTX, Inc. | vials | 5.0 | Ompi® 10R clear Type 1 borosilicate glass vial | -60°C to -90°C | 12 months |
| | | | | | | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 6 months |
| | | | | | | 25 ± 2°C | 72 hours |
| 6007520004 | Clinical | ModernaTX, Inc. | vials | 5.0 | Ompi® 10R clear Type 1 borosilicate glass vial | -60°C to -90°C | 12 months |
| | | | | | | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 6 months |
| | | | | | | 25 ± 2°C | 72 hours |

| Lot | Purpose | Manufacturing Location | Lot Size | Fill Volume (mL) | Container Closure | Conditions | |
|---|---|---|---|---|---|---|---|
| | | | | | | Temperature | Duration |
| 6007520005 | Clinical | ModernaTX, Inc. | (b) (4) vials | 5.0 | Ompi® 10R clear Type 1 borosilicate glass vial | -60°C to -90°C | 9 months |
| 6007520006 | Clinical | ModernaTX, Inc. | vials | 5.0 | Ompi® 10R clear Type 1 borosilicate glass vial | -60°C to -90°C | 9 months |
| 6007320001 | Scale A | Catalent Biologics, LLC | (b) (4) vials | 6.3 | Ompi® 10R clear Type 1 borosilicate glass vial | -20°C ± 5°C | 12 months |
| | | | | | | 25°C ± 2°C | 72 hours |
| 6007320002 | Scale A | Catalent Biologics, LLC | (b) (4) vials | 6.3 | Ompi® 10R clear Type 1 borosilicate glass vial | -20°C ± 5°C | 12 months |
| | | | | | | 25°C ± 2°C | 72 hours |
| 6007320003 | Scale A | Catalent Biologics, LLC | (b) (4) vials | 6.3 | Ompi® 10R clear Type 1 borosilicate glass vial | -20°C ± 5°C | 12 months |
| | | | | | | 25°C ± 2°C | 72 hours |

Abbreviations: COP = cyclic olefin polymer; I = inverted; N/A = not applicable; PPQ = process performance qualification

**Table 2: Drug Product Registration Stability Lots in Type 1 Borosilicate Glass Vials**

| Lot | Purpose | Manufacturing Location (Fill Line) | Lot Size | Fill Volume (mL) | Container Closure | Conditions | |
|---|---|---|---|---|---|---|---|
| | | | | | | Temperature | Duration |
| 6007320005 | Scale B | Catalent Biologics, LLC (Flexible Fill line) | (b) (4) | 6.3 | Ompi® 10R clear Type 1 borosilicate glass vial | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 6 months |
| 6007320008 | Scale B | Catalent Biologics, LLC (Flexible Fill line) | | 6.3 | Ompi® 10R clear Type 1 borosilicate glass vial | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 4 months |
| 6007320009 | Scale B | Catalent Biologics, LLC (Flexible Fill line) | | 6.3 | Ompi® 10R clear Type 1 borosilicate glass vial | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 4 months |
| 6007320010 | Scale B | Catalent Biologics, LLC (Flexible Fill line) | | 6.3 | Ompi® 10R clear Type 1 borosilicate glass vial | -20 ± 5°C | 12 months |
| 6007320012 | Scale B | Catalent Biologics, LLC (Flexible Fill line) | | 6.3 | Ompi® 10R clear Type 1 borosilicate glass vial | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 4 months |
| 6008520001 | Scale B | Catalent Biologics, LLC (Vial Line (b) (4) | | 6.3 | Ompi® 10R clear Type 1 borosilicate glass vial | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 3 months |
| 6009921006 | Scale B | Catalent Biologics, LLC (Vial Line (b) (4) | | 8.0 | Ompi®10R clear Type 1 borosilicate glass vial | -20 ± 5°C | 12 months |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6003921002 | Scale B | Catalent Biologics, LLC (Vial Line (b) (4) | (b) (4) | 8.0 | Corning Velocity™ 10R clear Type 1 borosilicate glass vials | -20 ± 5°C | 12 months |
| 6009821002 | Scale B | Catalent Biologics, LLC (Flexible Fill Line) | | 8.0 | Ompi® clear Type 1 borosilicate glass vial | -20 ± 5°C | 12 months |
| 6008921001 | Scale B | Baxter (Vial Line (b) (4) | | 8.0 | Corning Velocity Vial Type 1 borosilicate glass | -20 ± 5°C | 12 months |

Abbreviations: COP = cyclic olefin polymer; I = inverted; N/A = not applicable; PPQ = process performance qualification

**Table 3: Drug Product Registration Stability Lots in Aluminosilicate Glass Vials**

| Lot | Purpose | Manufacturing Location (Fill Line) | Lot Size | Fill Volume (mL) | Container Closure | Conditions | |
|---|---|---|---|---|---|---|---|
| | | | | | | Temperature | Duration |
| 6008620001 | Scale B | Catalent Biologics, LLC (Vial Line (b) (4) | (b) (4) | 6.3 | Corning Valor 10R clear aluminosilicate glass vial | -20 ± 5°C | 12 months |
| 6008620002 | Scale B | Catalent Biologics, LLC (Vial Line (b) (4) | | 6.3 | Corning Valor 10R clear aluminosilicate glass vial | -20 ± 5°C | 12 months |
| 6008620007 | Scale B | Catalent Biologics, LLC (Vial Line (b) (4) | | 6.3 | Corning Valor 10R clear aluminosilicate glass vial | -20 ± 5°C | 12 months |
| 6010121002 | Scale B | Catalent Biologics, LLC (Vial Line (b) (4) | | 8.0 | Corning Valor 10R clear aluminosilicate glass vials | -20 ± 5°C | 12 months |
| 6008221002 | Scale B | Baxter (Vial Line | | 8.0 | Corning Valor clear aluminosilicate glass vials | -20 ± 5°C | 12 months |
| 6008221003 | Scale B | Baxter (Vial Line | | 8.0 | Corning Valor clear aluminosilicate glass vials | -20 ± 5°C | 12 months |

**Table 4: Drug Product Registration Stability Lots in Cyclic Olefin Polymer Vials**

| Lot | Purpose | Manufacturing Location (Fill Line) | Lot Size | Fill Volume (mL) | Container Closure | Conditions | |
|---|---|---|---|---|---|---|---|
| | | | | | | Temperature | Duration |
| 6007920001 | Scale B | Catalent Biologics, LLC (Flexible Fill Line) | (b) (4) | 6.3 | SiOPlas 10-mL COP vial | -20 ± 5°C | 12 months |
| | | | | | | 25°C ± 2°C | 72 hours |
| 6007920002 | Scale B | Catalent Biologics, LLC (Flexible Fill Line) | | 6.3 | SiOPlas 10-mL COP vial | -20 ± 5°C | 12 months |
| | | | | | | 25°C ± 2°C | 72 hours |
| 6007920003 | Scale B | Catalent Biologics, LLC (Flexible Fill Line) | | 6.3 | SiOPlas 10-mL COP vial | -20 ± 5°C | 12 months |
| | | | | | | 5 ± 3°C | 4 months |

Abbreviations: COP = cyclic olefin polymer

## 3.2.P.8.1.2 Stability Modeling Results

Degradation rates for purity of DP were estimated for five different storage conditions using the stability study results available as of April 12, 2021. The rates along with their 95% confidence intervals are summarized in Table 5. These rates are expressed as a percentage of initial purity lost in the next month (or hour), not as a drop in purity percentage units. For example, a (b) (4) loss per month for (b) (4) purity results in (b) (4) after 1 month, since (b) (4) purity is (b) (4) purity percentage units lost. The longest timepoint available for purity in April 2021 was 12 months. The statistical models are based on first-order kinetics.

**Table 5: Summary of Estimated Degradation Rates by Temperature**

| Temperature | Estimated Degradation Rate, %purity per month | Lower 95% CI for Degradation Rate | Upper 95% CI for Degradation Rate |
|---|---|---|---|
| -60°C to -90°C | (b) (4) | | |
| -40°C ± 5°C | | | |
| -20°C ± 5°C | | | |
| 5°C ± 3°C | | | |
| **Temperature** | **Estimated Degradation Rate, %purity per hour** | **Lower 95% CI for Degradation Rate** | **Upper 95% CI for Degradation Rate** |
| 25°C ± 2°C | (b) (4) | | |

### 3.2.P.8.1.2.1 Supporting End-on-End Stability Study Results

To support the real-life dosing of mRNA-1273 DP, drug product batches in vials were placed on stability using an end-on-end strategy for the transition from -70°C to 5°C and from -20°C to 5°C. These studies demonstrate that the product quality of mRNA-1273 drug product is not impacted by the transition from the frozen state to storage at 5°C. DP lots that were conditioned at -70°C or at -20°C for up to 2 months and then moved to storage at 5°C remained in specification for at least 3 months at 5°C.

Supporting stability data also demonstrate that storage of the vials at 25°C following the end-to-end studies for up to 72 hours is acceptable. The product quality attributes remain within specification when stored at 25°C for up to 72 hours.

## 3.2.P.8.1.3 Registration Stability Lots

### 3.2.P.8.1.3.1 Storage Condition (-20°C ± 5°C)

All Scale B PPQ lots have been placed at -20°C ± 5°C for intended duration of 12 months. Table 6 provides an index to the -20°C ± 5°C stability protocols for each lot.

All quality attributes meet the specification as presented in Section 3.2.P.8.3. Available stability data are presented in Section 3.2.P.8.3.

The symbol “x” in the tables below is used to identify when testing will occur.

**Table 6: Scale B PPQ Stability Lot Protocol Index (-20 ± 5°C)**

| Lot | Fill Line | Vial Type | Protocol |
|---|---|---|---|
| 6007320005 | Flexible Fill Line | Ompi® 10R Type 1 borosilicate glass vial | Table 8 |
| 6007320008 | Flexible Fill Line | Ompi® 10R Type 1 borosilicate glass vial | Table 7 |
| 6007320009 | Flexible Fill Line | Ompi® 10R Type 1 borosilicate glass vial | Table 7 |
| 6007320010 | Flexible Fill Line | Ompi® 10R Type 1 borosilicate glass vial | Table 9 |
| 6007320012 | Flexible Fill Line | Ompi® 10R clear Type 1 borosilicate glass vial | Table 7 |
| 6008520001 | Vial Line (b) (4) | Ompi® 10R clear Type 1 borosilicate glass vial | Table 10 |
| 6009921006 | Vial Line | Ompi® 10R clear Type 1 borosilicate glass vial | Table 11 |
| 6003921002 | Vial Line | 10R Velocity Vial Type 1 borosilicate glass vial | Table 11 |
| 6009821002 | Flexible Fill Line | Ompi® 10R clear Type 1 borosilicate glass vial | Table 12 |
| 6008921001 | Vial Line (b) (4) | 10R Velocity Vial Type 1 borosilicate glass | Table 11 |
| 6008620001 | Vial Line | Corning Valor 10R clear aluminosilicate glass vials | Table 8 |
| 6008620002 | Vial Line | Corning Valor 10R clear aluminosilicate glass vials | Table 8 |
| 6008620007 | Vial Line | Corning Valor 10R clear aluminosilicate glass vials | Table 8 |
| 6010121002 | Vial Line | Corning Valor 10R clear aluminosilicate glass vials | Table 12 |
| 6008221002 | Vial Line | Corning Valor 10R clear aluminosilicate glass vials | Table 11 |
| 6008221003 | Vial Line | Corning Valor 10R clear aluminosilicate glass vials | Table 11 |
| 6007920001 | Flexible Fill Line | 10R cyclic olefin polymer vials with SiO2 coating | Table 8 |
| 6007920002 | Flexible Fill Line | 10R cyclic olefin polymer vials with SiO2 coating | Table 8 |
| 6007920003 | Flexible Fill Line | 10R cyclic olefin polymer vials with SiO2 coating | Table 7 |

Abbreviations: COP = cyclic olefin polymer PPQ = process performance qualification

**Table 7: Stability Protocol for PPQ Lots 6007320008, 6007320009, 6007320012, and 6007920003 (-20 ± 5°C)**

| Attribute | Time Point (month) | | | | |
|---|---|---|---|---|---|
| | 0 | 3 | 6 | 9 | 12 |
| Appearance | X | NT | x | NT | x |
| %RNA Encapsulation | X | NT | x | NT | x |
| Purity by RP-HPLC | X | x | x | X | x |
| Product-Related Impurities by RP-HPLC | X | x | x | X | x |
| Particle Size by DLS | X | x | x | X | x |
| Polydispersity by DLS | X | x | x | X | x |
| In Vitro Translation | X | NT | x | NT | x |
| pH | X | NT | x | NT | x |
| RNA Content by AEX-HPLC | X | NT | x | NT | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | X | NT | x | NT | x |
| Bacterial Endotoxin | NT | | | | x |
| Particulate Matter | NT | | | | x |
| Container Closure Integrity | NT | | | | x |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); PPQ = process performance qualification; RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

**Table 8: Stability Protocol for PPQ Lots 6007320005, 6007920001, 6007920002, 6008620001, 6008620002, and 6008620007 (-20 ± 5°C)**

| Attribute | Time Point (month) | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 3 | 6 | 9 | 12 |
| Appearance | x | x | x | x | x | x |
| %RNA Encapsulation | x | x | x | x | x | x |
| Purity by RP-HPLC | x | x | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x | x | x | x |
| Particle Size by DLS | x | x | x | x | x | x |
| Polydispersity by DLS | x | x | x | x | x | x |
| In Vitro Translation | x | x | x | x | x | x |
| pH | x | x | x | x | x | x |
| RNA Content by AEX-HPLC | x | x | x | x | x | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | x | x | x | x | x |
| Bacterial Endotoxin | x | NT | | | | x |
| Particulate Matter | x | NT | | | | x |
| Container Closure Integrity | x | NT | | | | x |
| Sterility | x | NT | | | | |
| Identity by RT Sanger Sequencing | x | NT | | | | |
| Lipid Identity by HPLC-CAD | x | NT | | | | |
| Osmolality | x | NT | | | | |
| Container Content [a] | x | NT | | | | |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); PPQ = process performance qualification; RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

[a] Not tested for lot 6007320005

## Table 9: Stability Protocol for PPQ Lot 6007320010 (-20 ± 5°C)

| Attribute | Time Point (month) | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 3 | 6 | 9 | 12 |
| Appearance | x | NT | | x | NT | x |
| %RNA Encapsulation | x | NT | | x | NT | x |
| mRNA Purity by RP-HPLC | x | x | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x | x | x | x |
| Particle Size by DLS | x | x | x | x | x | x |
| Polydispersity by DLS | x | x | x | x | x | x |
| In Vitro Translation | x | NT | | x | NT | x |
| pH | x | NT | | x | NT | x |
| RNA Content by AEX-HPLC | x | NT | | x | NT | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | NT | | x | NT | x |
| Bacterial Endotoxin | x | NT | | | | x |
| Particulate Matter | x | NT | | | | x |
| Container Closure Integrity | x | NT | | | | x |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); PPQ = process performance qualification; RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

**Table 10: Stability Protocol for Lot 6008520001 (-20 ± 5°C)**

| Attribute | Time Point (month) | | | |
|---|---|---|---|---|
| | 0 | 3 | 6 | 12 |
| mRNA Purity by RP-HPLC | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x | x |
| Particle Size by DLS | x | x | x | x |
| Polydispersity by DLS | x | x | x | x |
| In Vitro Translation | x | NT | x | x |
| Appearance | x | NT | x | x |
| pH | x | NT | x | x |
| %RNA Encapsulation | x | NT | x | x |
| RNA Content by AEX-HPLC | x | NT | x | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | NT | x | x |
| Bacterial Endotoxin | NT | | | x |
| Particulate Matter | NT | | | x |
| Container Closure Integrity | NT | | | x |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

**Table 11: Stability Protocol for Lots 6009921006, 6003921002, 6008221002, 6008221003, and 6008921001 (-20 ± 5°C)**

| Attribute | Time Point (month) | | | |
|---|---|---|---|---|
| | 0 | 3 | 6 | 12 |
| mRNA Purity by RP-HPLC | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x | x |
| Particle Size by DLS | x | x | x | x |
| Polydispersity by DLS | x | x | x | x |
| In Vitro Translation | x | NT | x | x |
| Appearance | x | NT | x | x |
| pH | x | NT | x | x |
| %RNA Encapsulation | x | NT | x | x |
| RNA Content by AEX-HPLC | x | NT | x | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | NT | x | x |
| Bacterial Endotoxin | x | NT | | x |
| Particulate Matter | x | NT | | x |
| Container Closure Integrity | x | NT | | x |
| Sterility | x | NT | | |
| Identity by RT Sanger Sequencing | x | NT | | |
| Lipid Identity by HPLC-CAD | x | NT | | |
| Osmolality | x | NT | | |
| Container Content | x | NT | | |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

**Table 12: Stability Protocol for Lot 6009821002 and 6010121002 (-20 ± 5°C)**

| Attribute | Time Point (month) | | | |
|---|---|---|---|---|
| | 0 | 3 | 6 | 12 |
| mRNA Purity by RP-HPLC | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x | x |
| Particle Size by DLS | x | x | x | x |
| Polydispersity by DLS | x | x | x | x |
| In Vitro Translation | x | NT | x | x |
| Appearance | x | NT | x | x |
| pH | x | NT | x | x |
| %RNA Encapsulation | x | NT | x | x |
| RNA Content by AEX-HPLC | x | NT | x | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | NT | x | x |
| Bacterial Endotoxin | x | NT | | x |
| Particulate Matter | x | NT | | x |
| Container Closure Integrity | x | NT | | x |
| Sterility | x | NT | | x |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

### 3.2.P.8.1.3.2 Storage Condition (5°C ± 3°C)

The lots shown in Table 13 were tested at 5 ± 3°C storage condition.

**Table 13: Scale B PPQ Stability Lots (5 ± 3°C)**

| Lot | Fill Line | Vial Type | Protocol |
|---|---|---|---|
| 6007320005 | Flexible Fill Line | Ompi® 10R clear Type 1 borosilicate glass vial | Table 14 |
| 6007320008 | Flexible Fill Line | Ompi® 10R clear Type 1 borosilicate glass vial | Table 15 |
| 6007320009 | Flexible Fill Line | Ompi® 10R clear Type 1 borosilicate glass vial | Table 15 |
| 6007320012 | Flexible Fill Line | Ompi® 10R clear Type 1 borosilicate glass vial | Table 15 |
| 6007920003 | Flexible Fill Line | 10R cyclic olefin polymer vials with Si02 coating | Table 15 |
| 6008520001 | Vial Line (b) (4) | Ompi® 10R clear Type 1 borosilicate glass vial | Table 16 |

Abbreviations: PPQ = process performance qualification

**Table 14: Stability Protocol for PPQ Lot 6007320005 (5 ± 3°C)**

| Attribute | Time Point (month) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Appearance | x | x | NT | x | NT | | x |
| %RNA Encapsulation | x | x | NT | x | NT | | x |
| mRNA Purity by RP-HPLC | x | x | x | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x | x | x | x | x |
| Particle Size by DLS | x | x | x | x | x | x | x |
| Polydispersity by DLS | x | x | x | x | x | x | x |
| In Vitro Translation | x | x | NT | x | NT | | x |
| pH | x | x | NT | x | NT | | x |
| RNA Content by AEX-HPLC | x | x | NT | x | NT | | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | x | NT | x | NT | | x |
| Bacterial Endotoxin | x | NT | | | | | |
| Particulate Matter | x | NT | | | | | |
| Container Closure Integrity | x | NT | | | | | |
| Sterility | x | NT | | | | | |
| Identity by RT Sanger Sequencing | x | NT | | | | | |
| Lipid Identity by HPLC-CAD | x | NT | | | | | |
| Container Content | x | NT | | | | | |
| Osmolality | x | NT | | | | | |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection NT = not tested (not required per stability protocol); PPQ = process performance qualification; RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

**Table 15: Stability Protocol for PPQ Lots 6007320008, 6007320009, 6007320012, and 6007920003 (5 ± 3°C, inverted)**

| Attribute | Time Point (month) | | | |
|---|---|---|---|---|
| | 0 | 1 | 3 | 4 |
| Appearance | x | NT | x | NT |
| %RNA Encapsulation | x | NT | x | NT |
| mRNA Purity by RP-HPLC | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x | x |
| Particle Size by DLS | x | x | x | x |
| Polydispersity by DLS | x | x | x | x |
| In Vitro Translation | x | NT | x | NT |
| pH | x | NT | x | NT |
| RNA Content by AEX-HPLC | x | NT | x | NT |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | NT | x | NT |
| Bacterial Endotoxin | x | NT | | |
| Particulate Matter | x | NT | | |
| Container Closure Integrity | x | NT | | |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); PPQ = process performance qualification; RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

**Table 16: Stability Protocol for Lot 6008520001 (5 ± 3°C)**

| Attribute | Time Point (month) | | |
|---|---|---|---|
| | 0 | 1 | 3 |
| mRNA Purity by RP-HPLC | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x |
| Particle Size by DLS | x | x | x |
| Polydispersity by DLS | x | x | x |
| In Vitro Translation | x | NT | x |
| Appearance | x | NT | x |
| pH | x | NT | x |
| %RNA Encapsulation | x | NT | x |
| RNA Content by AEX-HPLC | x | NT | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | NT | x |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection NT = not tested (not required per stability protocol); PPQ = process performance qualification; RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

### 3.2.P.8.1.3.3 Storage Condition (25°C ± 2°C)

The lots shown in Table 17 were tested at the 25°C ± 2°C storage condition.

**Table 17: Scale B PPQ Stability Lots (25°C ± 2°C)**

| Lot | Fill Line | Vial Type | Protocol Outline |
|---|---|---|---|
| 6007920002 | Flexible Fill Line | SiOPlas 10-mL COP vial | Table 18 |
| 6007920001 | Flexible Fill Line | SiOPlas 10-mL COP vial | Table 18 |

Abbreviations: COP = cyclic olefin polymer; PPQ = process performance qualification

**Table 18: Stability Protocol for PPQ Lots 6007920001 and 6007920002 (25 ± 2°C)**

| Attribute | Time Point (hours) | | |
|---|---|---|---|
| | 0 | 24 | 72 |
| Appearance | x | NT | |
| %RNA Encapsulation | x | NT | |
| mRNA Purity by RP-HPLC | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x |
| Particle Size by DLS | x | x | x |
| Polydispersity by DLS | x | x | x |
| In Vitro Translation | x | NT | |
| pH | x | NT | |
| RNA Content by AEX-HPLC | x | NT | |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | NT | |
| Bacterial Endotoxin | x | NT | |
| Particulate Matter | x | NT | |
| Container Closure Integrity | x | NT | |
| Sterility [a] | x | NT | |
| Container Content [a] | x | NT | |
| Identity by RT Sanger Sequencing [a] | x | NT | |
| Lipid Identity by HPLC-CAD [a] | x | NT | |
| Osmolality [a] | x | NT | |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); PPQ = process performance qualification; RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

[a] Not required for lot 6007320010.

## 3.2.P.8.1.4 Clinical Stability Lots

The (b) (4) vial DP clinical lots were manufactured by ModernaTX (Norwood, MA).

All quality attributes meet the specification as presented in Section 3.2.P.8.3. Available stability data are presented in Section 3.2.P.8.3. Complete stability data (72 hours) are available at 25°C and are presented in Section 3.2.P.8.3.

The symbol “x” in the tables below is used to identify when testing will occur.

### 3.2.P.8.1.4.1 Storage Condition (-60°C to -90°C)

The lots shown in Table 19 were stored at -60°C to -90°C.

**Table 19: Clinical Stability Lots (-60°C to -90°C)**

| Lot | Purpose | Vial Type | Orientation | Protocol Outline |
|---|---|---|---|---|
| 6007520001 | Clinical | Ompi® 10R glass vial | Upright | Table 20 |
| 6007520002 | Clinical | | | |
| 6007520003 | Clinical | | | |
| 6007520004 | Clinical | | | |

Abbreviations: PPQ = process performance qualification

**Table 20: Stability Protocol for Clinical Lots 6007520001, 6007520002, 6007520003, and 6007520004 (-60°C to -90°C)**

| Attribute | Time Point (month) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 6 | 9 | 12 |
| Appearance | x | x | x | x | x | x | x |
| %RNA Encapsulation | x | x | x | x | x | x | x |
| mRNA Purity by RP-HPLC | x | x | x | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x | x | x | x | x |
| Particle Size by DLS | x | x | x | x | x | x | x |
| Polydispersity by DLS | x | x | x | x | x | x | x |
| In Vitro Translation | x | x | NT | x | x | x | x |
| pH | x | x | NT | x | x | x | x |
| RNA Content by AEX-HPLC | x | x | NT | x | x | x | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | x | NT | x | x | x | x |
| Particulate Matter | x | NT | | | | | x |
| Sterility | x | NT | | | | | NT |
| Bacterial Endotoxin | x | NT | | | | | x |
| Container Closure Integrity | NT | | | | | | x |
| Container Content | x | NT | | | | | |
| Identity by RT Sanger Sequencing | x | NT | | | | | |
| Lipid Identity by HPLC-CAD | x | NT | | | | | |
| Osmolality | x | NT | | | | | |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); RPHPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

### 3.2.P.8.1.4.2 Additional Storage Conditions for Clinical Stability Lots

The following lots shown in Table 21 were stored at -20°C ± 5°C, 5°C ± 3°C, and 25°C ± 2°C storage conditions.

**Table 21: Clinical Stability Lots (-20°C ± 5°C)**

| Lot | Purpose | Vial Type | Orientation | Protocol Outlines |
|---|---|---|---|---|
| 6007520001 | Clinical | Ompi® 10R glass vial | Upright | -20°C ± 5°C: Table 22<br>5°C ± 3°C: Table 23<br>25°C ± 2°C: Table 24 |
| 6007520002 | Clinical | | | |
| 6007520003 | Clinical | | | |
| 6007520004 | Clinical | | | |

**Table 22: Stability Protocol for Clinical Lots 6007520001, 6007520002, 6007520003, and 6007520004 (-20 ± 5°C)**

| Attribute | Time Point (month) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4.5 | 6 | 9 | 12 |
| Appearance | x | x | X | x | NT | x | x | x |
| %RNA Encapsulation | x | x | X | x | NT | x | x | x |
| mRNA Purity by RP-HPLC | x | x | X | x | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | X | x | x | x | x | x |
| Particle Size by DLS | x | x | X | x | NT | x | x | x |
| Polydispersity by DLS | x | x | X | x | NT | x | x | x |
| In Vitro Translation | x | x | NT | x | NT | x | x | x |
| pH | x | x | NT | x | NT | x | x | x |
| RNA Content by AEX-HPLC | x | x | NT | x | NT | x | x | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | x | NT | x | NT | x | x | x |
| Particulate Matter | x | NT | | | | | | |
| Sterility | x | NT | | | | | | |
| Bacterial Endotoxin | x | NT | | | | | | |
| Container Content | x | NT | | | | | | |
| Identity by RT Sanger Sequencing | x | NT | | | | | | |
| Lipid Identity by HPLC-CAD | x | NT | | | | | | |
| Osmolality | x | NT | | | | x | NT | |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

**Table 23: Stability Protocol for Clinical Lots 6007520001, 6007520002, 6007520003, and 6007520004 (5°C ± 3°C)**

| Attribute | Time Point (month) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 2.5 | 3 | 4 | 6 |
| Appearance | x | x | x | x | x | x | x |
| %RNA Encapsulation | x | x | NT | | x | NT | x |
| mRNA Purity by RP-HPLC | x | x | x | x | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x | x | x | x | x |
| Particle Size by DLS | x | x | x | x | x | x | x |
| Polydispersity by DLS | x | x | x | x | x | x | x |
| In Vitro Translation | x | x | NT | NT | x | NT | x |
| pH | x | x | NT | NT | x | NT | x |
| RNA Content by AEX-HPLC | x | x | NT | NT | x | NT | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | x | NT | NT | x | NT | x |
| Particulate Matter | x | NT | | | | | x |
| Sterility | x | NT | | | | | x |
| Bacterial Endotoxin | x | NT | | | | | x |
| Container Content | x | NT | | | | | |
| Identity by RT Sanger Sequencing | x | NT | | | | | |
| Lipid identity by HPLC-CAD | x | NT | | | | | |
| Osmolality | x | NT | | | | | |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

**Table 24: Stability Protocol for Clinical Lots 6007520001, 6007520002, 6007520003, and 6007520004 (25°C ± 2°C)**

| Attribute | Time Point (hours) | | |
|---|---|---|---|
| | 0 | 24 | 72 |
| Appearance | x | x | x |
| %RNA Encapsulation | x | x | x |
| mRNA Purity by RP-HPLC | x | x | x |
| Product-Related Impurities by RP-HPLC | x | x | x |
| Particle Size by DLS | x | x | x |
| Polydispersity by DLS | x | x | x |
| In Vitro Translation | x | x | x |
| pH | x | x | x |
| RNA Content by AEX-HPLC | x | x | x |
| Lipid Content and Lipid Impurities by HPLC-CAD | x | x | x |
| Container Content | x | NT | |
| Particulate Matter | x | NT | |
| Sterility | x | NT | |
| Bacterial Endotoxin | x | NT | |
| Identity by RT Sanger Sequencing | x | NT | |
| Lipid Identity by HPLC-CAD | x | NT | |
| Osmolality | x | NT | |

Abbreviations: AEX-HPLC = anion exchange high-performance liquid chromatography; DLS = dynamic light scattering; HPLC-CAD = high-performance liquid chromatography with charged aerosol detection; NT = not tested (not required per stability protocol); RP-HPLC = reverse-phase high-performance liquid chromatography; RT = reverse transcription

## 3.2.P.8.1.5 Deviations

Some stability testing results have been missed in the stability program for DP. The missed timepoints were noted at the time of occurrence and ModernaTX has implemented plans to mitigate the impact to the stability studies. Two deviations (QE-003849 and QE-005517) have been opened to fully document the events. As detailed in these deviation reports, the surge of testing required to support release and distribution of DP under Emergency Use Authorization during the COVID-19 pandemic could not be performed by the available laboratory resources during the initial rapid expansion of manufacturing. The stability study lots were maintained in controlled storage throughout this period but some stability timepoints were missed. The missed timepoints are being addressed by testing of later timepoints for the same studies, which

effectively bracket the missed results. ModernaTX, Inc is taking corrective and preventive actions to address the root cause of the deviation events and ensure full compliance with stability protocols.

## 3.2.P.8.1.6 Stress Studies

### 3.2.P.8.1.6.1 Photostability

Photostability studies were performed on fully thawed DP in Ompi® 10R clear Type 1 borosilicate glass vials (6.3 mL fill) per ICH Q1B guidelines. The chemical and biophysical stability of the product when exposed to ultraviolet A (UVA, 200 W h/$m^2$) and visible (fluorescent, 1200 klx h) light were evaluated. Samples were exposed to ultraviolet (UV)-only, visible-only, or to a combination of UV and visible light at 25°C (Table 25).

**Table 25: Maximum Visible Light and UVA Light Exposure per ICH Q1B**

| Light | UVA Light (W h/$m^2$) | Visible Light (klx h) |
|---|---|---|
| Cool white fluorescent and UV | 200 | 1200 |

Abbreviations: klx = kilolux; UVA = ultraviolet A

mRNA purity was the only attribute impacted by light exposure. Full ICH exposure to the combination of UV and visible light results in a loss of purity of approximately (b) (4) compared to the corresponding dark control at 25°C. UV-only or visible-only exposure results in a loss in purity of (b) (4) (UVA) and (b) (4) (visible) compared to the control, suggesting that the impact of UVA and visible light is additive.

A “Protect from Light” precautionary statement is included on the DP label.

Manufacturing and handling in normal ambient light conditions is discussed in Section 3.2.P.2.2.

### 3.2.P.8.1.6.2 Freeze Thaw Cycles

Freeze/thaw stability studies were performed using representative DP lots at 0.1 mg/mL mRNA (lot DHM-47522) and 0.5 mg/mL mRNA (lot DHM-47518). DP samples were subjected to a series of 5 freezing and thawing cycles and assessed for appearance, %RNA encapsulation, mRNA purity, particle size, and polydispersity index. The studies support 5 freeze/thaw cycles for bracketing dosage strengths of 0.1 – 0.5 mg/mL mRNA for mRNA-1273 DP. Reference Section 3.2.P.8.3 for study data.