# Transmission Dynamics of Severe Acute Respiratory Syndrome Coronavirus 2 in High-Density Settings, Minnesota, USA, March–June 2020

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Coronavirus disease has disproportionately affected persons in congregate settings and high-density workplaces. To determine more about the transmission patterns of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in these settings, we performed whole-genome sequencing and phylogenetic analysis on 319 (14.4%) samples from 2,222 SARS-CoV-2-positive persons associated with 8 outbreaks in Minnesota, USA, during March-June 2020. Sequencing indicated that virus spread in 3 long-term care facilities and 2 correctional facilities was associated with a single genetic sequence and that in a fourth long-term care facility, outbreak cases were associated with 2 distinct sequences. In contrast, cases associated with outbreaks in 2 meat-processing plants were associated with multiple SARS-CoV-2 sequences. These results suggest that a single introduction of SARS-CoV-2 into a facility can result in a widespread outbreak. Early identification and cohorting (segregating) of virus-positive persons in these settings, along with continued vigilance with infection prevention and control measures, is imperative.

In the United States, coronavirus disease (CO-VID-19) has disproportionately affected adults residing in long-term care facilities (LTCFs) (1–5). Outbreaks in LTCFs have caused high numbers of

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hospitalizations and deaths. Similar findings have been reported in correctional facilities, where severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection incidence among inmates and staff is  $\approx 5$  times greater and age-adjusted mortality rate 3 times greater than that of the general population (6–8). Workers in high-density workplaces (e.g., meat-processing plants) have similarly been heavily affected; minority populations have been disproportionately affected (9–11).

The first COVID-19 case in Minnesota was detected on March 6, 2020. Shortly thereafter, CO-VID-19 outbreaks occurred across the state, including in LTCFs (March 12, 2020) and meat-processing plants (March 15, 2020), followed shortly thereafter by correctional facilities (March 25, 2020). During March 6-June 30, 2020, the Minnesota Department of Health (MDH) identified and responded to 1,060 distinct outbreaks of COVID-19 in LTCFs, comprising 4,421 cases in residents and 3,002 in staff members. In addition, 4 discrete outbreaks in correctional facilities resulted in 382 cases, and 68 outbreaks in meatprocessing plants resulted in ≈2,616 cases among employees (data only from persons interviewed and where workplace information was provided); outbreaks in these 3 settings accounted for 31.3% of all identified persons in Minnesota.

For outbreaks in congregate settings and highdensity workplaces, confirming the temporal and relational aspects of SARS-CoV-2 transmission was difficult, and the role of intrafacility spread versus multiple introductions was difficult to disentangle on the basis of epidemiologic information alone. Whole-genome sequencing (WGS) of specimens from outbreak case-patients can be used to determine transmission dynamics and relatedness of viral pathogens in infectious disease outbreaks (12–15). Unprecedented efforts to sequence SARS-CoV-2 genomes have occurred at the local, regional, national, and international levels to investigate potential reinfections (16–19), nosocomial transmission (20), patterns of community spread (G.K. Moreno et al., unpub. data, https://doi.org/10.1101/2020.07.09.2 0149104) (21,22), and sources of SARS-CoV-2 introduction without known epidemiologic links (23).

In Minnesota, as part of the Centers for Disease Control and Prevention (CDC) SARS-CoV-2 Sequencing for Public Health Emergency Response, Epidemiology and Surveillance (SPHERES) consortium, the Minnesota Molecular Surveillance of SARS-CoV-2 initiative solicited specimens from outbreak case-patients for sequencing and genetic variation analysis to determine virus transmission patterns in congregate settings and meat-processing plants. To supplement epidemiologic information, assess whether single or multiple introductions were likely to have occurred during a facility outbreak, and evaluate molecular relatedness, we performed WGS on a convenience sample of SARS-CoV-2-positive specimens associated with outbreaks.

# Methods

We chose 3 types of outbreak settings for WGS (LTCFs, correctional facilities, and meat-processing plants) and selected specific facilities partly according to outbreak effect and severity, the need for further clarity regarding transmission patterns, and availability of samples. Selected outbreaks occurred during March 6–June 30, 2020, at 4 unique LTCFs (A–D), 2 correctional facilities (A and B), and 2 meat-processing plants (A and B); cases were identified in persons residing in the same county as meat-processing plant A (community samples A).

At LTCFs, an outbreak was defined as  $\geq 1$  confirmed COVID-19 case in a resident or staff member. At correctional facilities, an outbreak was defined as 1 of the following:

- ≥2 cases in the inmate population >7 days after intake to a new facility with an epidemiologic link (defined as residing in the same unit or ward within a 14-day period).
- ≥2 cases in correctional staff members with an epidemiologic link (defined as having the potential to have been within 6 feet for ≥15 minutes while working in the facility during the 14 days before symptom onset (e.g., worked on the same unit

during the same shift). An epidemiologic link also requires that cases among correctional staff neither shared a household nor were identified as close contacts with each other outside the facility during the standard case investigation.

• ≥1 facility-acquired COVID-19 cases in an inmate (defined as a confirmed diagnosis ≥14 days after entry to the facility, without exposure during the previous 14 days to another setting where an outbreak was known or suspected).

At meat-processing facilities, an outbreak was defined as  $\geq$ 3 laboratory-confirmed COVID-19 cases among facility workers who resided in separate households. On June 1, we added to the definition of an outbreak in meat-processing plants that case onset dates occurred within 14 days of each other.

We defined case-patients at all outbreak locations as persons with a positive SARS-CoV-2 result according to reverse transcription PCR (RT-PCR), determined by using the original CDC protocol (24). We collected epidemiologic data (sex, age, symptom status, symptom onset date, residence, occupation, and potential source of exposure) by interviewing persons with laboratory-confirmed SARS-CoV-2.

The MDH Public Health Laboratory (PHL) performed WGS on available specimens positive for SARS-CoV-2 by RT-PCR, collected March 6-June 30, 2020. Specimens were obtained from the nasopharynx, anterior nares, or oropharynx. SARS-CoV-2 RNA extracts were acquired either as residuals from clinical testing at the MDH PHL or from other clinical laboratories serving Minnesota residents. We created cDNA and tiled amplicons as described in the ARTIC Network nCoV-2019 sequencing protocol (25). We prepared Illumina sequencing libraries for next-generation sequencing according to the Nextera DNA Flex protocol created by the State Public Health Bioinformatics Group (StaPH-B) (26) and performed sequencing by using 2×250 bp Illumina V2 chemistry on MiSeq instruments (https:// www.illumina.com). Consensus SARS-CoV-2 genome sequences for each specimen were generated with the StaPH-B Toolkit Monroe pipeline (https:// staph-b.github.io/staphb\_toolkit/workflow\_docs/ monroe). We individually reviewed assembled SARS-CoV-2 genomes in Geneious Prime 2019.2.1 (https://www.geneious.com) and discarded genomes with gaps >125 nt.

We used the Augur toolkit (27) to align SARS-CoV-2 genome consensus sequences, generate phylogenetic trees, and incorporate epidemiologic sequence metadata. We aligned genomes with MAFFT version 7.310 with options "-keeplength-reorder-anysymbol-nomemesave-adjustdirection" (28). Variation in sequences identified in the first 54 and last 67 bases of the Wuhan-Hu-1 reference sequence (GenBank accession no. MN908947.3) was masked during tree generation because of the inability of the tiled-amplicon sequencing approach to reliably generate sequence in those regions. We used IQ-TREE version 1.6.1 to create phylogenetic trees with parameters "-ninit 2 -n 2 -me 0.05" (29). Output from Augur was visualized by using Auspice as hosted by the nextstrain team (http://auspice.us) (27). The resulting trees were visualized with the Interactive Tree of Life (30); branch lengths rounded and scaled represent mutations from the reference. Pangolin lineages for all samples were retrieved after assemblies were submitted to GISAID (https://github.com/cov-lineages/pangolin) (27,31).

We defined genetically closely related sequences (i.e., clusters) as cases that were both associated epidemiologically with a known outbreak and that formed a monophyletic clade on the statewide phylogenetic tree. Branch lengths were scaled to represent the number of single-nucleotide mutations.

In accordance with federal human subjects protection regulations at 45 CFR §46.101c and §46.102d and with the Guidelines for Defining Public Health Research and Public Health Non-Research, a human subjects protection coordinator at CDC and the MDH reviewed the project. They determined it to be a nonresearch, public health response exempt from institutional review board evaluation.

## Results

As of June 30, 2020, we had successfully conducted WGS and phylogenetic analysis of 468 total samples, 319 (68.2%) of which were associated with the 8 outbreaks, constituting 14.4% of the 2,222 total positive cases identified from outbreaks in Minnesota through June 2020. Specimens were obtained from staff and residents from 4 LTCFs (180 [35.6%] specimens from 505 case-patients were sequenced), staff and inmates from 2 correctional facilities (110 [20.2%] specimens from 544 case-patients were sequenced), and employees at 2 meat-processing plants, along with community case-patients (29 [2.5%] samples from 1,173 identified case-patients) (Table). Among most sequenced specimens, virus spread was associated with a single genetic sequence unique to each outbreak facility at 3 LTCFs and both correctional facilities. At a fourth LTCF, outbreak cases were associated with 2 distinct sequences. In contrast, cases associated with outbreaks in the 2 meat-processing plants were represented by multiple SARS-CoV-2 sequences. (Figure 1)

## Single Cluster in LTCFs

During the COVID-19 outbreak at LTCF A (3), April 15–June 11 (Figure 2), infection was confirmed for 51/77 residents and 38/108 healthcare workers

Table. Features of outbr	eaks and convenie	ence samples of specimens	s collected and ch	naracterized by whole-g	enome sequencing at
LTCFs, correctional facilities, and meat-processing plants in Minnesota, USA, March 6–June 30, 2020*					
	Total confirmed	Total samples		Total outbreak cases	Total samples
	outbreak cases	successfully sequenced		at facility confirmed	successfully sequenced
Outbreak facility	at facility, no.	from facility, no. (%)	Role at facility	by role, no.	by role, no. (%)
LTCF					
A	89	27 (30.3)	Staff	38	10 (26.3)
			Residents	51	17 (33.3)
В	190	82 (43.2)	Staff	76	5 (6.6)
			Residents	114	77 (67.5)
С	139	32 (23.0)	Staff	56	23 (41.0)
			Residents	83	9 (10.8)
D	74	39 (52.7)	Staff	21	3 (14.2)
			Residents	53	36 (67.9)
Correctional facility					· · ·
A	128	49 (38.3)	Staff	82	15 (18.3)
			Inmates	46	34 (73.9)
В	416	61 (14.7)	Staff	210	1 (0.5)
			Inmates	206	60 (29.1)
Meat-processing plant					· · ·
A	432	16 (3.7)	Employees	432	16 (3.7)
В	724	5 (0.7)	Employees	724	5 (0.7)
Community sample A	17	8 (47.1)	Known contact	9	2 (22.2)
		. ,	No known	8	6 (75.0)
			contact		
Total	2,222	319 (14.4)	NA	NA	NA

\*No cases or samples sequenced after June 30, 2020, are included in study. An outbreak is defined as closed if there are no new coronavirus disease cases for 28 days after the onset date of the last case. The outbreak at correctional facility A was considered closed as of July 20; the outbreak at correctional facility B was considered closed as of August 5. The outbreaks at processing plants A and B were considered ongoing as of November 6, 2020. LTCF, long-term care facility; NA, not applicable.



**Figure 1.** Phylogenetic tree of severe acute respiratory syndrome coronavirus 2 associated with selected outbreaks in Minnesota, USA, March 6–June 30, 2020. IQ-TREE (29) was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of single-nucleotide mutations as shown in the scale key. LTCF, long-term care facility.

(HCWs) tested after identification of SARS-CoV-2positive HCWs. Specimens from 17 residents (33.3% of case-patients) and 10 HCWs (26.3% of case-patients) were available for WGS. SARS-CoV-2 viral sequences from these 27 persons were genetically closely related (pangolin lineage B.1.2). Viral genomes from 2 HCWs (MN-MDH-1007 and MN-MDH-1016) sampled on April 30 and 1 resident (MN-MDH-1171) sampled on May 18 at LTCF A did not cluster with each other or the primary outbreak cluster, although all were a part of the broad pangolin lineage B.1.

In LTCF B (3) (Appendix Figure 1, https://wwwnc. cdc.gov/EID/article/27/8/20-4838-App1.pdf), during April 29–June 11, SARS-CoV-2 positivity was confirmed for 114 of 182 tested residents and 76 of 233 tested HCWs, after a SARS-CoV-2–positive resident was identified on April 29. All 82 sequenced specimens from this facility, including those from 77 residents (67.5% of case-patients) and 5 HCWs (6.6% of case-patients), were closely related (pangolin lineage B.1.116).

The first COVID-19 case at LTCF C (Appendix Figure 2) was identified on April 24. Four positive HCWs and 3 symptomatic residents were identified by April 30. Throughout May and June, facilitywide testing was implemented; ≈941 residents and staff were tested and 80 SARS-CoV-2-positive residents and 52 SARS-CoV-2-positive staff members were identified. Phylogenetic analysis of the 32 successfully sequenced genomes, including those from 9 residents (10.8% of case-patients) and 23 staff members (41% of case-patients) showed that viruses from 29 of the 32 case-patients were closely related (pangolin lineage B.1.2). Viruses from the remaining 3

case-patients (pangolin lineages B.1 and B.4) were not closely related to each other nor identified with further transmission.

#### Two Distinct Clusters in an LTCF

LTCF D (Figure 3) is a 100-bed facility with ≈78 residents and 100 staff, where an outbreak began on April 17, 2020, with a symptomatic HCW. The first cases in residents and staff were identified on April 20, 2020; subsequent testing identified of 53 SARS-CoV-2-positive residents and 21 positive staff members. Although this outbreak was epidemiologically similar to outbreaks at other LTCFs, an analysis of the genetic relatedness among 39 sequenced isolates demonstrated that 2 distinct genetic clusters were in the facility during approximately the same period. In contrast to the outbreaks in LTCFs A, B, and C, viruses from both clusters at LTCF D seemed to circulate simultaneously throughout the facility, each contributing to the outbreak. All sequenced isolates from LTCF D belonged to the broad pangolin lineage B.1.

#### Single Cluster in Correctional Facilities

In late March 2020, an outbreak of SARS-CoV-2 was identified in correctional facility A (Figure 4). The first identified case-patient was an inmate who became symptomatic and had a positive SARS-CoV-2 test result on March 25. By March 30, a total of 7 confirmed cases and 6 suspected cases among the inmate population

were identified. During March 30–April 7, SARS-CoV-2 test results were positive for 15 staff members. Analysis of the genetic relatedness of the virus from 34 inmates (73.9% of case-patients) and 15 staff members (18.3% of case-patients) from correctional facility A were all closely related (pangolin lineage A.1).

In early June 2020, an outbreak was identified in correctional facility B (Appendix Figure 3). The investigation revealed that an employee had symptoms consistent with COVID-19 on May 13, had a positive SARS-CoV-2 test result on May 14, and was subsequently excluded from work and isolated at home. Approximately 2 weeks later, 3 additional case-patients (1 staff member and 2 inmates from the same unit as the index patient) had positive SARS-CoV-2 test results. A point-prevalence survey on June 1 in this unit revealed 63 SARS-CoV-2-positive inmates among the 87 tested. Subsequent facilitywide testing of both staff and inmates identified cases in other units, 83 new cases in inmates and 1 new case in a staff member, identified among the ≈2,200 persons tested. Test results were ultimately positive for 210 staff members and 206 inmates during this outbreak. Phylogenetic analysis of viruses from this outbreak among the 1 staff member (0.5% of staff case-patients) and 60 inmates (29.1% of inmate case-patients) at correctional facility B shows that all viruses were closely related (pangolin lineage B.1.2) and genetically identical to, or plausibly descended from, the sequence of SARS-CoV-2 from the index case-patient.



Figure 2. Phylogenetic tree of severe acute respiratory syndrome coronavirus 2 genome sequences associated with long-term care facility A, Minnesota, USA, April 15-June 11, 2020. Solid circles represent sequences in samples from residents; open circles represent sequences from samples from healthcare workers, IQ-TREE (29) was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of singlenucleotide mutations. as shown in the scale. MDH, Minnesota Department of Health.



Figure 3. Phylogenetic tree of severe acute respiratory syndrome coronavirus 2 genome sequences associated with long-term care facility D. Minnesota, USA, April 17-May 15, 2020. Filled circles represent sequences taken from residents; open circles represent sequences from healthcare workers. IQ-TREE (29) was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of singlenucleotide mutations, as shown in the scale. MDH, Minnesota Department of Health.

## Linking LTCF C with Correctional Facility B

During the epidemiologic investigation at LTCF C, we learned that an HCW at LTCF C was a household contact of a correctional facility B employee. Both persons became symptomatic at the same time, and both subsequently had positive test results in mid-May. SARS-CoV-2 genome sequences recovered from these 2 household contacts were identical to each other and to the genomic sequences recovered from 32 inmates at correctional facility B (Figure 5). In addition, this genomic sequence differs by only a single mutation (G5617T) from isolates sequenced from 13 case-patients at LTCF C.

#### Multiple Clusters in Meat-Processing Plants

In early April 2020, an outbreak was detected at processing plant A (Figure 6), a large primary and secondary meat processor. This outbreak continued for several weeks until mid-May, when the number of cases among workers began to increase rapidly. During March 15–July 1, a total of 446 persons with confirmed cases who reported working at processing plant A, including 4 (1%) case-patients with positive test results in March (management and office staff), 5 (1%) in April, 211 (47%) in May, and 226 (51%) in June. Of the 16 samples (3.7% of case-patients) sequenced during March 15–June 3, at least 6 clusters or single cases were unrelated. Although most genomes sequenced from processing plant B belonged to pangolin lineages B.1, B1.2, B.1.26, one early case is genetically quite different (pangolin lineage A.1). An interview confirmed that this early case-patient had traveled out of the state during the exposure period (14 days before symptom onset).

During May 15–June 1, we sequenced samples obtained from 8 case-patients in the county where processing plant A is located (community samples A). From these 8 samples, we identified 5 clusters. Of the 8 samples, 5 were closely related with 3 clusters from processing plant A, while the remaining 3 samples formed 2 distinct clusters. Of the 5 sequences from community samples A that clustered with sequences from processing plant A, 4 had sequences that were identical to

sequences from processing plant A, and all 4 persons had no known contact with a verified case-patient.

In mid-April 2020, an outbreak was identified among employees at processing plant B (Appendix Figure 4), another large meat-processing plant. By May 1, a total of 649 cases among workers at processing plant B were confirmed. Sequencing of the 5 available samples from processing plant B (0.7% of cases) identified 1 cluster and 2 single genomes, all belonging to pangolin lineage B.1.

# Discussion

WGS identified 3 primary patterns of genetic relatedness among cases in various outbreak settings: outbreaks in which cases were part of 1 genetically related cluster; an outbreak with 2 unique clusters of cases, each contributing to the outbreak during the same period; and outbreaks for which multiple genetically distinct sequences were present. Phylogenetic analyses of the viral sequences from available specimens (Appendix Table 1) associated with outbreaks in LTCFs A, B, and C were all consistent with  $\geq$ 1 primary cluster affecting each facility, suggesting that a single introduction of SARS-CoV-2 into a facility can result in a widespread outbreak. This finding is similar to previously reported findings, in which WGS has evidenced rapid spread in high-density settings as opposed to multiple introductions



Figure 4. Phylogenetic tree of severe acute respiratory syndrome coronavirus 2 genome sequences associated with correctional facility A, Minnesota, USA, March 25-June 30, 2020, Filled circles represent sequences from samples from inmates, open circles represent sequences from samples from facility staff. IQ-TREE (29) was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of single-nucleotide mutations, as shown in the scale, MDH, Minnesota Department of Health.



**Figure 5.** Phylogenetic tree of severe acute respiratory syndrome coronavirus 2 genome sequences associated with long-term care facility C and correctional facility B, Minnesota, US, April–June 2020. Filled circles represent sequences from samples from inmates or residents; open circles represent sequences from long-term care facility C are shown on a white background; sequences from correctional facility B, on a gray background. Sequences from 2 household contacts are noted with stars. IQ-TREE (*29*) was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of single-nucleotide mutations, as shown in the scale. MDH, Minnesota Department of Health.



Figure 6. Phylogenetic tree of SARS-CoV-2 genome sequences associated with meat-processing plant A and the surrounding community, Minnesota, USA, March 15-June 30, 2020. Open circles represent sequences from samples from staff at processing plant A; squares represent sequences from samples from persons in the surrounding community. IQ-TREE (29) was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of single-nucleotide mutations, as shown in the scale. MDH. Minnesota Department of Health.

contributing to the outbreak (20). Cases from LTCF D, in contrast, formed 2 distinct genetic clusters, 1 consisting of 17 related samples and the other consisting of 22 samples. This finding is consistent with a potential scenario in which there were 2 separate, independent introductions into the facility and subsequent parallel intrafacility spread of each individually distinct sequence.

Phylogenetic analysis conducted for LTCFs A and C also demonstrated outlier SARS-CoV-2 viral sequences that were not genetically closely related to the primary cluster in each facility. This finding suggests community-acquired infection and subsequent introduction of SARS-CoV-2 into the facility (3). Two of the 3 outlier case-patients at LTCF C had positive test results >1 month after the first identified case. Similarly, 2 of the 3 outlier case-patients identified at LTCF A were identified 10 days after the first identified case-patient, and the third had a positive test result 28 days later. It is not possible to determine whether these introductions of distinct genetic sequences resulted in additional spread, given that WGS characterization was not performed on all positive samples in each facility and not all HCWs or residents were tested. However, the timing of the identification of these outlier cases after the date of the first identified primary case suggests that mitigation strategies implemented after the initial identification of the outbreak, including cohorting strategies, infection prevention and control measures, and correct use of personal protective equipment (PPE), may have effectively prevented

intrafacility transmission of these late outlier cases, as has been reported (*3*,*21*,*22*).

WGS identified a different genetic landscape in meat-processing plants, in which several distinct sequences contributed to the facility outbreak. This finding is despite sequencing of only 2.5% of SARS-CoV-2-positive samples from the processing plants, suggesting that increased sequencing may have identified even greater genetic diversity. In addition, several genomes identified at processing plant A were either identical or closely related to genomes in the surrounding community (community samples A). Of the 8 sequenced community samples (community sample A), 6 were from persons with no known epidemiologic link to a case-patient at processing plant A, strongly suggesting an unrecognized connection. The benefit of WGS for identifying previously unrecognized transmission patterns has been established (20,32). Although no definitive conclusions can be made regarding the direction of transmission, WGS provided strong evidence of worker/community member spread; hypothesized factors potentially contributing to this transmission pattern are communal housing, multigenerational families, and group transportation.

WGS has contributed to improved knowledge of an outbreak after retrospective analysis (G.K. Moreno et al., unpub. data, https://doi.org/10.1101/2020.07 .09.20149104) (3,20,21), justification for specific public health measures (21,22), and added insight to transmission patterns in high-risk settings. Our work further supports use of WGS in these situations while identifying several additional public health implications. WGS has demonstrated that outbreaks in LTCFs and correctional facilities can result from a single introduction. Continued vigilance, including facilitywide staff screening and subsequent exclusion of symptomatic HCWs or staff and those with known or suspected contacts, is imperative. WGS has demonstrated extensive intrafacility spread; closely related sequences comprise all or most cases contributing to the outbreak. Measures such as infection prevention and control, consistent and correct use of PPE, cohorting of known positive residents, and exclusion of positive HCWs must be maintained. WGS has also illuminated the transmission patterns in processing plants, including the multiple introductions identified through the multiple genetically distinct sequences identified and the related community strains. WGS has illustrated the need for community-level mitigation to prevent introductions in high-density worksites, including accessible communitywide testing, housing and transportation strategies, and facility-level measures to prevent unintended introduction into the workplace.

The first limitation of this study is that only a subset of specimens were available for sequencing because of different laboratory specimen retention policies. For example, at LTCF B, samples from only 5 staff members were available for sequencing. Similarly, in meat-processing plant B, only 5 samples were available because of a clinical testing laboratory protocol that resulted in the discarding of samples after  $\approx$ 7 days. In addition, not all available samples could be successfully sequenced, primarily because of degraded quality or low concentrations of viral RNA.

Another limitation is that not all staff and employees at the LTCFs, correctional facilities, and processing plants agreed to be tested. Because of the incomplete genomic picture at each setting, definitive conclusions about single introductions in LTCFs A and D are speculative, and these individual introductions may have resulted in some virus transmission that was not identified in the study.

Last, we were not able to present sociodemographic data such as race or ethnicity associated with these outbreaks because of limitations in the case investigation process and incomplete case data. This limitation is particularly relevant because of the disproportionate effect of COVID-19 on those who are Black, indigenous, or other persons of color. Because those populations disproportionately experience incarceration and a high proportion of meat-processing plant employees are persons from immigrant communities, these settings can serve to amplify racial and ethnic health disparities related to COVID-19.

LTCFs, correctional facilities, and high-density workplace settings have many factors that are hypothesized to contribute to rapid transmission of SARS-CoV-2. These factors include insufficient resources and training in infection prevention and control, difficulties implementing social distancing because of close habitation or work environment, and delayed case detection and access to care (8,11,33). WGS results have demonstrated that many outbreaks in Minnesota were caused by single introductions of SARS-CoV-2, highlighting the value of consistent and correct PPE use, rigorous and systematic infection prevention and control, environmental control measures, and systematic testing of residents and staff to identify asymptomatic infected persons. As this pandemic continues, community mitigation strategies and strong enforcement of policies to reduce the risk of introducing SARS-CoV-2 virus into congregate settings are more crucial than ever. Similarly, infection prevention and control and aggressive containment practices are vital for mitigating the spread of SARS-CoV-2 after its introduction into a facility. WGS can be a useful tool for supplementing epidemiologic information and examining the role of facility and community factors contributing to SARS-COV-2 outbreaks in high-risk settings.

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Dr. Lehnertz is a medical specialist in infectious disease epidemiology, prevention, and control at the MDH. His current research involves the epidemiology of COVID-19 transmission patterns, clinical characteristics of presymptomatic COVID-19 infection in residents of LTCFs, and human belief systems surrounding COVID-19.

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#### SARS-CoV-2 Transmission Dynamics, Minnesota, USA

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# Transmission Dynamics of Severe Acute Respiratory Syndrome Coronavirus 2 in High-Density Settings, Minnesota, USA, March–June 2020

# Appendix

Appendix Table. GISAID accession num	bers for all sequenced samples from outbreak	settings*
Outbreak	Genome	GISAID Accession
Community Samples A	MN-MDH-1211	EPI_ISL_477300
Community Samples A	MN-MDH-1212	EPI_ISL_477301
Community Samples A	MN-MDH-1213	EPI_ISL_477302
Community Samples A	MN-MDH-1220	EPI_ISL_477309
Community Samples A	MN-MDH-1221	EPI_ISL_477310
Community Samples A	MN-MDH-1224	EPI ISL 481242
Community Samples A	MN-MDH-1249	EPI_ISL_482970
Community Samples A	MN-MDH-1250	EPI_ISL_482971
Correctional Facility A	MN-MDH-286	EPI_ISL_437362
Correctional Facility A	MN-MDH-315	EPI_ISL_437363
Correctional Facility A	MN-MDH-336	EPI_ISL_437364
Correctional Facility A	MN-MDH-374	EPI_ISL_437366
Correctional Facility A	MN-MDH-436	EPI_ISL_437373
Correctional Facility A	MN-MDH-278	EPI_ISL_450752
Correctional Facility A	MN-MDH-316	EPI_ISL_450774
Correctional Facility A	MN-MDH-1298	EPI_ISL_495597
Correctional Facility A	MN-MDH-1299	EPI ISL 495598
Correctional Facility A	MN-MDH-1300	EPI_ISL_495599
Correctional Facility A	MN-MDH-1301	EPI ISL 495600
Correctional Facility A	MN-MDH-1302	EPI_ISL_495601
Correctional Facility A	MN-MDH-1303	EPI ISL 495602
Correctional Facility A	MN-MDH-1304	EPI_ISL_495603
Correctional Facility A	MN-MDH-1305	EPI_ISL_495604
Correctional Facility A	MN-MDH-1306	EPI_ISL_495605
Correctional Facility A	MN-MDH-1307	EPI_ISL_495606
Correctional Facility A	MN-MDH-1308	EPI_ISL_495607
Correctional Facility A	MN-MDH-1309	EPI_ISL_495608
Correctional Facility A	MN-MDH-1310	EPI_ISL_495609
Correctional Facility A	MN-MDH-1332	EPI_ISL_496918
Correctional Facility A	MN-MDH-1345	EPI_ISL_507934
Correctional Facility A	MN-MDH-1346	EPI_ISL_507935
Correctional Facility A	MN-MDH-1347	EPI_ISL_507936
Correctional Facility A	MN-MDH-1348	EPI_ISL_507937
Correctional Facility A	MN-MDH-1349	EPI_ISL_507938
Correctional Facility A	MN-MDH-1350	EPI_ISL_507939
Correctional Facility A	MN-MDH-1351	EPI_ISL_507940
Correctional Facility A	MN-MDH-1352	EPI_ISL_507941
Correctional Facility A	MN-MDH-1353	EPI_ISL_507942
Correctional Facility A	MN-MDH-1354	EPI_ISL_507943
Correctional Facility A	MN-MDH-1355	EPI_ISL_507944
Correctional Facility A	MN-MDH-1356	EPI_ISL_507945
Correctional Facility A	MN-MDH-1357	EPI_ISL_507946
Correctional Facility A	MN-MDH-1358	EPI_ISL_507947
Correctional Facility A	MN-MDH-1359	EPI_ISL_507948
Correctional Facility A	MN-MDH-1360	EPI_ISL_507949
Correctional Facility A	MN-MDH-1361	EPI_ISL_507950
Correctional Facility A	MN-MDH-1362	EPI_ISL_507951
Correctional Facility A	MN-MDH-1363	EPI_ISL_507952

Outbreak	Genome	GISAID Accession
Correctional Facility A	MN-MDH-1364	EPI_ISL_515262
Correctional Facility A	MN-MDH-1365	EPI_ISL_507953
Correctional Facility A		EPI_ISL_507954
Correctional Facility A	MN-MDH-1368	EPI_ISL_307955
Correctional Facility A	MN-MDH-1397	EPI_ISL_507950
Correctional Facility A	MN-MDH-1398	EPI ISI 514617
Correctional Facility A	MN-MDH-1399	EPI ISI 514618
Correctional Facility A	MN-MDH-1461	EPI ISL 518855
Correctional Facility B	MN-MDH-1070	EPI_ISL_470750
Correctional Facility B	MN-MDH-1071	EPI_ISL_470751
Correctional Facility B	MN-MDH-1072	EPI_ISL_470752
Correctional Facility B	MN-MDH-1073	EPI_ISL_470753
Correctional Facility B	MN-MDH-1074	EPI_ISL_470754
Correctional Facility B	MN-MDH-1075	EPI_ISL_470755
Correctional Facility B		EPI_ISL_470756
Correctional Facility B	MN-MDH-1078	EPI_ISL_470758
Correctional Facility B	MN-MDH-1079	EPI ISI 470759
Correctional Facility B	MN-MDH-1080	EPI ISL 470760
Correctional Facility B	MN-MDH-1081	EPI_ISL_470761
Correctional Facility B	MN-MDH-1082	EPI_ISL_470762
Correctional Facility B	MN-MDH-1083	EPI_ISL_470763
Correctional Facility B	MN-MDH-1084	EPI_ISL_470764
Correctional Facility B	MN-MDH-1085	EPI_ISL_470765
Correctional Facility B	MN-MDH-1086	EPI_ISL_470766
Correctional Facility B		EPI_ISL_470769
Correctional Facility B	MN-MDH-1089	EPI_ISL_470769
Correctional Facility B	MN-MDH-1090	EPI ISI 470770
Correctional Facility B	MN-MDH-1091	EPI ISL 470771
Correctional Facility B	MN-MDH-1092	EPI_ISL_470772
Correctional Facility B	MN-MDH-1093	EPI_ISL_470773
Correctional Facility B	MN-MDH-1094	EPI_ISL_470774
Correctional Facility B	MN-MDH-1095	EPI_ISL_470775
Correctional Facility B		EPI_ISL_470776
Correctional Facility B	MN-MDH-1097 MN-MDH-1098	EFI_ISL_4707778
Correctional Facility B	MN-MDH-1099	EPI ISI 470779
Correctional Facility B	MN-MDH-1100	EPI ISL 470780
Correctional Facility B	MN-MDH-1101	EPI_ISL_470781
Correctional Facility B	MN-MDH-1102	EPI_ISL_470782
Correctional Facility B	MN-MDH-1103	EPI_ISL_470783
Correctional Facility B	MN-MDH-1104	EPI_ISL_470784
Correctional Facility B	MN-MDH-1105	EPI_ISL_470785
Correctional Facility B		EPI_ISL_470787
Correctional Facility B	MN-MDH-1108	EPI ISI 470788
Correctional Facility B	MN-MDH-1109	EPI ISL 470789
Correctional Facility B	MN-MDH-1169	EPI_ISL_476754
Correctional Facility B	MN-MDH-1177	EPI_ISL_476762
Correctional Facility B	MN-MDH-1178	EPI_ISL_476763
Correctional Facility B	MN-MDH-1179	EPI_ISL_476764
Correctional Facility B	MN-MDH-1180	EPI_ISL_476765
Correctional Facility B	MN-MDH-1181	EPI_ISL_476766
Correctional Facility B	MN-MDH-1252 MN-MDH-1253	EFI_ISL_462973 EPI_ISL_462974
Correctional Facility B	MN-MDH-1254	EPI ISI 482975
Correctional Facility B	MN-MDH-1255	EPI ISL 482976
Correctional Facility B	MN-MDH-1256	EPI_ISL_482977
Correctional Facility B	MN-MDH-1258	EPI_ISL_482979
Correctional Facility B	MN-MDH-1259	EPI_ISL_482980
Correctional Facility B	MN-MDH-1260	EPI_ISL_482981
Correctional Facility B	MN-MDH-1261	EPI_ISL_482982
Correctional Facility B		EPI_ISL_482983
Correctional Facility B	IVIIN-IVIDH-1203 MN-MDH-1264	EF1_10L_402904 ED1 191 /82085
Correctional Facility B	MN-MDH-1265	EPI ISI 482986
Correctional Facility B	MN-MDH-1266	EPI ISL 482987

Outbreak	Genome	GISAID Accession
Correctional Facility B	MN-MDH-1331	EPI_ISL_496917
LTCF A	MN-MDH-1000	EPI_ISL_462845
LTCF A	MN-MDH-1001	EPI_ISL_462846
LTCF A	MN-MDH-1002	EPI_ISL_462847
LTCF A	MN-MDH-1003	EPI_ISL_462848
LTCF A	MN-MDH-1004	EPI_ISL_462849
LTCF A	MN-MDH-1005	EPI_ISL_462850
LTCF A	MN-MDH-1006	EPI_ISL_462851
LTCF A	MN-MDH-1007	EPI_ISL_462852
LTCF A	MN-MDH-1008	EPI_ISL_462853
LTCF A	MN-MDH-1009	EPI_ISL_462854
LTCF A	MN-MDH-1010	EPI_ISL_462855
I TCF A	MN-MDH-1011	EPI ISI 462856
LTCF A	MN-MDH-1012	EPI ISI 462857
I TCF A	MN-MDH-1013	EPI ISI 462858
LTCF A	MN-MDH-1014	EPI ISI 462859
LTCF A	MN-MDH-1015	EPI ISI 462860
LTCE A	MN-MDH-1016	EPI ISI 462861
LTCE A	MN-MDH-1017	EPI ISI 462862
	MN-MDH-1018	EPI ISI 462863
	MN-MDH-1019	EPI ISI 462864
	MN-MDH-1042	EPI ISI 462887
		EDI ISI 462888
		EPI_13L_402000
		EFI_13L_402009
		EPI_ISL_402090
		EPI_ISL_470755
		EPI_ISL_470750
		EFI_ISL_402003
		EFI_I3L_402000
		EFI_ISL_402007
		EFI_I3L_402000
		EPI_13L_402009
		EPI_ISL_402070
		EPI_ISL_462871
		EPI_13L_402072
		EPI_ISL_462873
		EPI_ISL_462874
		EPI_ISL_462875
		EPI_13L_402070
		EPI_13L_402077
		EPI_ISL_462878
		EPI_ISL_462879
		EPI_ISL_462880
		EPI_ISL_462881
	MN-MDH-1037	EPI_ISL_462882
		EPI_ISL_462883
		EPI_ISL_462884
		EPI_13L_402003
		EPI_ISL_462886
		EPI_ISL_462891
		EPI_ISL_462892
		EPI_ISL_462893
	MIN-MIDH-1049	EPI_ISL_462894
	MN-MDH-1050	EPI_ISL_462895
		EPI_ISL_462896
	MN-MDH-1052	EPI_ISL_462897
		EPI_ISL_462898
		EPI_ISL_462899
		EP1_13L_402900
		EPI_ISL_462901
	IVIN-IVIDH-1057	EPI_ISL_462902
		EPI_ISL_462903
	IVIN-IVIDH-1059	EPI_ISL_462904
	MN-MDH-1060	EPI_ISL_462905
	MIN-MDH-1061	EPI_ISL_462906
	MN-MDH-1062	EPI_ISL_462907
	MN-MDH-1063	EPI_ISL_462908
LICF B	MN-MDH-1064	EPI_ISL_462909

LTCF B         MMADH-1065         EPI_SL_462910           LTCF B         MMADH-1067         EPI_SL_470747           LTCF B         MMADH-1067         EPI_SL_470747           LTCF B         MMADH-1067         EPI_SL_470747           LTCF B         MMADH-1067         EPI_SL_470747           LTCF B         MMADH-1108         EPI_SL_470748           LTCF B         MMADH-1111         EPI_SL_470780           LTCF B         MMADH-1113         EPI_SL_470783           LTCF B         MMADH-1113         EPI_SL_470783           LTCF B         MMADH-1114         EPI_SL_470784           LTCF B         MMADH-1116         EPI_SL_470786           LTCF B         MMADH-1117         EPI_SL_470786           LTCF B         MMADH-1117         EPI_SL_470786           LTCF B         MMADH-1117         EPI_SL_470786           LTCF B         MMADH-1117         EPI_SL_470786           LTCF B         MMADH-1173         EPI_SL_477273	Outbreak	Genome	GISAID Accession
LTOF B         MM-MDH-1066         EPI_SL_470747           LTOF B         MM-MDH-1067         EPI_SL_470747           LTOF B         MM-MDH-1068         EPI_SL_470747           LTOF B         MM-MDH-1068         EPI_SL_470749           LTOF B         MM-MDH-1061         EPI_SL_470749           LTOF B         MM-MDH-1111         EPI_SL_470793           LTOF B         MM-MDH-1113         EPI_SL_470793           LTOF B         MM-MDH-1114         EPI_SL_470794           LTOF B         MM-MDH-1115         EPI_SL_470794           LTOF B         MM-MDH-1116         EPI_SL_470796           LTOF B         MM-MDH-1116         EPI_SL_470796           LTOF B         MM-MDH-1116         EPI_SL_470796           LTOF B         MM-MDH-1116         EPI_SL_470796           LTOF B         MM-MDH-1113         EPI_SL_476757           LTOF B         MM-MDH-1120         EPI_SL_476759           LTOF B         MM-MDH-1130         EPI_SL_476759           LTOF B         MM-MDH-1163         EPI_SL_476760           LTOF B         MM-MDH-1163         EPI_SL_476760           LTOF B         MM-MDH-1183         EPI_SL_477274           LTOF B         MM-MDH-1183         EPI_SL_477277	LTCF B	MN-MDH-1065	EPI_ISL_462910
LTCF B         MMMDH-1067         EPI_ISL_470747           LTCF B         MMMDH-1068         EPI_ISL_470748           LTCF B         MMMDH-1111         EPI_ISL_470749           LTCF B         MMMDH-1111         EPI_ISL_470749           LTCF B         MMMDH-1111         EPI_ISL_470730           LTCF B         MMMDH-1111         EPI_ISL_470731           LTCF B         MMMDH-1111         EPI_ISL_470733           LTCF B         MMMDH-1113         EPI_ISL_470736           LTCF B         MMMDH-113         EPI_ISL_470736           LTCF B         MMMDH-113         EPI_ISL_470736           LTCF B         MMMDH-113         EPI_ISL_470760           LTCF B         MMMDH-113         EPI_ISL_470760           LTCF B         MMMDH-113         EPI_ISL_470778           LTCF B         MMMDH-113         EPI_ISL_470778           LTCF B         MMMDH-113         EPI_ISL_477272           LTCF B         MMMDH-1143         EPI_ISL_477277	LTCF B	MN-MDH-1066	EPI_ISL_462911
LTCF B         MMMDH-1068         EPI_SL_470748           LTCF B         MMMDH-1109         EPI_SL_470749           LTCF B         MMMDH-1111         EPI_SL_470791           LTCF B         MMMDH-1112         EPI_SL_470791           LTCF B         MMMDH-1112         EPI_SL_470781           LTCF B         MMMDH-1113         EPI_SL_470782           LTCF B         MMMDH-1116         EPI_SL_470781           LTCF B         MMMDH-1116         EPI_SL_470786           LTCF B         MMMDH-1117         EPI_SL_470786           LTCF B         MMMDH-1117         EPI_SL_470786           LTCF B         MMMDH-1117         EPI_SL_470786           LTCF B         MMMDH-1120         EPI_SL_470786           LTCF B         MMMDH-1173         EPI_SL_470780           LTCF B         MMMDH-1173         EPI_SL_470780           LTCF B         MMMDH-1173         EPI_SL_470780           LTCF B         MMMDH-1174         EPI_SL_470780           LTCF B         MMMDH-1174         EPI_SL_470780           LTCF B         MMMDH-1174         EPI_SL_470780           LTCF B         MMMDH-1174         EPI_SL_470780           LTCF B         MMMDH-1182         EPI_SL_477273	LTCF B	MN-MDH-1067	EPI_ISL_470747
LTCF B         MMADH-1069         EPL ISL_470789           LTCF B         MMADH-1110         EPL ISL_470780           LTCF B         MMADH-1111         EPL ISL_470782           LTCF B         MMADH-1112         EPL ISL_470782           LTCF B         MMADH-1114         EPL ISL_470782           LTCF B         MMADH-1116         EPL ISL_470785           LTCF B         MMADH-1116         EPL ISL_470785           LTCF B         MMADH-1116         EPL ISL_470786           LTCF B         MMADH-1117         EPL ISL_470787           LTCF B         MMADH-1117         EPL ISL_470789           LTCF B         MMADH-1172         EPL ISL_470780           LTCF B         MMADH-1172         EPL ISL_470780           LTCF B         MMADH-1172         EPL ISL_470780           LTCF B         MMADH-1176         EPL ISL_477270           LTCF B         MMADH-1183         EPL ISL_477270           LTCF B         MMADH-1183         EPL ISL_477278           LTCF B         MMADH-1183         EPL ISL_477280	LTCF B	MN-MDH-1068	EPI_ISL_470748
LTCF B         MMAMDH-1110         EPL, ISL, 470791           LTCF B         MMADH-1111         EPL, ISL, 470791           LTCF B         MMADH-1112         EPL, ISL, 470793           LTCF B         MMADH-1113         EPL, ISL, 470793           LTCF B         MMADH-1114         EPL, ISL, 470793           LTCF B         MMADH-1114         EPL, ISL, 470796           LTCF B         MMADH-1117         EPL, ISL, 470796           LTCF B         MMADH-1117         EPL, ISL, 470798           LTCF B         MMADH-1112         EPL, ISL, 470798           LTCF B         MMADH-1120         EPL, ISL, 470798           LTCF B         MMADH-1172         EPL, ISL, 470789           LTCF B         MMADH-1173         EPL, ISL, 470780           LTCF B         MMADH-1173         EPL, ISL, 470770           LTCF B         MMADH-1175         EPL, ISL, 470770           LTCF B         MMADH-1175         EPL, ISL, 470770           LTCF B         MMADH-1175         EPL, ISL, 470770           LTCF B         MMADH-1184         EPL, ISL, 47727           LTCF B         MMADH-1184         EPL, ISL, 477270           LTCF B         MMADH-1180         EPL, ISL, 477280           LTCF B         MMAN	LTCF B	MN-MDH-1069	EPI_ISL_470749
LTOF B         MM-NDH-1111         EPL, ISL, 470791           LTOF B         MM-NDH-1113         EPL, ISL, 470792           LTOF B         MM-NDH-1113         EPL, ISL, 470794           LTOF B         MM-NDH-1114         EPL, ISL, 470794           LTOF B         MM-NDH-1115         EPL, ISL, 470796           LTOF B         MM-NDH-1115         EPL, ISL, 470796           LTOF B         MM-NDH-1117         EPL, ISL, 470796           LTOF B         MM-NDH-1117         EPL, ISL, 470796           LTOF B         MM-NDH-1112         EPL, ISL, 470789           LTOF B         MM-NDH-1173         EPL, ISL, 470780           LTOF B         MM-NDH-1173         EPL, ISL, 470780           LTOF B         MM-NDH-1174         EPL, ISL, 470780           LTOF B         MM-NDH-1174         EPL, ISL, 470780           LTOF B         MM-NDH-1182         EPL, ISL, 470780           LTOF B         MM-NDH-1182         EPL, ISL, 477270           LTOF B         MM-NDH-1183         EPL, ISL, 477270           LTOF B <td>LTCF B</td> <td>MN-MDH-1110</td> <td>EPI_ISL_470790</td>	LTCF B	MN-MDH-1110	EPI_ISL_470790
LTCF B         MM-NDH-1112         EPL ISL 470792           LTCF B         MM-NDH-1113         EPL ISL 470793           LTCF B         MM-NDH-1114         EPL ISL 470795           LTCF B         MM-NDH-1116         EPL ISL 470795           LTCF B         MM-NDH-1116         EPL ISL 470795           LTCF B         MM-NDH-1117         EPL ISL 470797           LTCF B         MM-NDH-1117         EPL ISL 470798           LTCF B         MM-NDH-1117         EPL ISL 470780           LTCF B         MM-NDH-1120         EPL ISL 470780           LTCF B         MM-NDH-1173         EPL ISL 470780           LTCF B         MM-NDH-1173         EPL ISL 470780           LTCF B         MM-NDH-1176         EPL ISL 470780           LTCF B         MM-NDH-1176         EPL ISL 470780           LTCF B         MM-NDH-1176         EPL ISL 477270           LTCF B         MM-NDH-1183         EPL ISL 477274           LTCF B         MM-NDH-1183         EPL ISL 477280           LTCF B         MM-NDH-1190	LTCF B	MN-MDH-1111	EPI ISL 470791
LTCF B         MN-NDP-1113         EPI, ISL, 470793           LTCF B         MN-NDP-1114         EPI, ISL, 470794           LTCF B         MN-NDP-1115         EPI, ISL, 470796           LTCF B         MN-NDP-1116         EPI, ISL, 470796           LTCF B         MN-NDP-1117         EPI, ISL, 470796           LTCF B         MN-NDP-1117         EPI, ISL, 470798           LTCF B         MN-NDP-1112         EPI, ISL, 470798           LTCF B         MN-NDP-1173         EPI, ISL, 470783           LTCF B         MN-NDP-1172         EPI, ISL, 470784           LTCF B         MN-NDP-1173         EPI, ISL, 470784           LTCF B         MN-NDP-1173         EPI, ISL, 470784           LTCF B         MN-NDP-1173         EPI, ISL, 470784           LTCF B         MN-NDP-1172         EPI, ISL, 470784           LTCF B         MN-NDP-1172         EPI, ISL, 470784           LTCF B         MN-NDP-1172         EPI, ISL, 470784           LTCF B         MN-NDP-1174         EPI, ISL, 470784           LTCF B         MN-NDP-1185         EPI, ISL, 477274           LTCF B         MN-NDP-1189         EPI, ISL, 477284           LTCF B         MN-NDP-1190         EPI, ISL, 477284           LTCF B <td>LTCF B</td> <td>MN-MDH-1112</td> <td>EPI_ISL_470792</td>	LTCF B	MN-MDH-1112	EPI_ISL_470792
LTCF B         MN-NDP-1114         EPI, ISL 470796           LTCF B         MN-NDP-1116         EPI, ISL 470796           LTCF B         MN-NDP-1116         EPI, ISL 470796           LTCF B         MN-NDP-1116         EPI, ISL 470797           LTCF B         MN-NDP-1118         EPI, ISL 470797           LTCF B         MN-NDP-1120         EPI, ISL 470799           LTCF B         MN-NDP-1120         EPI, ISL 470799           LTCF B         MN-NDP-1120         EPI, ISL 476787           LTCF B         MN-NDP-1173         EPI, ISL 476786           LTCF B         MN-NDP-1176         EPI, ISL 476786           LTCF B         MN-NDP-1176         EPI, ISL 476781           LTCF B         MN-NDP-1176         EPI, ISL 477271           LTCF B         MN-NDP-1183         EPI, ISL 477272           LTCF B         MN-NDP-1183         EPI, ISL 477274           LTCF B         MN-NDP-1191         EPI, ISL 477284           LTCF B         MN-NDP-1193         EPI, ISL 477284           LTCF B         MN-N	LTCF B	MN-MDH-1113	EPI_ISL_470793
LTOP B         MN-MDH-1116         EPILSL_470796           LTOP B         MN-MDH-1116         EPILSL_470797           LTOP B         MN-MDH-1117         EPILSL_470797           LTOP B         MN-MDH-1118         EPILSL_470798           LTOP B         MN-MDH-1119         EPILSL_470789           LTOP B         MN-MDH-1112         EPILSL_470800           LTOP B         MN-MDH-1172         EPILSL_470787           LTOP B         MN-MDH-1173         EPILSL_470787           LTOP B         MN-MDH-1174         EPILSL_470787           LTOP B         MN-MDH-1174         EPILSL_470787           LTOP B         MN-MDH-1174         EPILSL_470787           LTOP B         MN-MDH-1184         EPILSL_477274           LTOP B         MN-MDH-1184         EPILSL_477276           LTOP B         MN-MDH-1184         EPILSL_477281           LTOP B         MN-MDH-1184         EPILSL_477728	LTCF B	MN-MDH-1114	EPI_ISL_470794
LTCF B         MM-NDH-1116         EFF_LSL_470796           LTCF B         MM-NDH-1117         EFF_LSL_470797           LTCF B         MM-NDH-1118         EFF_LSL_470798           LTCF B         MM-NDH-1112         EFF_LSL_470799           LTCF B         MM-NDH-1120         EFF_LSL_470786           LTCF B         MM-NDH-1173         EFF_LSL_4707575           LTCF B         MM-NDH-1173         EFF_LSL_4707576           LTCF B         MM-NDH-1176         EFF_LSL_4707576           LTCF B         MM-NDH-1176         EFF_LSL_4707676           LTCF B         MM-NDH-1176         EFF_LSL_470727           LTCF B         MM-NDH-1182         EFF_LSL_477274           LTCF B         MM-NDH-1184         EFF_LSL_477274           LTCF B         MM-NDH-1184         EFF_LSL_477274           LTCF B         MM-NDH-1183         EFF_LSL_477274           LTCF B         MM-NDH-1183         EFF_LSL_47728           LTCF B         MM-NDH-1183	LTCF B	MN-MDH-1115	EPI_ISL_470795
TCF B         MN-MDH-1117         EPISL	I TCF B	MN-MDH-1116	EPL ISL 470796
TCF B         MANDH-1118         EPISL-470789           LTCF B         MANDH-1119         EPISL-470789           LTCF B         MANDH-1120         EPISL-470780           LTCF B         MANDH-1120         EPISL-470787           LTCF B         MANDH-1173         EPISL-476757           LTCF B         MANDH-1173         EPISL-476758           LTCF B         MANDH-1175         EPISL-476760           LTCF B         MANDH-1175         EPISL-476761           LTCF B         MANDH-1182         EPISL-4776761           LTCF B         MANDH-1182         EPISL-477273           LTCF B         MANDH-1182         EPISL-477273           LTCF B         MANDH-1184         EPISL-477273           LTCF B         MANDH-1187         EPISL-477273           LTCF B         MANDH-1187         EPISL-477278           LTCF B         MANDH-1189         EPISL-477280           LTC	I TCF B	MN-MDH-1117	EPL ISL 470797
TCF B         WN-NDH-1120         EPI SL. 470799           LTCF B         WN-NDH-1120         EPI SL. 470790           LTCF B         WN-NDH-1172         EPI SL. 476757           LTCF B         WN-NDH-1173         EPI SL. 476758           LTCF B         WN-NDH-1174         EPI SL. 476760           LTCF B         WN-NDH-1176         EPI SL. 476761           LTCF B         WN-NDH-1176         EPI SL. 476761           LTCF B         WN-NDH-1183         EPI SL. 477272           LTCF B         WN-NDH-1183         EPI SL. 477273           LTCF B         WN-NDH-1183         EPI SL. 477275           LTCF B         WN-NDH-1186         EPI SL. 477275           LTCF B         WN-NDH-1188         EPI SL. 477278           LTCF B         WN-NDH-1189         EPI SL. 477281           LTCF B         WN-NDH-1190         EPI SL. 477281           LTCF B         WN-NDH-1190         EPI SL. 477281           LTCF B         WN-NDH-1192         EPI SL. 477281           LTCF B         WN-NDH-1192         EPI SL. 477281           LTCF B         WN-NDH-1193         EPI SL. 477281           LTCF B         WN-NDH-1193         EPI SL. 477281           LTCF B         WN-NDH-1193	LTCE B	MN-MDH-1118	EPLISE 470798
TCF B         MN-NDH-1120         EP_ISL_470800           LTCF B         MN-NDH-1173         EP_ISL_476757           LTCF B         MN-NDH-1173         EP_ISL_476769           LTCF B         MN-NDH-1176         EP_ISL_476760           LTCF B         MN-NDH-1176         EP_ISL_476761           LTCF B         MN-NDH-1176         EP_ISL_476761           LTCF B         MN-NDH-1182         EP_ISL_47772           LTCF B         MN-NDH-1183         EP_ISL_47773           LTCF B         MN-NDH-1183         EP_ISL_477774           LTCF B         MN-NDH-1183         EP_ISL_477275           LTCF B         MN-NDH-1188         EP_ISL_477278           LTCF B         MN-NDH-1189         EP_ISL_477278           LTCF B         MN-NDH-1190         EP_ISL_477281           LTCF B         MN-NDH-1190         EP_ISL_477281           LTCF B         MN-NDH-1190         EP_ISL_477282           LTCF B         MN-NDH-1190         EP_ISL_477282           LTCF B         MN-NDH-1190         EP_ISL_477284           LTCF B         MN-NDH-1190         EP_ISL_477284           LTCF B         MN-NDH-1190         EP_ISL_477284           LTCF B         MN-NDH-1190         EP_ISL_477286 <td>I TCF B</td> <td>MN-MDH-1119</td> <td>EPL ISL 470799</td>	I TCF B	MN-MDH-1119	EPL ISL 470799
TCF B         MN-NDH-1172         EPI-SL 478757           TCF B         MN-NDH-1173         EPI-SL 478757           LTCF B         MN-NDH-1174         EPI-SL 476750           LTCF B         MN-NDH-1175         EPI-SL 476760           LTCF B         MN-NDH-1176         EPI-SL 476761           LTCF B         MN-NDH-1182         EPI-SL 476761           LTCF B         MN-NDH-1182         EPI-SL 477273           LTCF B         MN-NDH-1183         EPI-SL 477274           LTCF B         MN-NDH-1183         EPI-SL 477275           LTCF B         MN-NDH-1183         EPI-SL 477276           LTCF B         MN-NDH-1183         EPI-SL 477280           LTCF B         MN-NDH-1183         EPI-SL 477281           LTCF B         MN-NDH-1191         EPI-SL 477281           LTCF B         MN-NDH-1183         EPI-SL 477284           LTCF B         MN-NDH-1184         EPI-SL 477284           LTCF B         MN-NDH-1184         EPI-SL 477284           LTCF B         MN-NDH-1184         EPI-SL 477284 </td <td>LTCE B</td> <td>MN-MDH-1120</td> <td>EPLISE 470800</td>	LTCE B	MN-MDH-1120	EPLISE 470800
TCF B         MN-NDH-1173         EPLSL. 478758           LTCF B         MN-NDH-1174         EPLSL. 478759           LTCF B         MN-NDH-1176         EPLSL. 478760           LTCF B         MN-NDH-1176         EPLSL. 477670           LTCF B         MN-NDH-1182         EPLSL. 477723           LTCF B         MN-NDH-1182         EPLSL. 477273           LTCF B         MN-NDH-1183         EPLSL. 477274           LTCF B         MN-NDH-1183         EPLSL. 477275           LTCF B         MN-NDH-1187         EPLSL. 477275           LTCF B         MN-NDH-1188         EPLSL. 477276           LTCF B         MN-NDH-1198         EPLSL. 477278           LTCF B         MN-NDH-1190         EPLSL. 477281           LTCF B         MN-NDH-1190         EPLSL. 477284           LTCF B         MN-NDH-1190         EPLSL. 477286<	LTCF B	MN-MDH-1172	EPLISE 476757
LTCF B         MN-NDH-1174         EPI SL 476769           LTCF B         MN-NDH-1175         EPI SL 476761           LTCF B         MN-NDH-1176         EPI SL 476761           LTCF B         MN-NDH-1182         EPI SL 477723           LTCF B         MN-NDH-1183         EPI SL 477273           LTCF B         MN-NDH-1183         EPI SL 477274           LTCF B         MN-NDH-1183         EPI SL 477275           LTCF B         MN-NDH-1180         EPI SL 477275           LTCF B         MN-NDH-1180         EPI SL 477276           LTCF B         MN-NDH-1180         EPI SL 477276           LTCF B         MN-NDH-1180         EPI SL 477278           LTCF B         MN-NDH-1180         EPI SL 477280           LTCF B         MN-NDH-1180         EPI SL 477280           LTCF B         MN-NDH-1180         EPI SL 477280           LTCF B         MN-NDH-1180         EPI SL 477281           LTCF B         MN-NDH-1180         EPI SL 477284           LTCF B         MN-NDH-1180         EPI SL 477284           LTCF B         MN-NDH-1181         EPI SL 477284           LTCF B         MN-NDH-1181         EPI SL 477284           LTCF B         MN-NDH-1181         EPI SL 477284	LTCE B	MN-MDH-1173	EPI ISI 476758
LTCF B         MN-MDH-1175         EPL ISL 476760           LTCF B         MN-MDH-1176         EPL ISL 477670           LTCF B         MN-MDH-1182         EPL ISL 477272           LTCF B         MN-MDH-1183         EPL ISL 477272           LTCF B         MN-MDH-1183         EPL ISL 477274           LTCF B         MN-MDH-1185         EPL ISL 477274           LTCF B         MN-MDH-1186         EPL ISL 477277           LTCF B         MN-MDH-1186         EPL ISL 477277           LTCF B         MN-MDH-1188         EPL ISL 477279           LTCF B         MN-MDH-1189         EPL ISL 477281           LTCF B         MN-MDH-1190         EPL ISL 477282           LTCF B         MN-MDH-1190         EPL ISL 477282           LTCF B         MN-MDH-1193         EPL ISL 477283           LTCF B         MN-MDH-1193         EPL ISL 477284           LTCF B         MN-MDH-1193         EPL ISL 477284           LTCF B         MN-MDH-1193         EPL ISL 477283           LTCF B         MN-MDH-1193         EPL ISL 477284           LTCF B         MN-MDH-1193         EPL ISL 477284           LTCF B         MN-MDH-1193         EPL ISL 477284           LTCF C         MN-MDH-1197	LTCE B	MN-MDH-1174	EPI ISI 476759
LTOF B         MNMDH-1176         EL_LS_470701           LTOF B         MNMDH-1182         EP_LSL_477273           LTOF B         MNMDH-1183         EP_LSL_477273           LTOF B         MNMDH-1184         EP_LSL_477273           LTOF B         MNMDH-1184         EP_LSL_477273           LTOF B         MNMDH-1187         EP_LSL_477275           LTOF B         MNMDH-1185         EP_LSL_477278           LTOF B         MNMDH-1189         EP_LSL_477280           LTOF B         MNMDH-1190         EP_LSL_477280           LTOF B         MNMDH-1190         EP_LSL_477280           LTOF B         MNMDH-1190         EP_LSL_477280           LTOF B         MNMDH-1190         EP_LSL_477284           LTOF B         MNMDH-1192         EP_LSL_477284           LTOF B         MNMDH-1196         EP_LSL_477284           LTOF B         MNMDH-1196         EP_LSL_477284           LTOF B         MNMDH-1198         EP_LSL_477284           LTOF B         MNMDH-1198         EP_LSL_477284           LTOF B         MNMDH-1197         EP_LSL_477284           LTOF B         MNMDH-1198         EP_LSL_477284           LTOF C         MNMDH-1198         EP_LSL_477284      <			EPI ISI 476760
LTOF B         MNAMDH 1102         ED LISE 477272           LTOF B         MNAMDH 1183         ED LISE 477272           LTOF B         MNAMDH 1183         EP LISE 477273           LTOF B         MNAMDH 1184         EP LISE 477274           LTOF B         MNAMDH 1186         EP LISE 477274           LTOF B         MNAMDH 1186         EP LISE 477277           LTOF B         MNAMDH 1186         EP LISE 477279           LTOF B         MNAMDH 1189         EP LISE 477279           LTOF B         MNAMDH 1190         EP LISE 477281           LTOF B         MNAMDH 1191         EP LISE 477282           LTOF B         MNAMDH 1192         EP LISE 477283           LTOF B         MNAMDH 1193         EP LISE 477284           LTOF B         MNAMDH 1193         EP LISE 477284           LTOF B         MNAMDH 1193         EP LISE 477284           LTOF B         MNAMDH 1197         EP LISE 477284           LTOF B         MNAMDH 1193         EP LISE 477284           LTOF B         MNAMDH 1193         EP LISE 477284           LTOF B         MNAMDH 1193         EP LISE 477287           LTOF B         MNAMDH 1193         EP LISE 477287           LTOF C         MNAMDH 1193		MN-MDH-1176	ED 191 476761
LTGF B         MNMDH 1182         EP LISE 47223           LTGF B         MNMDH 1183         EP LISE 477273           LTGF B         MNMDH 1184         EP LISE 477273           LTGF B         MNMDH 1185         EP LISE 477275           LTGF B         MNMDH 1185         EP LISE 477273           LTGF B         MNMDH 1187         EP LISE 477276           LTGF B         MNMDH 1189         EP LISE 477278           LTGF B         MNMDH 1190         EP LISE 477278           LTGF B         MNMDH 1190         EP LISE 477280           LTGF B         MNMDH 1190         EP LISE 477284           LTGF B         MNMDH 1190         EP LISE 477284           LTGF B         MNMDH 1192         EP LISE 477284           LTGF B         MNMDH 1196         EP LISE 477286           LTGF B         MNMDH 1196         EP LISE 477286           LTGF B         MNMDH 1198         EP LISE 477288           LTGF B         MNMDH 1198         EP LISE 477280           LTGF B         MNMDH 1198         EP LISE 477280           LTGF B         MNMDH 1198         EP LISE 477280           LTGF C         MNMDH 1180         EP LISE 477280           LTGF C         MNMDH 1180         EP LISE 476737<			EDI ISI 477272
LTCF B         MINMDH-1184         EP         LAL_77273           LTCF B         MN-MDH-1184         EP         L477274           LTCF B         MN-MDH-1185         EP         L3L_477275           LTCF B         MN-MDH-1186         EP         L3L_477277           LTCF B         MN-MDH-1188         EP         L3L_477279           LTCF B         MN-MDH-1190         EP         L3L_477280           LTCF B         MN-MDH-1193         EP         L3L_477280           LTCF B         MN-MDH-1193         EP         L3L_477281           LTCF B         MN-MDH-1193         EP         L3L_477283           LTCF B         MN-MDH-1193         EP         L3L_477283           LTCF B         MN-MDH-1193         EP         L3L_477283           LTCF B         MN-MDH-1196         EP         L3L_477285           LTCF B         MN-MDH-1198         EP         L3L_477287           LTCF C         MN-MDH-1198         EP         L3L_476739			
LTCF B         MINMDH-1164         EP         LSL_477274           LTCF B         MN-MDH-1185         EP         LSL_477275           LTCF B         MN-MDH-1187         EP         LSL_477277           LTCF B         MN-MDH-1188         EP         LSL_477279           LTCF B         MN-MDH-1189         EP         LSL_477280           LTCF B         MN-MDH-1190         EP         LSL_477281           LTCF B         MN-MDH-1191         EP         LSL_477282           LTCF B         MN-MDH-1192         EP         LSL_477282           LTCF B         MN-MDH-1193         EP         LSL_477284           LTCF B         MN-MDH-1196         EP         LSL_477286           LTCF B         MN-MDH-1197         EP         LSL_477286           LTCF B         MN-MDH-1199         EP         LSL_477287           LTCF B         MN-MDH-1199         EP         LSL_477287           LTCF B         MN-MDH-1199         EP         LSL_477280           LTCF B         MN-MDH-1199         EP         LSL_477280           LTCF B         MN-MDH-1199         EP         LSL_477280           LTCF C         MN-MDH-1197         EP         LSL_476732			EFI_I3L_4/7273
LLDF B         MINMUP-1185         EP         LSL         M1/213           LTCF B         MN-MDH-1187         EPI_LSL         477277           LTCF B         MN-MDH-1189         EPI_LSL         477278           LTCF B         MN-MDH-1189         EPI_LSL         477279           LTCF B         MN-MDH-1190         EPI_LSL         47729           LTCF B         MN-MDH-1191         EPI_LSL         477281           LTCF B         MN-MDH-1193         EPI_LSL         477281           LTCF B         MN-MDH-1193         EPI_LSL         477283           LTCF B         MN-MDH-1193         EPI_LSL         477285           LTCF B         MN-MDH-1196         EPI_LSL         477285           LTCF B         MN-MDH-1198         EPI_LSL         477287           LTCF B         MN-MDH-1198         EPI_LSL         477287           LTCF B         MN-MDH-1190         EPI_LSL         477287           LTCF C         MN-MDH-1190         EPI_LSL			
LTCF B         MN-MDH-1167         EPL ISL_477278           LTCF B         MN-MDH-1188         EPL ISL_477279           LTCF B         MN-MDH-1189         EPL ISL_477279           LTCF B         MN-MDH-1190         EPL ISL_477280           LTCF B         MN-MDH-1191         EPL ISL_477281           LTCF B         MN-MDH-1192         EPL ISL_477282           LTCF B         MN-MDH-1193         EPL ISL_477283           LTCF B         MN-MDH-1193         EPL ISL_477284           LTCF B         MN-MDH-1196         EPL ISL_477286           LTCF B         MN-MDH-1196         EPL ISL_477287           LTCF B         MN-MDH-1197         EPL ISL_477287           LTCF B         MN-MDH-1197         EPL ISL_477287           LTCF B         MN-MDH-1199         EPL ISL_477280           LTCF B         MN-MDH-1193         EPL ISL_477280           LTCF B         MN-MDH-1101         EPL ISL_476732           LTCF C         MN-MDH-1102         EPL ISL_476732           LTCF C         MN-MDH-1165         EPL ISL_476730           LTCF C         MN-MDH-1165         EPL ISL_476740           LTCF C         MN-MDH-1166         EPL ISL_476750           LTCF C         MN-MDH-1165			EPI_ISL_4/7275
LTCF B         MN-MDH-1189         EPL/SL_477279           LTCF B         MN-MDH-1189         EPL/SL_477280           LTCF B         MN-MDH-1190         EPL/SL_477281           LTCF B         MN-MDH-1191         EPL/SL_477281           LTCF B         MN-MDH-1192         EPL/SL_477283           LTCF B         MN-MDH-1193         EPL/SL_477285           LTCF B         MN-MDH-1196         EPL/SL_477286           LTCF B         MN-MDH-1196         EPL/SL_477286           LTCF B         MN-MDH-1196         EPL/SL_477286           LTCF B         MN-MDH-1196         EPL/SL_477286           LTCF B         MN-MDH-1197         EPL/SL_477286           LTCF B         MN-MDH-1198         EPL/SL_477286           LTCF B         MN-MDH-1199         EPL/SL_477280           LTCF B         MN-MDH-1190         EPL/SL_476732           LTCF B         MN-MDH-1100         EPL/SL_476732           LTCF C         MN-MDH-1133         EPL/SL_476739           LTCF C         MN-MDH-1154         EPL/SL_476739           LTCF C         MN-MDH-1166         EPL/SL_476749           LTCF C         MN-MDH-1165         EPL/SL_476750           LTCF C         MN-MDH-1120         EPL/SL_476752			
LTCF B         MN+MDH-1199         EPLISL_477280           LTCF B         MN+MDH-1191         EPLISL_477280           LTCF B         MN-MDH-1191         EPLISL_477281           LTCF B         MN-MDH-1192         EPLISL_477282           LTCF B         MN-MDH-1193         EPLISL_477283           LTCF B         MN-MDH-1195         EPLISL_477286           LTCF B         MN-MDH-1195         EPLISL_477286           LTCF B         MN-MDH-1196         EPLISL_477286           LTCF B         MN-MDH-1196         EPLISL_477286           LTCF B         MN-MDH-1197         EPLISL_477287           LTCF B         MN-MDH-1199         EPLISL_477289           LTCF B         MN-MDH-1201         EPLISL_477290           LTCF B         MN-MDH-1330         EPLISL_476732           LTCF C         MN-MDH-11422         EPLISL_476737           LTCF C         MN-MDH-1155         EPLISL_476730           LTCF C         MN-MDH-1166         EPLISL_476740           LTCF C         MN-MDH-1166         EPLISL_476750           LTCF C         MN-MDH-1166         EPLISL_476750           LTCF C         MN-MDH-1227         EPLISL_476750           LTCF C         MN-MDH-1228         EPLISL_48294			EPI_ISL_4/7270
LTCF B       MN-MDH-1190       EP1/SL_47/280         LTCF B       MN-MDH-1191       EP1/SL_477281         LTCF B       MN-MDH-1192       EP1/SL_477283         LTCF B       MN-MDH-1193       EP1/SL_477283         LTCF B       MN-MDH-1194       EP1/SL_477283         LTCF B       MN-MDH-1196       EP1/SL_477284         LTCF B       MN-MDH-1196       EP1/SL_477286         LTCF B       MN-MDH-1197       EP1/SL_477286         LTCF B       MN-MDH-1199       EP1/SL_477287         LTCF B       MN-MDH-1199       EP1/SL_477286         LTCF B       MN-MDH-1199       EP1/SL_477280         LTCF B       MN-MDH-1201       EP1/SL_47732         LTCF C       MN-MDH-1330       EP1/SL_476732         LTCF C       MN-MDH-1152       EP1/SL_476739         LTCF C       MN-MDH-1165       EP1/SL_476740         LTCF C       MN-MDH-1165       EP1/SL_476750         LTCF C       MN-MDH-1165       EP1/SL_476750         LTCF C       MN-MDH-1167       EP1/SL_482946         LTCF C       MN-MDH-1225       EP1/SL_482946         LTCF C       MN-MDH-1226       EP1/SL_482946         LTCF C       MN-MDH-1228       EP1/SL_482946 <td></td> <td></td> <td>EPI_ISL_4/7279</td>			EPI_ISL_4/7279
LTCF B       MN-MDH-1191       EP_LSL_477281         LTCF B       MN-MDH-1192       EP_LSL_477282         LTCF B       MN-MDH-1193       EP_LSL_477282         LTCF B       MN-MDH-1193       EP_LSL_477284         LTCF B       MN-MDH-1195       EP_LSL_477284         LTCF B       MN-MDH-1196       EP_LSL_477286         LTCF B       MN-MDH-1196       EP_LSL_477287         LTCF B       MN-MDH-1198       EP_LSL_477287         LTCF B       MN-MDH-1199       EP_LSL_477289         LTCF B       MN-MDH-1200       EP_LSL_477289         LTCF B       MN-MDH-1201       EP_LSL_476730         LTCF C       MN-MDH-1201       EP_LSL_476732         LTCF C       MN-MDH-1132       EP_LSL_476731         LTCF C       MN-MDH-1155       EP_LSL_476730         LTCF C       MN-MDH-1164       EP_LSL_476750         LTCF C       MN-MDH-1166       EP_LSL_476751         LTCF C       MN-MDH-1167       EP_LSL_476750         LTCF C       MN-MDH-1166       EP_LSL_476750         LTCF C       MN-MDH-1225       EP_LSL_482946         LTCF C       MN-MDH-1226       EP_LSL_482946         LTCF C       MN-MDH-1223       EP_LSL_482945 <td></td> <td>MIN-MDH-1190</td> <td>EPI_ISL_477280</td>		MIN-MDH-1190	EPI_ISL_477280
LTCF B       MN-MDH-1192       EP_ISL_47/282         LTCF B       MN-MDH-1193       EP_ISL_477283         LTCF B       MN-MDH-1194       EP_ISL_477283         LTCF B       MN-MDH-1195       EP_ISL_477285         LTCF B       MN-MDH-1196       EP_ISL_477286         LTCF B       MN-MDH-1197       EP_ISL_477286         LTCF B       MN-MDH-1199       EP_ISL_477286         LTCF B       MN-MDH-1199       EP_ISL_477280         LTCF B       MN-MDH-1201       EP_ISL_477280         LTCF B       MN-MDH-1201       EP_ISL_476732         LTCF C       MN-MDH-1330       EP_ISL_476732         LTCF C       MN-MDH-1152       EP_ISL_476739         LTCF C       MN-MDH-1155       EP_ISL_476730         LTCF C       MN-MDH-1166       EP_ISL_476750         LTCF C       MN-MDH-1166       EP_ISL_476750         LTCF C       MN-MDH-1166       EP_ISL_476750         LTCF C       MN-MDH-1120       EP_ISL_476750         LTCF C       MN-MDH-1123       EP_ISL_482946         LTCF C       MN-MDH-1166       EP_ISL_476750         LTCF C       MN-MDH-1225       EP_ISL_482946         LTCF C       MN-MDH-1223       EP_ISL_482946 <td></td> <td>MIN-MDH-1191</td> <td>EPI_ISL_4/7281</td>		MIN-MDH-1191	EPI_ISL_4/7281
LICF B         MN-MDH-1193         EPL_ISL_477283           LTCF B         MN-MDH-1194         EPL_ISL_477284           LTCF B         MN-MDH-1195         EPL_ISL_477286           LTCF B         MN-MDH-1197         EPL_ISL_477286           LTCF B         MN-MDH-1197         EPL_ISL_477286           LTCF B         MN-MDH-1199         EPL_ISL_477287           LTCF B         MN-MDH-1199         EPL_ISL_477287           LTCF B         MN-MDH-1190         EPL_ISL_477289           LTCF B         MN-MDH-1200         EPL_ISL_477289           LTCF B         MN-MDH-1300         EPL_ISL_476732           LTCF C         MN-MDH-1135         EPL_ISL_476737           LTCF C         MN-MDH-1155         EPL_ISL_476737           LTCF C         MN-MDH-1165         EPL_ISL_476740           LTCF C         MN-MDH-1165         EPL_ISL_476750           LTCF C         MN-MDH-1165         EPL_ISL_476751           LTCF C         MN-MDH-1165         EPL_ISL_476752           LTCF C         MN-MDH-11220         EPL_ISL_476751           LTCF C         MN-MDH-1165         EPL_ISL_476752           LTCF C         MN-MDH-1220         EPL_ISL_482946           LTCF C         MN-MDH-1220		MN-MDH-1192	EPI_ISL_477282
LICF B         MN-MDH-1194         EPLISL 47/284           LTCF B         MN-MDH-1195         EPLISL 47/285           LTCF B         MN-MDH-1196         EPLISL 47/286           LTCF B         MN-MDH-1197         EPLISL 47/287           LTCF B         MN-MDH-1198         EPLISL 47/287           LTCF B         MN-MDH-1199         EPLISL 47/288           LTCF B         MN-MDH-1200         EPLISL 47/289           LTCF B         MN-MDH-1201         EPLISL 477280           LTCF C         MN-MDH-1301         EPLISL 476732           LTCF C         MN-MDH-1134         EPLISL 476732           LTCF C         MN-MDH-1152         EPLISL 476730           LTCF C         MN-MDH-1155         EPLISL 476740           LTCF C         MN-MDH-1166         EPLISL 476750           LTCF C         MN-MDH-1166         EPLISL 476751           LTCF C         MN-MDH-1166         EPLISL 476752           LTCF C         MN-MDH-1122         EPLISL 476752           LTCF C         MN-MDH-1122         EPLISL 478752           LTCF C         MN-MDH-1122         EPLISL 478752           LTCF C         MN-MDH-1123         EPLISL 478752           LTCF C         MN-MDH-1226         EPLISL 482946		MN-MDH-1193	EPI_ISL_477283
LTCF B       MN-MDH-1195       EPLISL_477285         LTCF B       MN-MDH-1196       EPLISL_477286         LTCF B       MN-MDH-1197       EPLISL_477287         LTCF B       MN-MDH-1199       EPLISL_477288         LTCF B       MN-MDH-1199       EPLISL_477289         LTCF B       MN-MDH-1200       EPLISL_477280         LTCF B       MN-MDH-1201       EPLISL_476732         LTCF C       MN-MDH-1130       EPLISL_476732         LTCF C       MN-MDH-1152       EPLISL_476732         LTCF C       MN-MDH-1155       EPLISL_476737         LTCF C       MN-MDH-1165       EPLISL_476730         LTCF C       MN-MDH-1165       EPLISL_476750         LTCF C       MN-MDH-1166       EPLISL_476751         LTCF C       MN-MDH-1166       EPLISL_476755         LTCF C       MN-MDH-1120       EPLISL_476755         LTCF C       MN-MDH-1120       EPLISL_476755         LTCF C       MN-MDH-1120       EPLISL_482946         LTCF C       MN-MDH-1226       EPLISL_482946         LTCF C       MN-MDH-1220       EPLISL_482948         LTCF C       MN-MDH-1230       EPLISL_482951         LTCF C       MN-MDH-1230       EPLISL_482956 <td></td> <td>MN-MDH-1194</td> <td>EPI_ISL_4/7284</td>		MN-MDH-1194	EPI_ISL_4/7284
LICF B       MN-MDH-1196       EPI_ISL_477286         LTCF B       MN-MDH-1197       EPI_ISL_477287         LTCF B       MN-MDH-1198       EPI_ISL_477288         LTCF B       MN-MDH-1199       EPI_ISL_477289         LTCF B       MN-MDH-1201       EPI_ISL_477230         LTCF B       MN-MDH-1201       EPI_ISL_476732         LTCF C       MN-MDH-1301       EPI_ISL_476732         LTCF C       MN-MDH-1152       EPI_ISL_476732         LTCF C       MN-MDH-1155       EPI_ISL_476739         LTCF C       MN-MDH-1165       EPI_ISL_476730         LTCF C       MN-MDH-1166       EPI_ISL_476750         LTCF C       MN-MDH-1166       EPI_ISL_476752         LTCF C       MN-MDH-1167       EPI_ISL_476752         LTCF C       MN-MDH-1170       EPI_ISL_476752         LTCF C       MN-MDH-11226       EPI_ISL_476752         LTCF C       MN-MDH-1226       EPI_ISL_482946         LTCF C       MN-MDH-1230       EPI_ISL_482947         LTCF C       MN-MDH-1231       EPI_ISL_482950         LTCF C       MN-MDH-1231       EPI_ISL_482956         LTCF C       MN-MDH-1233       EPI_ISL_482956         LTCF C       MN-MDH-1233       EPI_I		MN-MDH-1195	EPI_ISL_477285
LTCF B       MN-MDH-1197       EPI_SL_47/287         LTCF B       MN-MDH-1198       EPI_SL_477288         LTCF B       MN-MDH-1199       EPI_SL_477289         LTCF B       MN-MDH-1200       EPI_SL_477290         LTCF B       MN-MDH-1201       EPI_SL_476737         LTCF C       MN-MDH-1132       EPI_SL_476737         LTCF C       MN-MDH-1155       EPI_SL_476737         LTCF C       MN-MDH-1155       EPI_SL_476740         LTCF C       MN-MDH-1166       EPI_SL_476740         LTCF C       MN-MDH-1166       EPI_SL_476750         LTCF C       MN-MDH-1166       EPI_SL_476751         LTCF C       MN-MDH-1166       EPI_SL_476751         LTCF C       MN-MDH-1166       EPI_SL_476752         LTCF C       MN-MDH-11227       EPI_SL_482946         LTCF C       MN-MDH-1227       EPI_SL_482948         LTCF C       MN-MDH-1230       EPI_SL_482950         LTCF C       MN-MDH-1231       EPI_SL_482951         LTCF C       MN-MDH-1233       EPI_SL_482951         LTCF C       MN-MDH-1233       EPI_SL_482951         LTCF C       MN-MDH-1233       EPI_SL_482951         LTCF C       MN-MDH-1233       EPI_SL_482951 </td <td></td> <td>MN-MDH-1196</td> <td>EPI_ISL_477286</td>		MN-MDH-1196	EPI_ISL_477286
LTCF B       MN-MDH-1198       EPI_SL_47/288         LTCF B       MN-MDH-1200       EPI_SL_477289         LTCF B       MN-MDH-1200       EPI_SL_477290         LTCF B       MN-MDH-1201       EPI_SL_476732         LTCF C       MN-MDH-11330       EPI_SL_466732         LTCF C       MN-MDH-1152       EPI_SL_476737         LTCF C       MN-MDH-1154       EPI_SL_476739         LTCF C       MN-MDH-1164       EPI_SL_476749         LTCF C       MN-MDH-1165       EPI_SL_476750         LTCF C       MN-MDH-1165       EPI_SL_476750         LTCF C       MN-MDH-1166       EPI_SL_476751         LTCF C       MN-MDH-1167       EPI_SL_476752         LTCF C       MN-MDH-11226       EPI_SL_482947         LTCF C       MN-MDH-1226       EPI_SL_482947         LTCF C       MN-MDH-1228       EPI_SL_482947         LTCF C       MN-MDH-1228       EPI_SL_482943         LTCF C       MN-MDH-1231       EPI_SL_482943         LTCF C       MN-MDH-1232       EPI_SL_482952         LTCF C       MN-MDH-1233       EPI_SL_482953         LTCF C       MN-MDH-1234       EPI_SL_482954         LTCF C       MN-MDH-1235       EPI_SL_482954     <		MN-MDH-1197	EPI_ISL_4/7287
LTCF B         MN-MDH-1199         EPLISL_477289           LTCF B         MN-MDH-1200         EPLISL_481241           LTCF B         MN-MDH-1330         EPLISL_4861241           LTCF C         MN-MDH-1330         EPLISL_476732           LTCF C         MN-MDH-1147         EPLISL_476732           LTCF C         MN-MDH-1152         EPLISL_476739           LTCF C         MN-MDH-1155         EPLISL_476739           LTCF C         MN-MDH-1165         EPLISL_476740           LTCF C         MN-MDH-1165         EPLISL_476750           LTCF C         MN-MDH-1166         EPLISL_476751           LTCF C         MN-MDH-1166         EPLISL_476752           LTCF C         MN-MDH-1166         EPLISL_476755           LTCF C         MN-MDH-11225         EPLISL_482946           LTCF C         MN-MDH-1226         EPLISL_482947           LTCF C         MN-MDH-1228         EPLISL_482948           LTCF C         MN-MDH-1228         EPLISL_482949           LTCF C         MN-MDH-1231         EPLISL_482951           LTCF C         MN-MDH-1231         EPLISL_482951           LTCF C         MN-MDH-1234         EPLISL_482954           LTCF C         MN-MDH-1234         EPLISL_4829		MN-MDH-1198	EPI_ISL_477288
LTCF B       MN-MDH-1200       EPLISL_481241         LTCF B       MN-MDH-1201       EPLISL_477290         LTCF B       MN-MDH-1330       EPLISL_476732         LTCF C       MN-MDH-1152       EPLISL_476737         LTCF C       MN-MDH-1152       EPLISL_476737         LTCF C       MN-MDH-1152       EPLISL_476739         LTCF C       MN-MDH-1155       EPLISL_476740         LTCF C       MN-MDH-1164       EPLISL_476750         LTCF C       MN-MDH-1165       EPLISL_476751         LTCF C       MN-MDH-1166       EPLISL_476752         LTCF C       MN-MDH-1167       EPLISL_476752         LTCF C       MN-MDH-1167       EPLISL_476752         LTCF C       MN-MDH-1225       EPLISL_476755         LTCF C       MN-MDH-1226       EPLISL_482946         LTCF C       MN-MDH-1228       EPLISL_482947         LTCF C       MN-MDH-1228       EPLISL_482949         LTCF C       MN-MDH-1231       EPLISL_482950         LTCF C       MN-MDH-1231       EPLISL_482951         LTCF C       MN-MDH-1234       EPLISL_482953         LTCF C       MN-MDH-1235       EPLISL_482956         LTCF C       MN-MDH-1237       EPLISL_482956 <td>LTCF B</td> <td>MN-MDH-1199</td> <td>EPI_ISL_477289</td>	LTCF B	MN-MDH-1199	EPI_ISL_477289
LTCF B       MN-MDH-1201       EPI_SL_477290         LTCF B       MN-MDH-11330       EPI_SL_476732         LTCF C       MN-MDH-1147       EPI_SL_476732         LTCF C       MN-MDH-1152       EPI_SL_476737         LTCF C       MN-MDH-1154       EPI_SL_476739         LTCF C       MN-MDH-1155       EPI_SL_476740         LTCF C       MN-MDH-1165       EPI_SL_476740         LTCF C       MN-MDH-1166       EPI_SL_476750         LTCF C       MN-MDH-1166       EPI_SL_476750         LTCF C       MN-MDH-1166       EPI_SL_476751         LTCF C       MN-MDH-1166       EPI_SL_476752         LTCF C       MN-MDH-11225       EPI_SL_476752         LTCF C       MN-MDH-1225       EPI_SL_482946         LTCF C       MN-MDH-1226       EPI_SL_482946         LTCF C       MN-MDH-1228       EPI_SL_482946         LTCF C       MN-MDH-1228       EPI_SL_482943         LTCF C       MN-MDH-1230       EPI_SL_482943         LTCF C       MN-MDH-1231       EPI_SL_482951         LTCF C       MN-MDH-1233       EPI_SL_482953         LTCF C       MN-MDH-1233       EPI_SL_482954         LTCF C       MN-MDH-1233       EPI_SL_482954     <	LTCF B	MN-MDH-1200	EPI_ISL_481241
LTCF B       MN-MDH-1330       EPI_SL_486916         LTCF C       MN-MDH-1147       EPI_SL_476732         LTCF C       MN-MDH-1152       EPI_SL_476737         LTCF C       MN-MDH-1155       EPI_SL_476749         LTCF C       MN-MDH-1164       EPI_SL_476750         LTCF C       MN-MDH-1165       EPI_SL_476750         LTCF C       MN-MDH-1166       EPI_SL_476752         LTCF C       MN-MDH-1167       EPI_SL_476752         LTCF C       MN-MDH-1167       EPI_SL_476752         LTCF C       MN-MDH-1167       EPI_SL_476752         LTCF C       MN-MDH-1170       EPI_SL_476752         LTCF C       MN-MDH-1225       EPI_SL_482946         LTCF C       MN-MDH-1226       EPI_SL_482947         LTCF C       MN-MDH-1228       EPI_SL_482947         LTCF C       MN-MDH-1228       EPI_SL_482947         LTCF C       MN-MDH-1228       EPI_SL_482947         LTCF C       MN-MDH-1230       EPI_SL_482947         LTCF C       MN-MDH-1230       EPI_SL_482950         LTCF C       MN-MDH-1233       EPI_SL_482951         LTCF C       MN-MDH-1233       EPI_SL_482953         LTCF C       MN-MDH-1234       EPI_SL_482953 <td>LTCF B</td> <td>MN-MDH-1201</td> <td>EPI_ISL_477290</td>	LTCF B	MN-MDH-1201	EPI_ISL_477290
LTCF C       MN-MDH-1117       EPL_ISL_476732         LTCF C       MN-MDH-1152       EPL_ISL_476737         LTCF C       MN-MDH-1154       EPL_ISL_476739         LTCF C       MN-MDH-1155       EPL_ISL_476740         LTCF C       MN-MDH-1165       EPL_ISL_476750         LTCF C       MN-MDH-1166       EPL_ISL_476750         LTCF C       MN-MDH-1166       EPL_ISL_476752         LTCF C       MN-MDH-1167       EPL_ISL_476752         LTCF C       MN-MDH-1170       EPL_ISL_476755         LTCF C       MN-MDH-1125       EPL_ISL_482946         LTCF C       MN-MDH-1226       EPL_ISL_482947         LTCF C       MN-MDH-1227       EPL_ISL_482948         LTCF C       MN-MDH-1228       EPL_ISL_482948         LTCF C       MN-MDH-1230       EPL_ISL_482948         LTCF C       MN-MDH-1231       EPL_ISL_482950         LTCF C       MN-MDH-1233       EPL_ISL_482953         LTCF C       MN-MDH-1234       EPL_ISL_482953         LTCF C       MN-MDH-1237       EPL_ISL_482956         LTCF C       MN-MDH-1233       EPL_ISL_482950         LTCF C       MN-MDH-1233       EPL_ISL_482950         LTCF C       MN-MDH-1233       EPL_IS	LTCF B	MN-MDH-1330	EPI_ISL_496916
LTCF C       MN-MDH-1152       EPL_ISL_476737         LTCF C       MN-MDH-1154       EPL_ISL_476739         LTCF C       MN-MDH-1155       EPL_ISL_476740         LTCF C       MN-MDH-1164       EPL_ISL_476750         LTCF C       MN-MDH-1165       EPL_ISL_476751         LTCF C       MN-MDH-1166       EPL_ISL_476752         LTCF C       MN-MDH-1167       EPL_ISL_476752         LTCF C       MN-MDH-1167       EPL_ISL_476752         LTCF C       MN-MDH-1126       EPL_ISL_482946         LTCF C       MN-MDH-1226       EPL_ISL_482946         LTCF C       MN-MDH-1226       EPL_ISL_482947         LTCF C       MN-MDH-1228       EPL_ISL_482947         LTCF C       MN-MDH-1228       EPL_ISL_482940         LTCF C       MN-MDH-1230       EPL_ISL_482950         LTCF C       MN-MDH-1231       EPL_ISL_482953         LTCF C       MN-MDH-1233       EPL_ISL_482953         LTCF C       MN-MDH-1236       EPL_ISL_482956         LTCF C       MN-MDH-1233       EPL_ISL_482956         LTCF C       MN-MDH-1233       EPL_ISL_482956         LTCF C       MN-MDH-1237       EPL_ISL_482956         LTCF C       MN-MDH-1233       EPL_IS	LTCF C	MN-MDH-1147	EPI_ISL_476732
LTCF C         MN-MDH-1154         EPI_ISL_476739           LTCF C         MN-MDH-1155         EPI_ISL_476740           LTCF C         MN-MDH-1164         EPI_ISL_476749           LTCF C         MN-MDH-1165         EPI_ISL_476750           LTCF C         MN-MDH-1166         EPI_ISL_476751           LTCF C         MN-MDH-1167         EPI_ISL_476752           LTCF C         MN-MDH-1170         EPI_ISL_476755           LTCF C         MN-MDH-11225         EPI_ISL_482946           LTCF C         MN-MDH-1226         EPI_ISL_482947           LTCF C         MN-MDH-1226         EPI_ISL_482948           LTCF C         MN-MDH-1227         EPI_ISL_482948           LTCF C         MN-MDH-1228         EPI_ISL_482949           LTCF C         MN-MDH-1228         EPI_ISL_482950           LTCF C         MN-MDH-1230         EPI_ISL_482951           LTCF C         MN-MDH-1231         EPI_ISL_482953           LTCF C         MN-MDH-1233         EPI_ISL_482953           LTCF C         MN-MDH-1233         EPI_ISL_482956           LTCF C         MN-MDH-1233         EPI_ISL_482956           LTCF C         MN-MDH-1236         EPI_ISL_482957           LTCF C         MN-MDH-1236	LTCF C	MN-MDH-1152	EPI_ISL_476737
LTCF C       MN-MDH-1155       EPI_ISL_476740         LTCF C       MN-MDH-1165       EPI_ISL_476750         LTCF C       MN-MDH-1165       EPI_ISL_476750         LTCF C       MN-MDH-1166       EPI_ISL_476751         LTCF C       MN-MDH-1166       EPI_ISL_476752         LTCF C       MN-MDH-1170       EPI_ISL_482946         LTCF C       MN-MDH-1225       EPI_ISL_482946         LTCF C       MN-MDH-1226       EPI_ISL_482947         LTCF C       MN-MDH-1228       EPI_ISL_482947         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1230       EPI_ISL_482950         LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1233       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482953         LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482956         LTCF C       MN-MDH-1237       EPI_IS	LTCF C	MN-MDH-1154	EPI_ISL_476739
LTCF C       MN-MDH-1164       EPI_ISL_476749         LTCF C       MN-MDH-1165       EPI_ISL_476750         LTCF C       MN-MDH-1166       EPI_ISL_476751         LTCF C       MN-MDH-1167       EPI_ISL_476752         LTCF C       MN-MDH-1170       EPI_ISL_476755         LTCF C       MN-MDH-1225       EPI_ISL_482946         LTCF C       MN-MDH-1226       EPI_ISL_482947         LTCF C       MN-MDH-1226       EPI_ISL_482947         LTCF C       MN-MDH-1228       EPI_ISL_482947         LTCF C       MN-MDH-1228       EPI_ISL_482947         LTCF C       MN-MDH-1228       EPI_ISL_482947         LTCF C       MN-MDH-1230       EPI_ISL_482950         LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1231       EPI_ISL_482951         LTCF C       MN-MDH-1233       EPI_ISL_482955         LTCF C       MN-MDH-1234       EPI_ISL_482955         LTCF C       MN-MDH-1236       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482959         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1238       EPI_IS	LTCF C	MN-MDH-1155	EPI_ISL_476740
LTCF C       MN-MDH-1165       EPI_ISL_476750         LTCF C       MN-MDH-1166       EPI_ISL_476751         LTCF C       MN-MDH-1167       EPI_ISL_476752         LTCF C       MN-MDH-1170       EPI_ISL_476755         LTCF C       MN-MDH-1225       EPI_ISL_482946         LTCF C       MN-MDH-1226       EPI_ISL_482947         LTCF C       MN-MDH-1226       EPI_ISL_482949         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1230       EPI_ISL_482950         LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1231       EPI_ISL_482954         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1235       EPI_ISL_482954         LTCF C       MN-MDH-1236       EPI_ISL_482954         LTCF C       MN-MDH-1236       EPI_ISL_482954         LTCF C       MN-MDH-1236       EPI_ISL_482954         LTCF C       MN-MDH-1238       EPI_ISL_482954         LTCF C       MN-MDH-1238       EPI_IS	LTCF C	MN-MDH-1164	EPI_ISL_476749
LTCF C         MN-MDH-1166         EPI_ISL_476751           LTCF C         MN-MDH-1167         EPI_ISL_476752           LTCF C         MN-MDH-1170         EPI_ISL_476755           LTCF C         MN-MDH-1225         EPI_ISL_482946           LTCF C         MN-MDH-1226         EPI_ISL_482947           LTCF C         MN-MDH-1226         EPI_ISL_482948           LTCF C         MN-MDH-1227         EPI_ISL_482948           LTCF C         MN-MDH-1228         EPI_ISL_482950           LTCF C         MN-MDH-1230         EPI_ISL_482950           LTCF C         MN-MDH-1230         EPI_ISL_482951           LTCF C         MN-MDH-1231         EPI_ISL_482953           LTCF C         MN-MDH-1233         EPI_ISL_482954           LTCF C         MN-MDH-1233         EPI_ISL_482955           LTCF C         MN-MDH-1234         EPI_ISL_482956           LTCF C         MN-MDH-1235         EPI_ISL_482957           LTCF C         MN-MDH-1237         EPI_ISL_482959           LTCF C         MN-MDH-1238         EPI_ISL_482959           LTCF C         MN-MDH-1238         EPI_ISL_482959           LTCF C         MN-MDH-1238         EPI_ISL_482959           LTCF C         MN-MDH-1240	LTCF C	MN-MDH-1165	EPI_ISL_476750
LTCF C       MN-MDH-1167       EPLISL_476752         LTCF C       MN-MDH-1170       EPLISL_476755         LTCF C       MN-MDH-1225       EPLISL_482946         LTCF C       MN-MDH-1226       EPLISL_482947         LTCF C       MN-MDH-1227       EPLISL_482947         LTCF C       MN-MDH-1228       EPLISL_482949         LTCF C       MN-MDH-1228       EPLISL_482950         LTCF C       MN-MDH-1230       EPLISL_482951         LTCF C       MN-MDH-1231       EPLISL_482952         LTCF C       MN-MDH-1233       EPLISL_482953         LTCF C       MN-MDH-1233       EPLISL_482954         LTCF C       MN-MDH-1233       EPLISL_482955         LTCF C       MN-MDH-1236       EPLISL_482955         LTCF C       MN-MDH-1236       EPLISL_482957         LTCF C       MN-MDH-1236       EPLISL_482957         LTCF C       MN-MDH-1237       EPLISL_482958         LTCF C       MN-MDH-1238       EPLISL_482959         LTCF C       MN-MDH-1238       EPLISL_482961         LTCF C       MN-MDH-1237       EPLISL_482961         LTCF C       MN-MDH-1238       EPLISL_482960         LTCF C       MN-MDH-1240       EPLISL_482961 <td>LTCF C</td> <td>MN-MDH-1166</td> <td>EPI_ISL_476751</td>	LTCF C	MN-MDH-1166	EPI_ISL_476751
LTCF C       MN-MDH-1170       EPI_ISL_476755         LTCF C       MN-MDH-1225       EPI_ISL_482946         LTCF C       MN-MDH-1226       EPI_ISL_482947         LTCF C       MN-MDH-1226       EPI_ISL_482948         LTCF C       MN-MDH-1227       EPI_ISL_482948         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1231       EPI_ISL_482952         LTCF C       MN-MDH-1232       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1236       EPI_ISL_482955         LTCF C       MN-MDH-1236       EPI_ISL_482956         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1236       EPI_ISL_482958         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1239       EPI_ISL_482958         LTCF C       MN-MDH-1239       EPI_ISL_482959         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482961         LTCF C       MN-MDH-1243       EPI_IS	LTCF C	MN-MDH-1167	EPI_ISL_476752
LTCF C       MN-MDH-1225       EPI_ISL_482946         LTCF C       MN-MDH-1226       EPI_ISL_482947         LTCF C       MN-MDH-1227       EPI_ISL_482948         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1229       EPI_ISL_482950         LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1231       EPI_ISL_482952         LTCF C       MN-MDH-1232       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482955         LTCF C       MN-MDH-1234       EPI_ISL_482956         LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1239       EPI_ISL_482959         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1243       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1170	EPI_ISL_476755
LTCF C       MN-MDH-1226       EPI_ISL_482947         LTCF C       MN-MDH-1227       EPI_ISL_482948         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1229       EPI_ISL_482950         LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1231       EPI_ISL_482952         LTCF C       MN-MDH-1232       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1233       EPI_ISL_482955         LTCF C       MN-MDH-1236       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1237       EPI_ISL_482959         LTCF C       MN-MDH-1237       EPI_ISL_482950         LTCF C       MN-MDH-1238       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1225	EPI_ISL_482946
LTCF C       MN-MDH-1227       EPI_ISL_482948         LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1229       EPI_ISL_482950         LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1231       EPI_ISL_482952         LTCF C       MN-MDH-1232       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1234       EPI_ISL_482954         LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1236       EPI_ISL_482958         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1239       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1241       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1226	EPI_ISL_482947
LTCF C       MN-MDH-1228       EPI_ISL_482949         LTCF C       MN-MDH-1229       EPI_ISL_482950         LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1231       EPI_ISL_482952         LTCF C       MN-MDH-1232       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1233       EPI_ISL_482955         LTCF C       MN-MDH-1235       EPI_ISL_482955         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1237       EPI_ISL_482959         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1239       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482963         LTCF C       MN-MDH-1242       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1227	EPI_ISL_482948
LTCF C       MN-MDH-1229       EPI_ISL_482950         LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1231       EPI_ISL_482952         LTCF C       MN-MDH-1232       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1234       EPI_ISL_482955         LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1236       EPI_ISL_482958         LTCF C       MN-MDH-1237       EPI_ISL_482959         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1239       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482961         LTCF C       MN-MDH-1242       EPI_ISL_482962         LTCF C       MN-MDH-1243       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1228	EPI_ISL_482949
LTCF C       MN-MDH-1230       EPI_ISL_482951         LTCF C       MN-MDH-1231       EPI_ISL_482952         LTCF C       MN-MDH-1232       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1234       EPI_ISL_482955         LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1237       EPI_ISL_482959         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1242       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1229	EPI_ISL_482950
LTCF C       MN-MDH-1231       EPI_ISL_482952         LTCF C       MN-MDH-1232       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1234       EPI_ISL_482955         LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1238       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1230	EPI_ISL_482951
LTCF C       MN-MDH-1232       EPI_ISL_482953         LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1234       EPI_ISL_482955         LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1238       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482960         LTCF C       MN-MDH-1241       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1243       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1231	EPI_ISL_482952
LTCF C       MN-MDH-1233       EPI_ISL_482954         LTCF C       MN-MDH-1234       EPI_ISL_482955         LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1238       EPI_ISL_482960         LTCF C       MN-MDH-1239       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1242       EPI_ISL_482962         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1232	EPI_ISL_482953
LTCF C       MN-MDH-1234       EPI_ISL_482955         LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1239       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1242       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1233	EPI_ISL_482954
LTCF C       MN-MDH-1235       EPI_ISL_482956         LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1239       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1242       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1234	EPI_ISL_482955
LTCF C       MN-MDH-1236       EPI_ISL_482957         LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1239       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1242       EPI_ISL_482962         LTCF C       MN-MDH-1242       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482964	LTCF C	MN-MDH-1235	EPI_ISL_482956
LTCF C       MN-MDH-1237       EPI_ISL_482958         LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1239       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1242       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482963	LTCF C	MN-MDH-1236	EPI_ISL_482957
LTCF C       MN-MDH-1238       EPI_ISL_482959         LTCF C       MN-MDH-1239       EPI_ISL_482960         LTCF C       MN-MDH-1240       EPI_ISL_482961         LTCF C       MN-MDH-1241       EPI_ISL_482962         LTCF C       MN-MDH-1242       EPI_ISL_482962         LTCF C       MN-MDH-1242       EPI_ISL_482963         LTCF C       MN-MDH-1243       EPI_ISL_482964	LTCF C	MN-MDH-1237	EPI_ISL_482958
LTCF C         MN-MDH-1239         EPI_ISL_482960           LTCF C         MN-MDH-1240         EPI_ISL_482961           LTCF C         MN-MDH-1241         EPI_ISL_482962           LTCF C         MN-MDH-1242         EPI_ISL_482963           LTCF C         MN-MDH-1243         EPI_ISL_482963	LTCF C	MN-MDH-1238	EPI_ISL_482959
LTCF C         MN-MDH-1240         EPI_ISL_482961           LTCF C         MN-MDH-1241         EPI_ISL_482962           LTCF C         MN-MDH-1242         EPI_ISL_482963           LTCF C         MN-MDH-1243         EPI_ISL_482963	LTCF C	MN-MDH-1239	EPI_ISL_482960
LTCF C         MN-MDH-1241         EPI_ISL_482962           LTCF C         MN-MDH-1242         EPI_ISL_482963           LTCF C         MN-MDH-1243         EPI_ISL_482964	LTCF C	MN-MDH-1240	EPI_ISL_482961
LTCF C         MN-MDH-1242         EPI_ISL_482963           LTCF C         MN-MDH-1243         EPI_ISL_482964	LTCF C	MN-MDH-1241	EPI ISL 482962
LTCF C MN-MDH-1243 EPI_ISL_482964	LTCF C	MN-MDH-1242	EPI_ISL_482963
	LTCF C	MN-MDH-1243	EPI_ISL_482964

Outbreak	Genome	GISAID Accession
LTCF C	MN-MDH-1244	EPI_ISL_482965
LTCF C	MN-MDH-1245	EPI_ISL_482966
LTCF C	MN-MDH-1581	EPI_ISL_530177
LTCF C	MN-MDH-1582	EPI_ISL_530178
LTCF D	MN-MDH-1121	EPI_ISL_476706
LTCF D	MN-MDH-1122	EPI_ISL_476707
LTCF D	MN-MDH-1123	EPI_ISL_476708
LTCF D	MN-MDH-1124	EPI_ISL_476709
LTCF D	MN-MDH-1125	EPI_ISL_476710
LTCF D	MN-MDH-1126	EPI_ISL_476711
LTCF D	MN-MDH-1127	EPI ISL 476712
I TCF D	MN-MDH-1128	EPI ISI 476713
LTCF D	MN-MDH-1129	EPI ISL 476714
LTCF D	MN-MDH-1130	EPI ISL 476715
LTCF D	MN-MDH-1131	EPI ISL 476716
LTCF D	MN-MDH-1132	EPI ISI 476717
I TCF D	MN-MDH-1133	EPI ISI 476718
LTCE D	MN-MDH-1134	EPI ISI 476719
LTCF D	MN-MDH-1135	EPI ISI 476720
LTCE D	MN-MDH-1136	EPI ISI 476721
LTCF D	MN-MDH-1137	EPI ISI 476722
LTCF D	MN-MDH-1138	EPI ISI 476723
LTCE D	MN-MDH-1139	EPI ISI 476724
LTCE D	MN-MDH-1140	EPI ISI 476725
LTCE D	MN-MDH-1141	EPI ISI 476726
LTCE D	MN-MDH-1142	EPI ISI 476727
LTCE D	MN-MDH-1143	EPI ISI 476728
LTCE D	MN-MDH-1144	EPI ISI 476729
	MN-MDH-1145	EPI ISI 476730
	MN-MDH-1146	EPI ISI 476731
	MN-MDH-1148	EPI ISI 476733
	MN-MDH-1149	EPI ISI 476734
	MN-MDH-1150	EPI ISI 476735
	MN-MDH-1151	EPI ISI 476736
	MN-MDH-1153	EPI ISI 476738
LTCE D	MN-MDH-1156	EPI ISI 476741
	MN-MDH-1157	EPI ISI 476742
	MN-MDH-1158	ED ISI 476742
	MN-MDH-1159	EPI ISI 476744
	MN-MDH-1160	EPI ISI 476745
	MN-MDH-1161	EPI ISI 476746
	MN-MDH-1162	EPI ISI 476747
	MN-MDH-1163	EPI ISI 476748
Processing Plant A	MN-MDH-1202	EPI ISI 477291
Processing Plant A	MN-MDH-1202	EPI ISI 477292
Processing Plant A	MN-MDH-1205	EPI ISI 477294
Processing Plant A	MN-MDH-1206	EPI ISI 477295
Processing Plant A	MN-MDH-1208	EPI ISI 477297
Processing Plant A	MN-MDH-1200	EPI ISI 477298
Processing Plant A	MN-MDH-1210	EPI ISI 477299
Processing Plant A	MN-MDH-1214	EPI ISI 477303
Processing Plant A	MN-MDH-1215	EPI ISI 477304
Processing Plant A	MN-MDH-1216	EPI ISI 477305
Processing Plant A	MN-MDH-1217	EPI ISI 477306
Processing Plant A	MN-MDH-1218	EPI ISI 477307
Processing Plant A	MN-MDH-1210	FPI ISI 477308
Processing Plant A	MN_MDH_1222	ED 19 177311
Processing Plant A	MN-MDH-1222	FPI ISL 477317
Processing Plant A	MN_MDH_1251	ED 191 482072
Processing Plant R		ED 191 402312 ED 191 477203
Processing Plant B	MN-MDH-1204	EDI 191 /77206
Processing Plant B	MN-MDH-1246	EPI ISL 482067
Processing Plant B	MN-MDH-1240	EPI ISI 482068
Processing Plant B	MN-MDH-1247	EPI ISI 482060
		LI 1_10L_402303

\*GISAID, http://www.gisaid.org.



**Appendix Figure 1.** Phylogenetic tree of SARS-CoV-2 genome sequences associated with LTCF B from April 29 to June 11, 2020. Filled circles represent sequences taken from residents, open circles represent sequences from healthcare workers. IQ-TREE was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of single nucleotide mutations as shown in the scale key.



**Appendix Figure 2.** Phylogenetic tree of SARS-CoV-2 genome sequences associated with LTCF C from April 24 to June 30, 2020. Filled circles represent sequences taken from residents, open circles represent sequences from healthcare workers. IQ-TREE was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of single nucleotide mutations as shown in the scale key.



**Appendix Figure 3.** Phylogenetic tree of SARS-CoV-2 genome sequences associated with Correctional Facility B from May 13 to June 30, 2020. Filled circles represent sequences taken from inmates, open circles represent sequences from facility staff. IQ-TREE was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of single nucleotide mutations as shown in the scale key.



Tree scale: 1 ⊢

**Appendix Figure 4.** Phylogenetic tree of SARS-CoV-2 genome sequences associated with Processing Plant B from April 11 to June 30, 2020. Open circles represent sequences from staff at Processing Plant B. IQ-TREE was used with the general time reversible substitution model for tree generation. Branch lengths were scaled to represent number of single nucleotide mutations as shown in the scale key.